Study Material for Competitive Examinations

ICET



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CENTRE FOR EDUCATIONAL DEVELOPMENT OF MINORITIES

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Study Material for Competitive Examinations

ICET

Ву

D. SUBRAMANYAM

M. Com.

Faculty in Reasoning & Arithmetic For Civil Services and Other Competitive Examinations

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Integrated Common Entrance Test for MBA / MCA

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PREFACE

The word competition is mandatory in every field of human life. In education, particularly for professional courses, this concept is much high. Various institutions, colleges and academics are in the race for leadership. In view of this, the Government of Telangana, in order to improve the participation and performance of the candidates belonging to minorities *Viz.* Muslim, Christian, Jains, Sikhs, Buddhist and Parsis in various competitive examinations, provided the facilities of free coachings under the Minorities Welfare Departments, coordination with Osmania University a nodal agency.

In view of the above, the Osmania University established the Centre for Educational Development of Minorities (CEDM) in the year 1994 at Nizam College Campus. Since then the Centre is offering through Project – I and Project – II.

- I. In Project I, the Centre is providing the coaching and study material at X class level to improve the classroom performance of the students of minorities at thickly minority populated districts of Telangana.
- II. In Project II, the Centre is providing the free coaching and study material for Admission Seeking students of minorities, like POLYCET, ECET, DEECET, EAMCET, NEET, ICET and EdCET etc. through crash course. The study material for the coaching EAMCET and NEET prepared by the selected experiences subject experts resource persons.

We can say that this study material is not the end but it will be kind helpful to the students who are appearing the exams. We thank to the resource persons who accepted the painful job to compile and summarized the arrangement of important questions and answers.

Hyderabad June 2022

Dr. Kaleem Ahmed Jaleeli I/c. Director

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Data Sufficiency:

(Marks : 20)

Note: Each question is followed by data in the form of two statements labelled as I and II. You must decide whether the data given in the statements are sufficient to answer the questions. Using the data make an appropriate choice from (1) to (4) as per the following guidelines:

- (a) Mark choice (1) if the statement I alone is sufficient to answer the question.
- (b) Mark choice (2) if the statement II alone is sufficient to answer the question.
- (c) Mark choice (3) if both the statements I and II are sufficient to answer the question but neither statement alone is sufficient.
- (d) Mark choice (4) if both the statements I and II together are not sufficient to answer the question and additional data is required.
- 1. What is $\angle A$ in the triangle ABC?

I.
$$\angle A = 2\angle B$$
 II. $3\angle B = 2\angle C$

- 2. A and B are two sets. What are the elements of B?
 - I. $A \cap B = \{1, 2, 3, 4, 5\}$ II. $A B = \{7, 8, 9, 10\}$
- For integers a and b, is a > b?
 I. | a | > b
 II. | a | = b
- 4. What is the value of $\sin \theta$?

I. The matrix $\begin{pmatrix} \sin \theta & 0 & 0 \\ 2 & 2 & 0 \\ 3 & 4 & 1 \end{pmatrix}$ is not invertiable. II. θ lies in the second quadrant.

- 5. Does the natural number n divide 15n² + 8n + 6?
 I. n divides 10
 II. n divides 3!
- 6. If a and b are real numbers, what is the value of $a^3 + b^3$? I. $a^2 + b^2 = 0$ II. a + b = 4
- 7. Is $x^2 < y^2$? I. x < y

II. x and y are non-negative real numbers.

- 8. If a is an integer and 100 < a < 200, what is the value of a?I. When a is divided by 10, the remainder is 5.
 - II. When a is divided by 8, the remainder is 3.
- 9. What is the value of θ ?
 - I. $\sin^2 \theta 1 = 0$ II. $0 < \theta < \pi$
- 10. What is the area of an equilateral triangle?I. Each angle of the triangle is 60°.II. The height of the triangle is 12cm.

11. Is the real number a, positive?

I. $a^3 < 0$

II.
$$a^2 - 5a + 6 < 0$$

- 12. Is it a Sunday?
 - I. The same date in the previous year is Friday.
 - II It is 1st January 2088.
- 13. What is the rate per metre length of the fencing of the rectangular field?
 - I. The area of the field is 10,000 sq. metres.
 - II. The total cost for fencing the field is Rs.1,00,000
- 14. What is the value of the non-negative integer a?I. 3^a divides 33886II. 7^a divides 2058
- 15. Is the set A contained in the set of prime numbers?
 - I. Every element of A is a positive real number

II.
$$A \subseteq \left\{ x \in \mathbb{R} \mid x < \frac{1}{n} \text{ for all positive integers } n \right\}$$

- 16. Is n divisible by 720?
 - I. n is divisible by 24 and 30
 - II. n = a(a+1)(a+2)(a+3)(a+4)(a+5) for some positive integer a.
- 17. What is a : b : c?
 I. a : b = 2 : 3
 II. b : c = 5 : 6
- 18. The price of which of the mobile phones A and B is reduced more?
 - I. The price of A is reduced by 10% II. The price of B is reduced by 12%
- 19. If a, b and c are distinct prime numbers, is a an even number?
 - I. The product of a, b and c is even. II. The sum of b and c is odd.
- 20. Are a, b and c in arithmetic progression?
 - I. 5a, 5b and 5c are in arithmetic progression
 - II. 2a, 3b and 4c are in arithmetic progression.
- 21. What is the value of $\sin \theta$?
 - I. $\tan \theta + \cot \theta = 3$ II. $(\csc \theta + \cot \theta) (\csc \theta \cot \theta) = 1$
- 22. Is $x^2 < x$? I. x is a real number

II. x is an integer.

23. How long will 200 men take to reap the harvest of a field of area 2.4 km²?

	 I. 100 men will reap the harvest of a field of area 1 km² in 6 weeks. II. 200 women will reap the harvest of a field of area 1.2 km² in 6 weeks. 				
24.	Is $ab = cd$? I. $a\%$ of c is equal to b% of d.	II. b% of c is equal to d% of a.			
25.	Is $x = y$? I. $x\%$ of y is equal to $y\%$ of x.	II. x is 20% of z			
26.	Is the positive integer x odd? I. x^2 is even.	II. $4x$ is even.			
27.	Is the set A equal to the set B? I. $A \cap B \neq A$	II. $n(A) = n(B)$			
28.	What is the slope of the straight line?I. The straight line passes through the origin andII. The straight line passes through (3, 3)	d the point $(3, 2)$.			
29.	What is the unit digit of the integer x ? I. The unit digit of x^4 is 1.	II. The unit digit of x^3 is 2.			
30.	Which is the largest number among <i>x</i> , <i>y</i> and <i>z</i> ? I. $12x = z^2$	II. $x: y: z = 3: 7: 6$			
31.	Is $(\log_{10} x)^2 = \log_{10} y^2$? I. $x = y = 10$	II. $x^2 > y^2$			
32.	What are the values of the real numbers a and b? I. 2 is a root of $x^a - b = 0$	II. 2 is a root of $a^4 - \sqrt{2^x} = 0$			
33.	What are the values of the real numbers a and b? I. $a: b = 7: 3, b > 0$	II. $2a: b = 6: 11, a > 0$			
34.	Is the positive integer a divisible by 42? I. a is not divisible by 7.	II. a is divisible by 21.			
35.	What is the volume of the cone? I. The height of the cone is 10 cm.	II. The area of its base is 126 sq.cm.			
36.	What is the area of the triangle formed by joining I. $A = (2, 5), B = (3, 2)$	g the points A, B and C? II. A, B and C lie on a straight line.			
37.	What is the value of $a + b + c + d$?				

- I. 3a + 5b + 7c 6d = 24II. a - b - 3c + 10d = 1638. If A is the matrix $\begin{bmatrix} 5 & 6 \\ x & 4 \end{bmatrix}$, then what is the value of x? I. A is not a symmetric matrix. II. A is a singular matrix. 39. If x, y and n are positive integers, is $x^n + y^n$ divisible 2?
- 39. If x, y and n are positive integers, is $x^n + y^n$ divisible 2? I. x = 21 II. y = 1001
- 40. What is the average mark of 10 students?I. The average mark of 9 of them is 60.52.
- II. The marks obtained by one of them is
- 41. If $a_0 + a_1 + a_2 + \dots + a_{10} = S$ and $a_0 = 3$, what is S? I. $a_n = 5a_{n-1}$, $n = 1, 2, \dots, 10$ II. $a_n > 0$, $n = 1, 2, \dots, 10$
- 42. How many degrees is the angle *x*?

I. $y = 120^{0}$ II. $z = 87^{70}$

- 43. What are the values of the real numbers a, b, c in $f(x) = ax^2 + bx + c$? I. f(1) = 0 II. f(1 + i) = 0
- 44. What is the cost of painting a room which is of the form of a cube?
 - I. The base area of the room is 144 sq.ft.
 - II. The room has one door of size $6'_X 4'$ and has no windows.
- 45. Is n divisible by 120?
 - I. n is the product of consecutive integers. II. n is divisible by 6 and 20.
- 46. If x, y, z are distinct integers, is $(x y)^2 > 0$? I. z = 2x II. y > x
- 47. What is the sum of the real numbers a, b, c?I. a + c = 4II. a, b, c are in arithmetic progression.
- 48. Four circles of equal radius are inscribed in a square touching each other. What is the area covered by the four circles?
 - I. The perimeter of the square is 32cm.

- II. The ratio of the sum of the areas of the four circles to that of the square is $\pi/4$.
- 49. What is the equation of the straight line?
 - I. It passes through (1, 1)
 - II. Its perpendicular distance from the origin is 1.
- 50. If a, b, c are positive integers, is the product abc even?
 I. a + b + c is odd.
 II. a + c is odd.
- 51. Is the quadrilateral ABCD cyclic?
 - I. AC = BD II. $|BAD + |BCD = 180^{\circ}$
- 52. Is the triangle ABC right angled?

I. The coefficient of x^2 is 1.

I.
$$\angle A = 2\angle B$$
 II. $\angle B = \frac{2}{3}\angle C$

53. What is the equation?

- II. Both of its roots are real.
- 54. How many of A, B, C and D got selected into hockey team?
 - I. The statement Atleast one of A and B got selected into the team is true.
 - II. The statement C and D are selected into the team is false.
- 55. What is $A \cap B$? I. $A = \{3, 4, 5\}$ II. $B - A = \{1, 2\}$
- 56. Is *x* the largest among the positive real numbers *x*, *y* and *z*? I. x - y > |z| II. x + z > 2|y|
- 57. If x and y are non-zero real numbers, is x > y?

I.
$$(x - y)\left(\frac{1}{x} - \frac{1}{y}\right) = 0$$
 II. $(x - 5)^2 = (y - 5)^2$

58. Each student in a hostel speak Telugu or Kannada or both. What is the number of students who can speak Telugu only?

I. The total number of students in the hostel is 500 and the number of students who can speak both Telugu and Kannada is 156.

II. The number of students who can speak Kannada only is 124.

- 59. What is the minimum value of the real number y? I. $2y^2 \le y^2 + y$ II. $y \le 0$
- 60. If b, c are positive integers, is b + c, a prime number?

	I. b and c are odd.	II. $c = 5b$.
61.	Are the two triangles congruent? I. They are both equilateral triangles. heights.	II. They have equal bases and equal
62.	What is the value of the non-negative integer x ? I. 6^x is odd.	II. 7^x is odd.
63.	What is the value of $a + b$? I. $a - 2b = 25$	II. $a^2 - 25 = 4ab - 4b^2$
64.	What is the value of the integer a? I. $ a - 1 < 3$	II. $ a+3 < 3$
65.	What is the two-digit number? I. The sum of the two digits is 6.	II. The difference between the two digits.
66.	A and B are standing on a sunny day. A's shadow How tall is B? I. A is standing 2 feet away from B.	v is 10 feet long. B's shadow is 9 feet long. II. A is 6 feet tall.
67.	If x and y are integers, is $x > y$?	
	I. $\frac{x}{3} = \frac{y}{3}$	II. x is a multiple of y .
68.	Is $a > b$? I. $ a - b = 25$	II. $2a + b = 9$
69.	What are the dimensions of a rectangle? I. Its area is 12 sq. meters.	II. It's diagonal is 5 meters.
70.	What is the angle R in the triangle PQR? I. $\angle P + \angle R = 120^{\circ}$	II. $2 \angle Q + \angle R = 110^{\circ}$
71.	What is the value of $x + y$? I. $x - y = x^2 - y^2$	II. $x - y = y - x$
72.	Is $A = B = C = D$? I. $A = 2B = C$	II. $D = 3B + C$
73.	Is the integer 'a' even? I. 8a is even.	II. 7a is odd.

- 74. Who is the heavier among four friends A, B, C and D.
 - I. B is heavier than A but lighter than D. II. C is lighter than B.
- 75. What is the value of the integer a?

I.
$$\frac{1}{7} < \frac{1}{2+a} < \frac{1}{2}$$
 II. $a^2 + 24 = 10a$

- 76. What is the present age of A?
 - I. A was married in his 25th year.
 - II. A was a central government employee and retired in 1998 after completing 60 years.
- 77. Will it be a Wednesday tomorrow?
 - I. Coming Wednesday is a holiday. II. It is not Tuesday today.
- 78. In a class of 120 students, how many girls got distinction.
 - I. 20 boys in the class got distinction.
 - II. 25% of the students in the class got distinction.
- 79. How old is the son?
 - I. Mother was 22 years when the son was born.
 - II. Son retired in his 58^{th} year and by then the mother was no more.
- 80. What is the value of x?
 - I. 2x 3y = 4 II. $y^2 + 2y = -1$
- 81. What is the number of educated youth in the village?
 - I. In the village, $\frac{1}{4}$ th of the youth are educated.
 - II. In the village, $\frac{1}{5}$ th of the youth are employed.
- 82. What is the percentage of change in the area of the rectangle ABCD?
 - I. In measuring the sides, AB is taken 5% in excess.
 - II. In measuring the sides, AD is taken 4% in deficit.
- 83. Is a > b?
 - I. $a^2 > b^2$ II. $\frac{a}{b} = \frac{3}{5}$
- 84. What is the value of a b? I. 2(a - b) = 2b - 2a II. a + b = 5
- 85. What is the area of the rhombus?
 - I. Each of its sides is 120cm.
- II. Two of its opposite angles are 60° .

- 86. How old is each of the father and son?
 - I. Four years ago the father was six times older than his son.
 - II. After sixteen years, the father will be twice as old as his son.
- 87. What is the speed of the train?
 - I. The train goes $2\frac{1}{2}$ times as fast as a goods train.
 - II. The train leaves Hyderabad 3 hours after the goods train leaves and overtakes.
- 88. What is the equation for the straight line?
 - I. The line makes a intercept of 5 units on Y-axis.
 - II. The line passes through the point (0, 5).
- 89. What are the values of a and b in the polynomial $f(x) = 3x^5 11x^4 + 2x^3 5x^2 + ax + b$? I. $x^2 - 3x + 2$ divides f(x). II. f(x) is a multiple of x + 5.
- 90. If a, b, c, d are positive integers, what is the value of a? I. The average of a, b, c is 15. II. The average of b, c, d is 20.
- 91. What was the age of the father, when his eldest son was born? I. Fathers present age is twice the sum of the ages of all of his three sons born at intervals of two years.
 - II. Fathers present age is 42 years.
- 92. Does p divide 15x? I. p divides 3x + 4y.
- 93. What is the value of $(x + y + z)^4 x^4 y^4 z^4$? I. z = 8
- 94. What is value of $\frac{a}{b} \frac{b}{a}$?

I.
$$\frac{b^3}{a^3} - \frac{a^3}{b^3} = 36$$
 II. $a + b =$

- 95. What are the dimensions of the room? I. The sum of all edges of the room is 68ft. II. The room is rectangular.
- 96. What is the value of $\frac{a^2 b^2}{a^2 + ab}$?
 - I. $\frac{a}{b} = 1$ II. $a + b \neq 0$
- 97. What is the maximum value of x?
 - II. $\frac{1}{4r} + \frac{1}{5r} > 0$ I. $5x^2 < 4x^2 + x$

II. x = 6, y = -6

II. p divides both x + 2y and 2x + y.

10

98.	W	hat are the values of <i>a</i> and <i>b</i> ?	
	I.	2.5a + 7b = 35	

99. Is a < b?

I. 7a + 7b is positive.

- 100. If x is an integer, what is x?
 - I. $\frac{1}{4} < \frac{1}{x+2} < \frac{1}{2}$ II. $x^2 5x + 4 = 0$
- 101. What will be the age of x after 7 years from now?I. x is 21 years younger than his father. II. His father was 40 years old five years ago.

II. 10a + 28b = 140

II. -7a + 7b is negative.

- 102. What is the value of the non-negative integer x? I. 2^x is odd. II. 3^x is odd.
- 103. What is the area of the circle?
 - I. The circle passes through (0, 0) and (0, 2).
 - II. The circle is fully inscribed in a square of side 8 cm.
- 104. At what speed must the train x be travelling when it is over taking the train y?
 - I. The length of the train x is 200 meters.
 - II. The train y is travelling at a speed of 60 km/hr.
- 105. 5 men can complete a piece of work in 10 days. Some boys have joined the work 2 days later. In how many more days will the job be completed ?

I. One man can do as much as 2 boys.

- II. The boys who have joined can do the entire work in 20 days.
- 106. A and B are two positive real numbers. Which of them is greater than the other ? I. 3A - 2B + C = 0 II. A + B = C
- 107. What is the cost of 4 tables and 6 chairs ?I. One table and one chair cost Rs. 250II. Two tables and three chair cost Rs.800
- 108. What is the length of the train?
 - I. It crosses a pole in 8 seconds.
 - II. It crosses a bridge of length 100m in 12 seconds.
- 109. Does a divide b, where a, b and c are positive integer ?I. a divides bcII. c is a-prime
- 110. What is the value of 3^{5n-3} , where n is a positive integer? I. $3^n = 243$ II. $3^7 = 2187$

- 111. What is the number of odd positive integers less, than x?I. x > 200II. Their sum of 10000
- 112. What is the total salary of A, B and C ?
 I. A and B have equal salaries each of which is twice the salary of C.
 II. The salary of C is Rs.4,000 less than that of B.
 113. If a, b, c are integers is a + b + c even.
- I. a b + c is even. II. a, b, c is even.
- 114. x is a positive integer. Is x divisible by 36?
 - I. The digit in the units place of x is 2 and the digit in the tens place is odd.
 - II. The sum of all digits in x is divisible by 9.
- 115. What the value of the expression $4a^2 \frac{4a^2}{b}$? I. a = 2 II. $b^2 = 1$
- 116. The area of a rectangle is 12sq. meters. What is its perimeter?
 - I. The square of the diagonal of the rectangle is half of the sum of the squares of the sides.
 - II. The length of a side of the rectangle is 4 meters.
- 117. What is the value of $x^2 + y^2$? I. $(x - 8)^2 + (y + 6)^2 = 0$ II. (x + 7) + (y - 4) = 0
- 118. Is an assistant's salary more than that of a manager ?I. A doctor's salary is 40% higher than that of an assistant.II. The doctor's salary is Rs. 159 higher than that of a manager.
- 119. m and n are positive integrs. Is m greater than n ?I. $m^2 = 81$ II. $n^2 = 36$
- 120. A boy can swim two miles per hour in still water. What is his speed relative to shore in a river?
 - I. The river's current flows at three miles per hour.
 - II. The boy swims in the same direction as the current.
- 121. What is the area of the circle?
 - I. The center of the circle is (0, 0).
 - II. The point (2, 3) lies within the circle.
- 122. What is the value of 2x + 3y? I. x + y = 2
- 123. What is the value of $p^3 + q^3$? I. $p^2 + q^2 = 74$ II. pq = 35

II. 3x - 2y = 1

124. After how much time will A meet B?

I. A and B are at a distance of 50 meters from each other.

II. A and B are moving in the opposite directions with respective speeds of 10 kmph and 15kmph.

125. If a > 0 then is a > b?

- II. $\frac{a}{b} = \frac{2}{3}$. I. $a^2 > b^2$
- 126.Is $g: R \to R$ an even function?
 - I. g(x) = g(-x) for every $x \in R$ II. g(x) is a polynomial of even degree.
- 127. What is the cost price of the article?
 - I. The selling price of the article is Rs.50
- 128. What is the positive integer value of x? II. $4 < x^2 < 25$ I. 16 < 5x + 1 < 26
- 129. What is the present age of the father?
 - I. The sum of the present ages of the father and his son is 46.
 - II. 5 years ago the father's age was 5 times that of his son.
- 130. How many elements are there in the set A?
 - I. $A \cup B$ has 25 elements. II. A-B has 25 elements.
- 131. How many brothers does A have? I. A's father has four children.
- 132. In the right-angled $\triangle ABC$ what is $\angle A$?
 - I. $\angle B = 30^{\circ}$
- 133. What is the perimeter of the circular sector?
 - I. The angle of the sector is $\frac{\pi}{3}$.
- 134.Is the product a.b an irrational number? I. a is an irrational number.
- 135.Is the value of x unique?
 - I. x < 0

136. Is x > y? I. $5^x = 25^y$

II. The profit is 10%

- II. A is the only daughter of her parents.
- II. $A + B > 90^{\circ}$.
- II. The area of the sector is 6π square units.
 - II. b is an irrational number.
 - II. $x^2 = 16$.

137.W I.	that is the area of $\triangle ABC$? $\angle ABC = 60^{\circ}$	II. $AB = BC = AC = 4$
138.W I.	That is the average of a, b, c and d? a, b, c and d are primes.	II. a, b, c and d lie in { 10,11,12,,20 }
139.Is I 140.W	$\triangle ABC$ right-angled ? . A lies on the circle with BC as a diameter. hat is the value of V ? . V is the volume of a cylinder.	II. A, B, C lie on a circle. II. The cylinder is of height h units.
141. I. II.	What are the coordinates of the point M? M is a point on the y-axis M is a point such that MP is parallel to the x	-axis, where P is (3, -4)
142. I. II.	If a, b, c, d is a geometric progression what if The product of a and d is 24 The common ratio of the geometric progress	is the value of $\frac{b}{c}$?
143. I.	Does the point $P(x, y)$ lie on the first quadrant $x + y \ge 4$	II. $xy < -4$
144. I.	What are the values of a and b ? a: b = 7: 3, b > 0	II. $2a: b = 6: 11, a > 0$
145. I. II.	How many elements are in the set $B = \{n \in \mathbb{Z} \\ f: \mathbb{Z} \to \mathbb{Z} \text{ is given by } f(n) = 2n - 1 \text{ for } n \in \mathbb{Z} \\ f: \mathbb{Z} \to \mathbb{Z} \text{ is onto}$	$\mathbf{Z}: f(n) \leq 5\}?$
146. I.	Is the product of the integers x, y and z equal x + y + z = 3	1 to 1? II. $x > 0, y > 0, z > 0$
147. I.	What is the radius of the circle circumscribing ABC is a right-angled triangle	g the triangle ABC? II. The largest side of the triangle is 12 cms.
148. I.	Is ΔABC equilateral? AB = BC	II. $ ABC = 60^{\circ}$
149. I.	For the positive integer x is the greatest comparison x is a prime number	mon divisor of 150 and x a prime number? II. $x < 4$

150. If x and y are integers then is z an even integer?

I.	$z = (x + y)^2$				II. $z = 2$	2x + 8y			
151. I. 12	Is the set <i>E</i> infinite? <i>E</i> contains natural numbers 234567				II. E is the set of prime divisors of				visors of
152. I. 153.	Is $b > a$? x + 3 is a factor of What is the value of	$x^6 - 27^b$ f sin ⁴ θ + co	osec ⁴ θ?)	II. <i>x</i> - 2	is a fac	tor of x^2	² - 4 <i>a</i> ^b	
I.	$\sin\theta$ + $\csc\theta$ = 2	Ĩ	-		II. \sec^2	$\theta = 1 + 1$	$\tan^2 \theta$		
154. I. II.	For integers <i>a</i> and <i>b</i> $a^3 + b^3$ is an even in $a^3 + b^3$ is equal to the	$b^{is} (a^3 + b^3)$ iteger ie volume o	$(\frac{1}{3})^{\frac{1}{3}}$ an ir	nteger? with dir	nension	s 12cm,	18cm aı	nd 125ci	ms.
155. I. 5%	What is the cost price of the item?I. It is sold for Rs s at a loss of 10%II. If it is sold for Rs $(s + 50)$ the profit will be5%					fit will be			
156. I.	What is the area of the rhombus ABCD?. The length of the side AB is 12cmsII. One diagonal is of length 30cms					ms			
157. I.	Is $a + b = d$? I. The averages of a, b and c is 6 II. The average of c and d is 9								
158. I.	Are the lines L_1 and L_1 and L_2 make equa	L ₂ parallel ⁴ l angle with	y = 0		II. L ₁ ar	dL_2 lie	in a plar	ne	
159. I.	59. What is the digit in the units place of the integer n?I. <i>n</i> leaves remainder 17 when divided by 100 II. <i>n</i> is divisible by 17								
160. What is the value of $\frac{1}{x+48}$? I. $x+96=0$ II. $x+48 \neq 0$									
Data	Sufficiency:	Answ	ers						
1. 3	2. 4 3. 1 4. 1	1 5.4	6. 3	7. 3	8. 4	9. 3	10. 2	11. 2	12. 4
13. 4	14. 4 15. 4 16.	2 17. 3	18. 4	19. 1	20. 1	21.4	22. 2	23.1	24. 4
25. 4	26. 1 27. 4 28.	1 29. 2	30. 2	31. 1	32. 4	33. 4	34. 1	35. 3	36. 2

37. 338. 239. 340. 441. 142. 343. 344. 445. 146. 147. 348. 149. 450. 251. 252. 353. 454. 455. 456. 157. 158. 359. 160. 2

63. **4** 64. **3** 65. **4** 66. **2** 67. **1** 68. **4** 69. **3** 70. **1** 71. **4** 72. **3** 61. **3** 62. **1** 73. 2 74. 3 75. **3** 76. **4** 77. **2** 78. **3** 79.4 80. **3** 81. 4 82. **3** 83. **2** 84.1 85. **3** 86. **3** 87. **4** 88. **4** 89. **1** 90. **4** 91. **3** 92. 2 93. 3 94. 1 95. 4 96. 1 97. 1 98. 4 99. 2 100. 1 101. 3 102. 1 103. 2 104. 4 105. 2 106. 3 107.2 108. 3 109. **4** 110. **1** 111. **2** 112. **3** 113. **1** 114. **3** 115. **2** 116. **2** 117. **1** 118. **4** 119. **4** 120. **3** 121. **4** 122. **3** 123. **4** 124. **3** 125. **2** 126. **1** 127. **3** 128. **1** 129. **3** 130. **3** 131. **3** 132. **4** 133. **3** 134. **4** 135. **3** 136. **3** 137. **2** 138. **3** 139. **1** 140. **4** 141. 3 142. 2 143.2 144. 4 145. 1 146. 3 147. 3 148. 3 149. 3 150. 2 151. **2** 152. **3** 153. **1** 154. **2** 155. **3** 156. **3** 157. **3** 158. **1** 159. **1** 160. **1 Data Sufficiency: Explanations**

1. Let
$$\angle B = x$$
. So $\angle A = 2\angle B = 2x$. $\angle C = \frac{3}{2}x$. So $x + 2x + \frac{3}{2}x = 180$.
Thus $x = 40$. So $\angle A = 80^{\circ}$. Hence answer is 3.

- 2. Data is not sufficient. Some more data needed. Hence answer is 4.
- 3. Statement (I) is sufficient. Hence answer is 1.
- 4. Statement (I) is sufficient. Det of matrix = 0. So we get $\sin \theta = 0$. Hence answer is 1.
- 5. Both the statements are not sufficient. Some more data needed. Hence answer is 4.

6.
$$a^3 + b^3 = (a + b) (a^2 + b^2 - ab)$$
. So $a^3 + b^3 = -4ab$. Hence answer is 3.

- 7. $x^2 < y^2$ is true for all non-negative integers x, y and x < y. Hence answer is 3.
- 8. 115, 135, 195 lies between 100 and 200 they give remainders 5 and 3 respectively when divided by 10 and 8.**Hence answer is 4.**
- 9. $\theta = \frac{\pi}{2}$. Hence answer is 3.
- 10. We can find the area of the equilaterial triangle when height is known. Hence answer is 2.

Here height = 12. So base =
$$8\sqrt{3}$$
. Area = $\frac{1}{2}$ x base x height = $\frac{1}{2}$ x $8\sqrt{3}$ x 12 = $48\sqrt{3}$.

- 11. From statement (II) (a 2) $(a 3) < 0 \implies 2 < a < 3$. So *a* is positive. Hence answer is 2.
- 12. Data is not sufficient. Some more data needed. Hence answer is 4.
- 13. Area = length x breadth = l x b = 10,000 sq. mts. Perimeter = 2(l+b). Hence answer is 4.

- 14. $3^9 = 19,683; 3^{10} = 59,049; 7^4 = 2,401; 7^5 = 16,807$. Hence answer is 4.
- 15. Data is not sufficient. Some more data needed. Hence answer is 4.
- 16. Product of 6 consequtive integers is divisible by 6! = 720. Hence answer is 2.
- 17. $a: b = 2: 3 \Rightarrow a: b = 10: 15; b: c = 5: 6 \Rightarrow b: c = 15: 18.$ So a: b: c = 10: 15: 18.Hence answer is 3.
- 18. Without knowing the cost of mobile phones A and B we cannot conclude which phone price is reduced more. **Hence answer is 4.**
- 19. Statement (I) is sufficient. Hence answer is 1.
- 20. Statement (I) is sufficient. Hence answer is 1.
- 21. Data is not sufficient. Some more data needed. Hence answer is 4.
- 22. From statement (II) we know that x is an integer. So x^2 is always greater (or) equal but not less than x.**Hence answer is 2.**
- 23. From statement (I) we know that 100 men can reap the harvest of a field of area 1 km² in 6 weeks. Using the relation $\frac{M_1 x T_1}{W_1} = \frac{M_2 x T_2}{W_2}$. Hence answer is 1.
- 24. Data is not sufficient. Some more data needed. Hence answer is 4.
- 25. Data is not sufficient. Some more data needed. Hence answer is 4.
- 26. From statement (I) x^2 is even then x should be even number. Hence answer is 1.
- 27. Data is not sufficient. Some more data needed. Hence answer is 4.
- 28. From statement (I) the points of straight lines becomes (0,0) & (3,2).we can find-slope of straight line.**Hence answer is 1.**
- 29. From statement (II) x^3 unit digit is '2'. It is only possible if any number unit place '8'. Example: $8^3 = 512$. Hence answer is 2.
- 30. From statement (II) we can say *y* is the largest among *x*, *y*& *z* i.e.*x*:*y*:*z*=3:7:6.**Hence answer** is 2.
- 31. Data (I) alone is sufficient. Hence answer is 1.

- 32. Data is not sufficient. Some more data needed. Hence answer is 4.
- 33. Data is not sufficient. Some more data needed. Hence answer is 4.
- 34. Any number divisible by 42 then it should be divisible by 6 & 7 also. From statement (I) we know that 'a' is not divisible by '7', then it is not divisible by 42. **Hence answer is 1.**
- 35. From statement (I) we know that height of cone is 10 cm. From statement (II) we know that base area is 126 sq.cm. By combining both statement (I) & (II) together we can find the volume of cone. **Hence answer is 3.**
- 36. From statement (II) we know that points on same straight line. Thus the points are collinear. The area of triangle is "zero". **Hence answer is 2.**
- 37. By adding given statement (I) & statement (II) equations we get a + b + c + d = 10. Hence answer is 3.
- 38. From statement (II) 'A' is singular. So $|A| = 0 \Rightarrow 20 6x = 0 \Rightarrow x = 10/3$. Hence answer is 2.
- 39. From statement (I), x = 21 is odd number. From statement (II), y = 1001 is odd number. We know that any (odd number)ⁿ is odd. Using both statements together we can say $x^n + y^n = \text{odd} + \text{odd} = \text{even}$. Hence $x^n + y^n$ is divisible by '2'. **Hence answer is 3**.
- 40. Data is not sufficient. Some more data needed. Hence answer is 4.
- 41. Given $a_0 + a_1 + a_2 + ... + a_{10} = S$. $a_0 = 3$; From statement (I), $a_n = S$. $a_0 = 3$. From statement (I), $a_n = 5$, a_{n-1} , $n = 1, 2, ..., 10 \Rightarrow a_1 = 5.a_0 \Rightarrow a_2 = 5.a_2$. Since we have $a_0 = 3$, we can find $a_1, a_2, a_3, ..., a_n$. Then we can find S. Hence answer is 1.
- 42. We have to find *x*.
 So, to find *x*, we need *y*, *z*We can get *y*, *z* from (I) and (II).
 Hence answer is 3.



- 43. $f(x) = ax^2 + bx + c$. From statement (I), f(1) = 0. a + b + c = 0From statement (II), f(1+i) = 0 $\Rightarrow a(1+i)^2 + b(1+i) + c = 0 \Rightarrow a(1+1+2i) + b(1+i) + c = 0$ $\Rightarrow 2ia + b + ib + c = 0 \Rightarrow 2ia + ib + b + c = 0$. Hence answer is 3.
- 44. To find the cost of painting a room which is in the form of a cube, we need to find the area of 4 sides and the areas of cieling and floor (or) at least area of one side.

From statement (I) we can know the area of the floor i.e., 14 sq.ft. So, area of the entire room is 6(144) sq.ft. But the cost is not known from both statements. **Hence answer is 4.**

- 45. The product of three consecutive integers are divisible by 6. The product of 4 consecutive integers is divisible by 24 and the product of 5 consecutive integers is divisible by 120. So, statement (I) is enough. Hence answer is 1.
- 46. Let (x y) > 0. From statement (I), z = 2x. $(x y)^{2n} > 0$ $[(x y)^x]^2 > 0$. This is true because the power is even and x, y, z are distinct integers. **Hence answer is 1.**
- 47. We need to find a + b + c. From statement (I), we have a + c = 4. So, we can't find a + b + c from a + c = 4. So, we can't find a + b + c from thus only. From statement (II), we have 2b = a + c, we can't find a + b + c, from here too. But if we combine two statements, a + c = 4 and $2b = a + c \Longrightarrow b = 2$. Now a + b + c = 4 + 2 = 6. **Hence answer is 3**.
- 48. If the four equal circles are inscribed in a square, side of square is equal to 4 times the redians of the circle. So r = 4r. From statement (I), perimeter of square is 32cm. ⇒ 4s = 32 ⇒ s = 8 ⇒ 4r = 8 ⇒ r = 2. Now, we can find the area covered by the covers. Hence answer is 1.
- 49. To find the equation of a straight line, we need two points, that the line pass through (or) one point and slope of the line. (or) intercepts of x and y axes. But even if we combine both statements, we get no information to find the equation. Hence answer is 4.
- 50. If the product of three integers is even, then at least one of those should be even. From statement (I), a + b + c is odd means all three are odd (or) two are even and one is odd. In the first case, product is odd but in the second case, product is even. Both are possible, so, we can't answer. From statement (II) a + c is odd, mean one is even and one is odd. Irrespective of b is either even or odd, one is even, the product is even. Hence answer is 2.
- If a quadrilateral ABCD is to be cyclic we should be known that sum of opposite angles is 180°.

Thus is given in statement (II). Hence answer is 2.

52. From statement (I), $\angle A = 2\angle B$. From satatment (II), $\angle B = \frac{2}{3} \angle C$. Combining both, $\angle A = 2\angle B$ and $3 < B = 2\angle C$. Since $\angle A + \angle B + \angle C = 180^{\circ}$.

$$\Rightarrow 2\angle B^+ \angle B^+ \angle B = 180^\circ \Rightarrow \frac{9\angle B}{2} = 180^\circ \Rightarrow CB = 40^\circ.$$

Now, $\angle A = 80$, $\angle C = 60$, So, ABC triangle is not right angled. Hence answer is 3.

53. To find a quadratic equation, we need sum of roots and product of roots.

But from both clues, we get nothing. Hence answer is 4.

- 54. We can't answer the question from either statements individully. But if we combine both, we can know that either C, D, A (or) C, D, B (or) C, D, B, A are selected into the team. So, the number can be c (or) d. **Hence answer is 4.**
- 55. What is $A \cap B$? In the first statement A is given, its of no use individually. In the second statement, B - A is given, its too of no use individually. Combining both, $A = \{3, 4, 5\}$, B - $A = \{1, 2\}$. If we combine these two, we get nothing. **Hence answer is 4.**
- 56. From statement (I), $x y > |z| \Rightarrow x > |z| + y$. Here, z is positive real number. $\Rightarrow x > y + z$. So, it is clear that x is largest among three. **Hence answer is 1.**

57. From statement (I), $\Rightarrow (x - y)\left(\frac{1}{x} - \frac{1}{y}\right) = 0 \Rightarrow \frac{(x - y)^2}{xy} = 0 \Rightarrow (x - y)^2 = 0 [\because x, y \neq 0]$

 $\Rightarrow x - y = 0 \Rightarrow x = y$. So, it is clear that x > y is not true. Hence answer is 1.

- 58. From statement (I), n = 500, i.e., $n(T \cup K) = 500$ and $n(T \cap K) 156$. We have to find the number of people who speak only Telugu i.e., $n(T \cap K')$. From statement (II), $n(K \cap T') = 124$. From both statements. We know that $n(T \cup K) = 500$. So, $n(T \cap K') = 500 - 156 - 124 = 500 - 280 = 220$. Hence answer is 3.
- 59. From statement (I), $2y^2 \le y^2 + y \Rightarrow y \ge y^2 \Rightarrow y^2 y \le 0$ $\Rightarrow y(y-1) \le 0 \Rightarrow 0 \le y \le 0$. So, the minimum value of y is 0. Hence answer is 1.
- 60. We have to check wheter b + c is prime or not from statement (I), b, c are odd numbers. Then b + c is even. Since 2 is a prime number and other even numbers are not from statement (II), c = 5b. Then b + c = 5 + 5b = 6b. Since b + c is divisible by 6, it is not a prime. Hence answer is 2.
- 61. Both the statements are sufficient. Hence answer is 3.
- 62. Statement (I) satisfies when x = 0 only. Hence answer is 1.
- 63. Both the statements are not sufficient. Hence answer is 4.
- 64. From statement (I) '*a*' values are $\{-1,0,1,2,3\}$. From statement (II) '*a*' values are $\{-1,-2,-3,-4,-5\}$ from both the common value is -1. **Hence answer is 3.**
- 65. The given statements cannot give the uinque value to the numbers. Some more data needed. Hence answer is 4.

- 66. Statement (I) is irrelavent. Statement (II) gives height of B=5.4 feet. Hence answer is 2.
- 67. From statement (I) x and y must be equal so x is not greater than y. Hence answer is 1.
- 68. The given data is not sufficient. Some more data is needed. Hence answer is 4.
- 69. From statement (I) $l \ge b = 1 \ge 12 = 2 \ge 6 = 3 \ge 4$; From statement (II) $l^2 + b^2 = d^2$, the second condition satisfies by only the dimensions $4 \ge 3$. By using both we can solve the answer. Hence answer is 3.
- 70. From statement (I) we get $\angle P + \angle Q = 120^{\circ}$ and $\angle P + \angle Q + \angle R = 180^{\circ}$ (sum of the angles in triangle is 180°). Thus $\angle R = 180^{\circ} 120^{\circ} = 60^{\circ}$. Hence answer is 1.
- 71. The given data is not sufficient to find the value of x+y. Some more data is needed. Hence answer is 4.
- 72. Statements (I) and (II) satisfies only when A = B = C = D = 0. Hence answer is 3.
- 73. From statement (II) 7a is odd, then 'a' should be odd. Hence answer is 2.
- 74. From statement (I) we get D > B > A and from statement (II) we get C < B. Combining these we get D is heavier among them. Hence answer is 3.
- 75. From (I), we get $0 \le a \le 5 \Rightarrow a \in \{1, 2, 3, 4\}$ but not unique. From (II) $a^2 + 24 - 10a = 0 \Rightarrow (a - 6) (a - 4) = 0 \Rightarrow a = 6$ (or) a = 4. Here also *a* is not unique. From (I) and (II) we get a = 4.

Only this value satisfies the condition $\frac{1}{7} < \frac{1}{2+a} < \frac{1}{2}$. Hence answer is 3.

- 76. The given statements are irrelevent to find age of A. Hence answer is 4.
- 77. Statement (I) is not sufficient. From statement (II) today is not Thrusday \Rightarrow tomorrow is not Wednesday. Hence answer is 2.
- 78. Statements (I) or (II) alone is not sufficient. Together, number of girls get distinction = 25% of 120 20 = 30 20 = 10. Hence answer is 3.
- 79. The given data is not sufficient. Some more data needed. Hence answer is 4.
- 80. Statement (I) or (II) alone is not sufficient. By combining them we get y = -1 and x = 1/2. Hence answer is 3.
- 81. The given data is not sufficient. Some more data needed. Hence answer is 4.
- 82. Data (I) or (II) alone is not sufficient. From (I) and (II) together, we can find the percentage of CEDM 19 ICET

change in area of rectangle. Hence answer is 3.

83. Statement (I) is not sufficient.

From statement (II) $\frac{a}{b} = \frac{3}{5}$ gives a < b. Hence answer is 2.

- 84. From statement (I) we get $4(a b) = 0 \Rightarrow a b = 0$. Hence answer is 1.
- 85. Data (I) or (II) alone is not sufficient. From (I) and (II) together, we can find side of rhombus = 120 cm. and the angle between the sides $\theta = 60^{\circ}$. So area of rhombus = $a^2 \sin \theta = 120^2$. sin $60^{\circ} = 14400$. $\sqrt{3}$ sq. cm. Hence answer is 3.
- 86. Data (I) or (II) alone is not sufficient. From (I) and (II) together, we get sons age = 9 years, father age is 34 years. Hence answer is 3.
- 87. The given statements are in sufficient. Some more data needed. Hence answer is 4.
- 88. The given statements are in sufficient. Some more data needed. Hence answer is 4.
- 89. From statement (I) $x^2 3x + 2 = (x 1)(x 2)$ is factor of $f(x) \Rightarrow x = 1, 2$ are roots of f(x). $\therefore a + b = 11$ and 2a + b = 84. Solving these we get a = 95, b = -84. Hence answer is 1.
- 90. The given statements are in sufficient. Some more data needed. Hence answer is 4.
- 91. Data (I) or (II) alone is not sufficient. From (I) and (II) together, we ger fathers age = 42 and his three children ages are 6, 7, 8. Thus the age of father, when the eldest son was born = 34 years.

Hence answer is 3.

92. Statement (I) is not sufficient. But from statement (II) we get $\frac{x+2y}{p}$ and $\frac{2x+y}{p}$ are integers.

Adding them we get $\frac{3x+3y}{p}$ is an integer. So p divides 15x. Hence answer is 2.

- 93. Data (I) or (II) alone is not sufficient. From (I) and (II) together, $(x + y + z)^4 - x^4 - y^4 - z^4 = 8^4 - 6^4 - 6^4 - 8^4 = -2592$. Hence answer is 3.
- 94. From statement (I) $\frac{b^3}{a^3} \frac{a^3}{b^3} = 36 \Rightarrow \left(\frac{b}{a} \frac{a}{b}\right)^3 + 3\left(\frac{b}{a} + \frac{a}{b}\right) = 36 \Rightarrow \frac{b}{a} \frac{a}{b} = 3.$ Hence answer is 1.
- 95. Both the statements are not sufficient. Hence answer is 4.
- 96. From statement (I) $\frac{a}{b} = 1 \Longrightarrow a = b$. So $\frac{a^2 b^2}{a^2 + ab} = 0$. Hence answer is 1.

- 97. From statement (I) $5x^2 \le 4x^2 + x \Rightarrow x^2 x \le 0 \Rightarrow 0 \le x \le 1$. So maximum value of x = 1. Hence answer is 1.
- 98. Statement (I) and (II) represents the same equation. So to find *a* and *b* some more data is needed. **Hence answer is 4**.
- 99. Statement (I) is not sufficient. From statement (II) $-7a + 7b < 0 \Rightarrow -a + b < 0 \Rightarrow b < a$. Hence answer is 2.
- 100. From statement (I) $2 < x + 2 < 4 \Rightarrow 0 < x < 2$ and x an integer $\Rightarrow x = 1$. Hence answer is 1.
- 101. Data (I) or (II) alone is not sufficient. From (I) and (II) together. Fathers age = 45 years and X's age = 45 - 21 = 24 years Age of X after 7 years = 31 years. Hence answer is 3.
- 102. From data (I) 2^x is add $\Rightarrow x = 0$. Hence answer is 1.
- 103. Data (I) is not sufficient; From data (II) side of the square = 8 cms. \Rightarrow Radius of the circle inscrided in square = $8\sqrt{2}$ cms. \Rightarrow Area of circle = 128 π sq.cms. Hence answer is 2.
- 104. Data is not sufficient. Some more data needed. Hence answer is 4.
- 105. Data (I) alone is not sufficient. From data (II), The boys Who joined the entire work in 20 days.

They together finish the work = $\Rightarrow \frac{2 \times 10 \times 20}{30} = 13 \frac{1}{3}$ days. Hence answer is 2.

- 106. Data (I) or (II) alone is not sifficient. From (I) and (II) together 3A 2B + C = 0 and $A + B + C \implies B = 2A \implies B$ is greater than A. Hence answer is 3.
- 107. Data (I) alone is not sufficient. From data (II) two tables and three chairs cost = Rs. 800 \Rightarrow 4 tables and 6 chairs cost = 1600. Hence answer is 2.
- 108. Data (I) or (II) alone not sufficient. From (I) and (II) together, gives length of the train =200mts. Hence answer is 3.
- 109. Data is not sufficient. Some more data needed. Hence answer is 4.
- 110. From data (I) 3n = 243, n = 5, $n^{5n-3} = 3^{22}$. Hence answer is 1.
- 111. Data (I) alone is not sufficient. From data (II). The sum of all positive integers less than x is $10000 = (100)^2 \Rightarrow$ The number of odd positive integers less than x is 100. Hence answer is 2.

- 112. Data (I) or (II) alone is not sufficient. From (I) and (II) together, C salary = 4,000;
 B salary = A salary = 8000 ⇒ Sum of A, B, C salaries = Rs. 20,00. Hence answer is 3.
- 113. From (I) a b + c is even \Rightarrow a + b + c = (a b + c) + 2b is also even. Hence answer is 1.
- 114. Data (I) or (II) alone is not sufficient. But from data (I), we get x is divisible by 4 and from (II) x is divisible by 9. (I) and (II) together, we gets x is divisible by 36. Hence answer is 3.
- 115. Data (I) alone is not sufficient. From data (II) $b = \pm 1$ gives $4a^2b \frac{4a^2}{b} = 0$.

Hence answer is 2.

- 116. Data (I) alone is not sufficient. From data (II) Length of rectangle = 4 cms \Rightarrow Its breadth = 3 cms \Rightarrow Perimeter = 14 cms. Hence answer is (2)
- 117. From data (I). We can get x = 8, $y = -6 \implies x^2 + y^2 = 100$. Hence answer is 1.
- 118. Data is not sufficient. Some more data needed. Hence answer is 4.
- 119. Data (I) and (II) doesn't determined m, n are either Positive or negative. Data is not sufficient. Hence answer is 4.
- 120. Data (I) or (II) alone is not sufficient. From (I) and (II) together, we get x = 2 kmph, y = 3 kmph and boy travels in down streem \Rightarrow His speed = 4 kmph. Hence answer is 3.
- 121. Both the statements are not sufficient. Area = πr^2 , by using both the statements we cannot find *r*. Hence answer is 4.
- 122. From (I) and (II) together we can find x and y values. Hence answer is 3.
- 123. Both the statements are not sufficient. Hence answer is 4.
- 124. Both the statements are not sufficient. Hence answer is 3 or 4.
- 125. From (I) $a^2 > b^2 \Rightarrow a \neq b$. Hence answer is 1. or From (II) $3a = 2b \Rightarrow a \neq b$. Hence answer is 2.
- 126. Statement (I) is definition of even function. Hence answer is 1.
- 127. By using both the statement we can find cost price. Hence answer is 3.
- 128. From statement (I) we get x = 4. Hence answer is 1.
- 129. Father age = x, son age = y; by using both the statements we get x = 35, y = 11.

Hence answer is 3.

- 130. By using both the statements we get set A contains 10 elements. Hence answer is 3.
- 131. By using both the statements we get A has three brothers. Hence answer is 3.
- 132. Both the statements are not sufficient. Hence answer is 4.
- 133. By using both the statements we can find the perimeter of the circular sector.

Area of sector = $\frac{1}{2}$ x Length of the arc x radius. Hence ans. is 3.

- 134. Both the statmenets are not sufficient. Hence answer is 4.
- 135. By using both the statements we get x = -4. Hence answer is 3.
- 136. $5^x = 25^y = (5^2)^y = 5^{2y} = 5^{-4}$; x = -4, y = -2. Hence answer is 3.
- 137. Statement \Rightarrow ABC is an equilateral triangle. Area $=\frac{\sqrt{3}}{4}a^2 = \frac{\sqrt{3}}{4}16 = 4(\sqrt{3})$ square units

or Area =
$$\sqrt{s(s-a)(s-b)(s-c)}$$
, where $s = \frac{a+b+c}{2}$. Hence anwer is 2.

138. By using both statements primes between $\{10, 11, 12, 13, ..., 20\}$ are 11, 13, 17, 19.

Average = $\frac{11+13+17+19}{4} = \frac{60}{4} = 15$. Hence answer is 3.

- 139. Angle in a semi circle is 90°. From statement (I) BC diameter. Hence answer is 1.
- 140. Both the statements are not sufficient. Hence answer is 4. Volume = $\pi r^2 h$, curved surface area of cylinder = $2\pi rh$.
- 141. By using both the statements we can find the coordinates of the point M. Hence answer is 3.
- 142. By using (II) statement only we can find the value of b/c. Hence answer is 2.
- 143. By using (II) statement only we can say that the point P doesnot lie in first quadrant. Hence answer is 2.
- 144. By using both the statements we cannot find the value of *a* and *b*. Hence answer is 4.
- 145. By using statement (I) is only we can find B as $B = \{0, 1, 2, -1, -2, -3, 3\}$. Hence answer is 1.
- 146. By using both the statements we get x = 1, y = 1, z = 1. Hence answer is 3.

ICET - 2013 Data Sufficiency:

Note: Each question is followed by data in the form of two statements labelled as I and II. You must decide whether the data given in the statements are sufficient to answer the questions. Using the data make an appropriate choice from (1) to (4) as per the following guidelines:

- (a) Mark choice (1) if the statement I alone is sufficient to answer the question.
- (b) Mark choice (2) if the statement II alone is sufficient to answer the question.

| (c) Mark choice (3) if both the statements I and II noither statement along is sufficient | are sufficient to answer the question but |
|--|--|
| (d) Mark choice (4) if both the statements L and II | together are not sufficient to ensure the |
| (u) Mark choice (4) If both the statements I and If | together are not sufficient to answer the |
| question and additional data is required.
1 Is $(x - a)$ a factor of the polynomial $f(x)$? | Answer is 1 |
| 1. Is $(x - u)$ a factor of the polynomial $f(x)$: | Allower is i |
| 1. $f(a) \neq 0$ | |
| II. The sum of the coefficients of $f(x)$ is constant | nt. Answer is 3 |
| 2. What is the simple interest earned yearly on a deposition of the simple interest e | sit in a bank ? |
| I. The amount deposited is Rs.10,000. | |
| II. The rate of interest is 8%. | |
| 3. What is the surface area of a sphere? | Answer is 2 |
| I. The sphere is made of iron. | |
| 11. The radius of the sphere is given.
4. What is the value of $x^4 + x^4$ if $x = 1.2$ | A |
| 4. what is the value of $x^{2} + y^{2}$, if $xy = 1$? | Answer is 1 |
| 1. x + y - 5 | |
| 11. $x > 0, y > 0$
5 What is the value of $8a^3 + b^3 - 27a^3 2$ | Answer is 3 |
| $\int abc = k$ | Answer is 5 |
| If $abc = k$
If $2a + b = 3c$ | |
| 6 What is the distance between two ships ? | Answer is 4 |
| I Seen from the top of a mountain their angles | s of depression are 60° and 30° |
| II. Height of the mountain is 60 metres. | |
| 7 Do the two circles with their centres at A and B and I | having radii r and r intersect? |
| L Distance between A and D is I should | $\frac{1}{2} \operatorname{merser}_{2} \operatorname{merse}_{2} \operatorname{merser}_{2} \operatorname{merser}_{2} \operatorname{merser}_{2} \operatorname{merser}_{2} \operatorname{merser}_{2} \operatorname{merse}_{2} \operatorname{mers}_{2} \operatorname{mers}_{2} \operatorname{mers}_{2} \operatorname{mers}_{2} \operatorname{mers}_{2} \operatorname{mers}_{2} \operatorname{mers}_{2} mers$ |
| 1. Distance between A and B is a units. | Answer is 5 |
| II. $ r_1 - r_2 < a < r_1 + r_2$ | |
| 8. Are two triangles similar? | Answer is 1 |
| I. They are equilateral. | |
| II. Their areas are equal. | |
| 9. What is the area of a regular hexagon? | Answer is 1 |
| I. A circle of radius 'a' units is inscribed in the h | exagon. |
| II. Each side of the hexagon subtends an angle | $e \circ f 60^{\circ}$ at the centre of the circle. |
| 10. What is the value of $log 10^x$? | Answer is 3 |
| I. <i>x</i> >3 | |
| II. $log10^{x} + log10^{(x-3)} = 1$ | |

11. Is ABCD a cyclic quadrilateral ?

I. The lengths of the diagonals are given.

X7•

Answer is 2

(Marks : 20)

| II. A circle with mid point of a diagonal as centre passes through the ver | tices. |
|---|----------------|
| 12.What is the 100 th term of a sequence ? | Answer is 4 |
| I. The sequence is an Arithmetic Progression. | |
| II. The first term of the sequence is 5. | |
| 13.Can we find the quadratic equation $ax^2 + bx + c = 0$? | Answer is 3 |
| I. The sum of the roots is given. | |
| II. The difference of the roots is given. | |
| 14. What is the percentage of profit on the sale of 50 books? | Answer is 3 |
| I. The cost price of each book is Rs.100. | |
| II. The sale price of each book is Rs.125. | |
| 15.What is the value of n ? | Answer is 1 |
| $I \cdot 1^3 + 2^3 + 3^3 + \dots + n^3 = 255$ | |
| II. <i>n</i> is a positive integer. | |
| 16. What is the day of 31st December of an year? | Answer is 1 |
| I. In that year the first of March was Monday. | |
| II. That year was a leap year. | |
| 17. What is the Arithmetic Mean of the numbers x, y, z and t ? | Answer is 3 |
| I. $x + 2y - z - 3t = K$ II. $2x + y + 4z + 6t = L$ | |
| 18.What is the equation of a straight line? | Answer is 4 |
| I. The line is parallel to $2x + 3y = 5$. | |
| II. The line does not pass through the origin. | |
| 19. What is the angle subtended by the chord AB of a circle at a point P on the | circumference? |
| I. The radius of the circle is 5 cm. | Answer is 4 |
| II. The length of the chord AB is 5 cm. | |
| 20. What is the value of $119x + 247y$? | Answer is 3 |
| I. $118x + 246y = 482$ II. x is greater than y by 2. | |
| | |
| ICET-2014 Data Sufficiency: (Mark | <u>s : 20)</u> |
| 1. What is the positive integer n not exceeding 180? | Answer is 3 |
| I. n is divisible by $/$. II. n is divisible by 13. | |
| 2. If ABCD is a square and E is a point on BC, then what is the area (in square) $L_{\rm DE}$ | units) of AECD |
| I. BE = 0 | Answer is 3 |
| II. BE : EC = I: 2 | |
| 3. What is the shape of the play ground? | Answer is 3 |
| I. The perimeter of the play ground is 440 m. | |
| 11. The area of the ground is 15400 sq. m. | Angregoria 2 |
| 4. What is the remainder when h is divided by 8? | Answer is 2 |
| I. The digit in units place of h is 8. | Angregon is 1 |
| 5 What is the groatest common divisor of numbers a and b? | Answer is I |
| J. W hat is the greatest common multiple of a and big share $\mathbf{H} = 15$ | |
| 6. What is the average of a b c and 5? | Answor is 1 |
| 0. We have 18 the average of a, b, c and b ? | |
| I = 5 (a + b + a) + 4 - 45 $II = a + b - a + d$ | |

| 7. What is the value of $\frac{x^2}{y^2} + \frac{y^2}{z^2}$? | Answer is 3 |
|---|------------------------------|
| $I.\left(\frac{x}{y} + \frac{y}{z}\right)^2 = 100 \qquad \qquad II. \ x = 2z$ | |
| 8.Is $xy < 0$? | Answer is 1 |
| I. $5 x + 3 y = 0$
9.How much time did A take to reach the destination ?
I. The ratio between the speeds of A and B is 3 : 4. | Answer is 3 |
| II. B takes 36 minutes to reach the same destination. 10. What is the slope of straight line ? I. The straight line passes through the origin. II. The straight line makes an angle 30° with the positive direction of the | Answer is 2
X-axis |
| 11. In the matrix $A = \begin{bmatrix} -5 & 20 \\ 2 & -x \end{bmatrix}$, what is the value of x? | Answer is 1 |
| I. <i>A</i> is singular. II. <i>A</i> is symmetric.
12. What is the value of $a + b$? | Answer is 3 |
| 1. $a \neq b$
13. Is the quadrilateral a square ?
I. All the sides of the quadrilateral are of equal length. | Answer is 3 |
| II. The diagonals of the quadrilateral are of equal length.
14.For positive integers x, y and z, is the product xyz even? | Answer is 1 |
| 15. What is the monthly salary of A?
I. A gets 15% more than B and B gets 10% less than C. | Answer is 3 |
| II. C's monthly salary is Rs.2,500.
16. Among the real numbers a and b, is b a rational number ?
L a + b is a rational number II. a - b is a rational number | Answer is 3 |
| 17.How many persons are there in the library? I. If 3 persons leave the library, then the library has less than 8 persons. | Answer is 3 |
| II. If 3 persons enter the library, then it has more than 12 persons.
18 In the figure given below what is the value of $\alpha + \beta + \alpha + \delta^2$ | Answaris ? |
| To find the figure given below, what is the value of $\alpha + \rho + \gamma + \delta$: | Allower 15 2 |
| 1. $\alpha + \beta = \gamma + \delta$ II. $\theta + \phi = 90^{\circ}$ | |
| 19. How much is $(x + y)$: $(x - y)$?
I. $x : y = 3 : 2$ II. $x > 0, y > 0$ | Answer is 31 |
| 20. If $p(x)$ is a polynomial, is $(x - 2)$ a factor of $p(2x^2 - 1)$?
I. $x - 1$ is a factor of $p(x)$.
II. $x - 7$ is a factor of $p(x)$. | Answer is 2 |

| <u>Telangana ICET- 2015</u> | <u>Data Suffic</u> | <u>iency:</u> | <u>(Marks : 20)</u> | |
|--|--|---|------------------------------|---|
| 1. Is $\frac{n}{18}$ an integer ? | | | | Answer is 3 |
| I. $6 \mid n$. | II. 9 does not | divide <i>n</i> . | | |
| 2. Is $\triangle ABC$ scalene?
I. $AB \neq BC$ | II. ZI | $BAC \neq \angle BCA$ | 1 | Answer is 4 |
| 3. With how many zeroes does
I. $5^3 a, 5^4$ does not c | s the number a =
livide a | = 16! end?
II. <i>a</i> is an ev | en number | Answer is 1 |
| 4.Is the quadrilateral ABCD a
I. AB = CD, AD = B | rectamgle?
C. II. AC | c = BD. | | Answer is 3 |
| 5. If P, A, B are three points of I. AB is the diameter of | on a circle, what
of the circle. | is $\angle APB$?
II. The sum | of the angles of ΔA | Answer is 1
(<i>PB</i> is 180 ⁰ . |
| 6. Is the number n divisible b
I.The sum of its digit | y2 ?
s is divisible by 2 | 2. II.The dig | its in the unit place | Answer is 2 is divisible by 2. |
| 7. Are the roots of $ax^2 + bx +$
I.4 $a + b = 0$ | $c = 0 (a \neq 0)$ real
II. $c = 5a$ | 1? | | Answer is 3 |
| 8.What is the area of the recta
I. E is the mid-point of | ngle ABCD ?
of AB. II. Are | ea of $\Delta CDE =$ | $= 50 cm^2 \cdot$ | Answer is 2 |
| 9.What are the numbers <i>a</i> and I. <i>a</i> and <i>b</i> are relativel | d <i>b</i> ?
y prime. | II.L.C.M of | <i>a</i> , <i>b</i> is 2500. | Answer is 4 |
| 10.What is the rate of simple
I.Rs. 23,000 is to be p
II.There is a penal into | interest on a loan
baid at the end of
erest of 10% if th | n of Rs. 20,00
f first year.
ne loan is not p | 0?
Daid at the end of the | Answer is 1
e first year. |
| 11. Suppose $f(x)$ is a polyn
I. $(x-7) f(x)$. | omial. Is <i>x</i> - 1 a
II. (<i>x</i> - | factor of $f(x-11) \mid f(x-3)$ | $(x^2 + 7)$? | Answer is 2 |
| 12. What is the value of xy ?
I. $x^2 = 9$ | II. <i>y</i> = | · 0. | | Answer is 2 |
| 13. Is the quadrilateral a squa | re? | | | Answer is 3 |

| I. All the sides of the q
II. The diagonals of th | uadrilateral are of equal length.
e quadrilateral are of equal length | l. |
|--|---|--|
| 14.If $0 \notin \{x, y\}$, then what is | s the value of $x + y$? | Answer is 4 |
| I. $x \neq y$. | II. $x^8 + y = y^8 + x$. | |
| 15. Is 525 x k a perfect squar
I. 21 divides k. | re ?
II. k = 21. | Answer is 2 |
| 16. If $n(A)$ denotes the numb
I. $n(A) = 35$. | per of elements in the set A, then n
II. $n(B) = 28$. | $n(A \cup B)$? Answer is 4 |
| 17.What is the value of the int
I. 25^n is odd | teger $n \ge 0$?
II. 30^n is odd | Answer is 2 |
| 18.For what integers a, b and
I. a = b | I c with $a = bc$, is $a > b$?
II. $c^2 = 9$ | Answer is 4 |
| 19. What is $x_1 + x_2 + x_3 + x_4 + x_4 + x_5 + x_4 $ | $+ x_5?$ | Answer is 3 |
| I. $x_3 = 20$ | II. x_1, x_2, x_3, x_4, x_5 are in arithm | netic progression. |
| 20. What is the average of a
I. a, b, c are positive in | - 3, b + 4, c - 5 and 6 ? Answe
ntegers. II.a + b + c = 1 | e r is 2
00. |
| A.P ICET- 2015 | Data Sufficiency: | <u>(Marks : 20)</u> |
| 1. Is $\triangle ABC$ equilateral?
I. $AB = BC$. | II. $\angle ABC = 60^{\circ}$. | Answer is 3 |
| 2. Is $a+b \neq 0$, if a and b are
I. $ab = 0$ | real numbers?
II. $a^2 + b^2 = 0$. | Answer is 2 |
| 3. If x and y are real numbers,
I. x is the smaller of f | , is $x > y$?
the roots of $x^2 - 1 = 0$ II. y is | Answer is 3 the real root of $y^3 - 1 = 0$. |
| 4. If a and b are real numbers,
I.2 $ a + b =0$ | s = ab >0?
II. $2 a = b .$ | Answer is 1 |
| 5.At how many points do the
I. The radii of the two
II.The distance betwe | two circles intersect ?
o circles are equal.
een their centres is 12 cms. | Answer is 4 |

| 6. What is the share of A in a profit of Rs.1,500 in that year ?I. A's capital is Rs.5,000 more than B.II.A and B are the only partners in the business. | Answer is 4 |
|--|-------------------------------|
| 7.For two sets A and B, what is $n(A \cap B)$?
I. $n(A) = 6$ and $(B - A) = 8$. II. $n(A - B) = 8 = n(B - A)$ and $n(A \cup A) = 8$. | Answer is 2
(B) = 24. |
| 8.If 'a' is a positive integer, is it a prime number?I. It is odd number.II. It is an even integer greater the | Answer is 2
an 2. |
| 9.If x and y are real numbers, what is the value of xy ?
I. $x + y = 16$. II. $x^2 + y^2 = 160$. | Answer is 3 |
| 10. What is the value of $\sin 2\theta$?
I. $\tan \theta + \cot \theta = 3$. II. $(\operatorname{Cosec} \theta + \cot \theta)(\operatorname{Cosec} \theta - \cot \theta) = 1$. | Answer is 1 |
| 11.What is the sum of the first 20 terms of the Arithmetic progression?I. The sum of the first term and 20th term of the AP is 120.II.The common difference of the AP is 5. | Answer is 1 |
| 12.What is the surface area of the cuboid?I. Ratio of its length to its breadth is 2 : 5. II.Volume of the cuboid | Answer is 4 is 100 cu. units. |
| 13. If 'a' is an integer, what is the value of a ?
I. $a^2 = 9$. II. $a^2 + a = 6$. | Answer is 3 |
| 14.If a and b real numbers, is $a^2 > b^2$?
I. $a > b$. II. $a > 0$. | Answer is 4 |
| 15. Is 6 a factor of n ?I. n is even and divisible by 3.II. n is divisible by a print | Answer is 1
me number. |
| 16. The product of two integers a and b is 270. What is the LCM of a and b?
I The GCD of a and b is 9 | Answer is 1 |
| 17. What is the value of the positive integer n?
$I_{12}^{2} = 2^{2}$ | Answer is 1 |
| 1. $1^2 + 2^2 + 3^2 + \dots n^2 = 285$. If $n < n < 20$.
18. If <i>a</i> and <i>b</i> are positive integers such that the product is 30, then what is the v | value of $a + b$. |
| $I.a > b. \qquad \qquad II. \ 1 < \frac{a}{b} < 2$ | Answer is 2 |
| 19.If a, b and c integers, is $a + b + c$ is divisible by 3?
I.a =2b - 10 and c = 3b + 25 II. $a + b + c$ is an odd in | Answer is 1 nteger. |
| 20.If x is non-negative integer, is x even? $I.8^x$ is an even integer.II.9x is an odd integer. | Answer is 4 |

Reasoning (sequence and series) Telangana ICET- 2015:

Note: In each of the questions numbered 1 to 10 a sequence of numbers or letters that follow a definite pattern is given. Each question has a blank space. This has to be filled by the correct answer from the four given options to complete the sequence without breaking the pattern.

1. 13, 28, 49, 76, ___, 148 (1) 89 (2)99 (3)109 (4)119 **Answer:3 Reason:** 13, 13 +15=28; 28 +21 = 49; 49 + 27 = 76; 76 + 33 = 109; 109 + 39 = 148

2. 2, 26, 242, _____ Answer:4 (1) 546 (2) 956 (3) 1266 (4) 2186 Reason:2=2x1;26=2x13; 242=2x121=2x11x11; 2186=2x1093

| 3. | $\frac{2}{3}, \frac{8}{9}, \frac{26}{27}, \frac{80}{81}$ | , <u>728</u> , <u>729</u> . | | | Answer:1 |
|----|--|-----------------------------|----------------------|-----------------------|----------|
| | (1) $\frac{242}{243}$ | $(2)\frac{322}{323}$ | $(3)\frac{542}{543}$ | (4) $\frac{722}{723}$ | |

Reason: $2 = 3^{1} - 1; 8 = 3^{2} - 1 = 9 - 1; 26 = 3^{3} - 1 = 27 - 1; 80 = 3^{4} - 1 = 81 - 1;$

 $242 = 3^5 - 1 = 243 - 1$; $728 = 3^6 - 1 = 729 - 1$. Observe the pattern. Answer:1

| 4. | 3Z2A,5X5C,7V8E | , | | | Answer:4 |
|-------|----------------------|------------------------|-------------------|----------------------|-------------------|
| | (1)9S10G | (2)10T120 | ũ | (3) 10S12G | (4) 9T11G |
| Reaso | n: Observe the patte | rn 3, 5, 7, <u>9</u> ; | Z,X,V, <u>T</u> ; | 2, 5, 8, <u>11</u> ; | A, C, E, <u>G</u> |

5. Z7A, Y6B, X5C, ____, U3E (1) V3C (2) V4C (3)V4D (4) V5D Reason: Z, Y, X, V, U; 7, 6, 5, 4, 3; A, B, C, D, E. Observe the pattern . Answer:3

6.
$$\sqrt{1+\sqrt{15}}$$
, $\sqrt{3+\sqrt{13}}$, ____, $\sqrt{10}$ Answer:4
(1) $\sqrt{4+\sqrt{10}}$ (2) $\sqrt{4+\sqrt{11}}$ (3) $\sqrt{5+\sqrt{7}}$ (4) $\sqrt{5+\sqrt{11}}$

Reason: Observe the pattern 1,3,5, 7; $\sqrt{15}$, $\sqrt{13}$, $\sqrt{11}$, $\sqrt{9} = 3$;

$$\sqrt{1+\sqrt{15}}$$
, $\sqrt{3+\sqrt{13}}$, $\sqrt{5+\sqrt{11}}$, $\sqrt{7+\sqrt{9}} = \sqrt{7+3} = \sqrt{10}$

7. UGX : AND :: QLN : ____

(1) WRT (2) WST (3)WRS (4) VRT **Reason:** A=1,G=7, U=21,Q=17, L=12, N=14, X=24, W= 23, R=18,S=19, T=20, V=22. Observe the pattern .First letter is moved 6 places forward, First letter is moved 7 places forward,Third letter is moved 6 places forward,

U G X : A N D :: Q L N : W S T Answer:2 21 7 24 : 1 14 4 :: 17 12 14 : 23 19 20

| 8. | : HDG | F::FILM : ADGH | | | Answer:2 | |
|---|--------------------------|-----------------------------|------------------------|-------------------------------|------------------|--|
| | (1) LIKM | (2) MILK | (3)KLIM | (4) | IKLM | |
| Rease | on: A=1, D=4, | F=6,G=7,H=8,I=9 | ,K=11,L=12, M=13 | 3. | | |
| MILK=13,9,12,11; HDGF=8,4,7,6; | | | FILM =6,9,12 | FILM =6,9,12,13; ADGH=1,4,7,8 | | |
| 9. | KEGV, JDFU
(1)HBDC | J, ICET,
(2) HBDF | (3)HBDS | (4) | Answer:3
HBDU | |
| Reason: K-J-I- <u>H</u> ; E-D-C- <u>B</u> ;G-F-E- <u>D</u> ;V-U-T- <u>S</u> .Hence HBDS | | | | | | |
| 10. | DIVIDEND :
(1) JDXANZ | CHUHCDMC :: K
QC (2)JDXN | EYBOARD:
ZAQC (3)JD | XANZRC | (4)JDXANZPC | |
| Rease | on: Observe th | e pattern . | | | Answer:1 | |
| | | | | | | |

Telangana ICET- 2015: Note: In each of the questions numbered 1 to 10 follow a definite pattern.Observe the same and fill in the blanks with the suitable answer.

 $11\frac{1}{9}, 12\frac{1}{2}, 14\frac{2}{7}, 16\frac{2}{3}, \dots$ 1. (1) $18\frac{2}{3}$ (2) $18\frac{2}{7}$ (3) $17\frac{1}{6}$ (4) 20 **Reason:** $11\frac{1}{9} = \frac{100}{9}$, $12\frac{1}{2} = \frac{25}{2} = \frac{100}{8}$, $14\frac{2}{7} = \frac{100}{7}$, $16\frac{2}{3} = \frac{50}{3} = \frac{100}{6}$, $\frac{100}{5} = 20$. So the missing term is $\frac{100}{5} = 20$; Answer:4 4, 7, 12, 19, 28, ____, 52 2. Answer:1 (1) 39 (2) 40 (3)41 (4) 42 **Reason:** 4; 4+3=7; 7+5=12; 12+7=19, 19+9=28; 28+11=39; 39+13=52. Observe the pattern 3. $\frac{15}{3}, \frac{24}{5}, \frac{35}{7}, -, \frac{63}{11}$ Answer:1 $(1)\frac{48}{9}$ $(2)\frac{46}{9}$ $(3)\frac{44}{9}$ $(4)\frac{42}{9}$ $\frac{15}{3}, \frac{15+9}{3+2} = \frac{24}{5}, \frac{24+11}{5+2} = \frac{35}{7}, \frac{35+13}{7+2} = \frac{48}{9}; \text{ Hence } \frac{48}{9}.$ 0010, 0011, 0101, ____, 1011 4. Answer:2 (2)0111 (1)0001(3) 1010 (4) 1111 **Reason:**In decimal system 0010=2, 0011=3, 0101=5, 0111=7, 1011=11. So 0111 is the missing term Answer:2
| 5. | 9, 36, 100, | 225,, 784 | | | Answer:2 |
|-------|-----------------|--|---|--------------------------------|--------------|
| | (1) 365 | (2) 441 | (3)498 | (4) 526 | |
| Reaso | on: $9=3^2;36=$ | 6 ² ;100=10 ² ;225 | =15 ² ;21 ² =441; | ; 28 ² =784. Obseve | the pattern. |

6. W4C, T9F, Q16I, ____, Answer:2 (1) P25L (2) N25L (3)P27L (4) M25L Reason: <u>W</u>, V, U, <u>T</u>, S, R, <u>Q</u>, P, O, <u>N</u>; 4, 4+5=9, 9+7=16, 16+9=<u>25</u>. <u>C</u>, D, E, <u>F</u>, G, H, <u>I</u>, J, K, <u>L</u> Obseve the pattern. 7. $(x+y), (x^2-y^2), (x+y)^2(x-y), (x^2-y^2)^2, (x+y)^3(x-y)^2,$ Answer:3 (1) $(x-y)^3(x+y)^2$ (2) (x^2-y^2) (3) $(x^2-y^2)^3$ (4) $(x^2-y^2)^2$

Reason: $(x^2 - y^2) = (x + y)(x - y)$. Obseve the pattern.

| 8. | $\frac{5}{9}, \frac{10}{28}, \frac{17}{65}, \frac{26}{126}$ | $\frac{5}{9}, \frac{10}{28}, \frac{17}{65}, \frac{26}{126}, \frac{37}{217}, \underline{\qquad}$ | | | | | | |
|----|---|---|---------------------|----------------------|--|--|--|--|
| | $(1) \frac{41}{344}$ | (2) $\frac{45}{344}$ | $(3)\frac{49}{344}$ | (4) $\frac{50}{344}$ | | | | |

Reasoning (sequence and series) A.P ICET- 2015:

| 1. | Train : Driver : | : Class : | | | Answer:3 |
|-------|-----------------------------|-----------------|-----------------------------|-----------------|----------|
| | (1) Benches | (2) School | (3)Teacher | (4) Black Board | |
| 2. | 5:3125::6:_ | | | | Answer:4 |
| | (1) 36656 | (2) 38656 | (3)46545 | (4) 46656 | |
| Reaso | $n:5^5=5 \ge 5 \ge 5 \ge 5$ | x 5 x5=3125. So | o 6 ⁵ =6x6x6x6x6 | 6=36x36x6=46656 | |
| 3. | 6:210::: :1 | 120 | | | Answer:4 |
| | (1) 3 | (2) 4 | (3)5 | (4) 7 | |
| Reaso | $n:6^6 - 6 = 216 - 6$ | =210. In the s | ame way $5^3 - 5 =$ | = 125 5 = 120. | |
| | | | 5 | | |
| 4. | BFJ:OSW:: | DJR : | | | Answer:4 |
| | (1)AGP | (2) BI | Q (3)CII | R (4) QWE | |
| 5. | 136 :358 :: | : 489 | | | Answer:2 |
| | (1) 258 | (2)267 | (3)289 | (4) 369 | |
| 6. | 1331 : 11 :: 17 | 28: | | | Answer:4 |
| | (1) 24 | (2) 22 | (3)14 | (4) 12 | |
| 7. | 6FJ : 16PT :: 8 | SHL: | | | Answer:3 |
| | (1) 15PT | (2) 18 | TX | (3)18RV | (4) 16QV |
| 8. | 9:72:::64 | 4 | | | Answer:3 |
| | (1) 6 | (2) 7 | (3)8 | (4) 9 | |
| 9. | 64 : 100 :: 72 : | · | | | Answer:4 |
| | (1)144 | (2)121 | (3)112 | (4) 81 | |

Reasoning (sequence and series) ICET- 2014: Note: In each of the questions numbered 1 to 10 a sequence of numbers or letters that follow a definite pattern is given. Each question has a blank space. This has to be filled by the correct answer from the four given options to complete the sequence without breaking the pattern. 1. If the letters D and E are removed from the English Alphabet, then the fourth letter is (1) F(2)C(3)G(4)HAnswer:1 2. 7:49:: :63 (1)5(2)6(3)9(4)11**Reason:** $7 \ge 7 = 49$. $9 \ge 7 = 63$ So the missing term is 9; Answer:3 3. HOSPITAL : PATIENTS :: SCHOOL : (2) CLASS ROOMS (3) STUDENTS (4) BLACK BOARDS (1) TEACHERS **Reason:** Observe the pattern. **Answer:1** 4. 81:64:: :9 Answer:1 (1) 16(2) 18 (3) 24(4) 345. AEF : BIJ :: : OUV (3)NOO (1) NOP (2) MPQ (4) NOR **Reason:** A=1,B=2,E=5,F=6,U=21,I=9,J=10, O=15, V=22. Observe the pattern. $A \in F : B \mid J :: N \mid O \mid Q : O \mid U \mid V$ Answer:3 156:29 10::141517:152122 6. DRIVE : EIDRV :: BEGUM : (1) BGMEU (2) MGBEU (3)UEBGM (4) BGMUE **Reason:** Observe the pattern. Answer:2 7. E x I : 5 x 9 :: : 15 x 21 (1) L x K (2) K x L(4) U x O (3)O x U **Reason:**E = 5, I = 9, O = 15, U = 21. So the missing term is O x U; Answer:3 8. ANT : CPV :: : DQZ (3)FSB(1) BOX (2) BRB (4) FTB **Reason:** A, C, B, D; N,P, O, Q; T,V, X,Z Observe the pattern. Answer:1 9. K 11 M , , G 15 I, E 17 G (1) I 13 K (2) I 14 J (3)I 12 J (4) I 13 M **Reason:** K = 11; M= 13; I = 9; G= 7; E = 5; 11-9-7-5; 11-13-15-17; 13-11-9-7

Observe the pattern . Answer:1

ICET-2014

Note: In each of the questions numbered 1 to 10 follow a definite pattern. Observe the same anf fill in the blanks with the suitable answer.

1. $111\frac{1}{9}$, 125, $142\frac{6}{7}$, ____, 200, 250 (1) $166\frac{2}{3}$ (2) $178\frac{4}{7}$ (3) $181\frac{2}{5}$ (4) $192\frac{3}{7}$ Reason: $111\frac{1}{9} = \frac{1000}{9}$; $125 = \frac{1000}{8}$; $142\frac{6}{7} = \frac{1000}{7}$; $\frac{1000}{6} = \frac{500}{3} = 166\frac{2}{3}$; $\frac{1000}{5} = 200$; $\frac{1000}{4} = 250$. So the missing term is $\frac{1000}{6} = \frac{500}{3} = 166\frac{2}{3}$; Answer:1 0, 2, 3, 5,8,10,15,__, 24,26,35. 2. (1)10 (2)18 (3)17 (4) 16 **Reason:** In the given sequence $0 = 1^2 - 1$; $3 = 2^2 - 1$; $8 = 3^2 - 1$; $15 = 4^2 - 1$; $24 = 5^2 - 1$; $35 = 6^2 - 1$ $2 = 1^{2} + 1:5 = 2^{2} + 1:10 = 3^{2} + 1:17 = 4^{2} + 1:26 = 5^{2} + 1:37 = 6^{2} + 1:$ So the missing term is 17;Answer:3 3. $\left\{\frac{1}{3}, \frac{1}{5}, \frac{1}{7}, \frac{1}{9}\right\}$, $\left\{\frac{1}{12}, \frac{1}{15}, \frac{1}{18}, \frac{1}{21}\right\}$, $\left\{\frac{1}{25}, \frac{1}{29}, \frac{1}{33}, \frac{1}{37}\right\}$, $\left\{\frac{1}{42}, \frac{1}{47}, \dots, \frac{1}{57}\right\}$ (1) $\frac{1}{50}$ (2) $\frac{1}{51}$ (3) $\frac{1}{52}$ (4) $\frac{1}{53}$ **Reason:**3,5,7,9(2 is added); 12,15,18,21(3 is added); 25,29,33,37(4 is added); 42,47,<u>52</u>,57(5 is added). So the missing term is $\frac{1}{52}$; Answer:3. 4. 5,11,21,43,85, ____ (1) 181 (2) 180 (3) 171 (4) 170 **Reason:** 5;11 = (2)(5) + 1;21 = (2)(11) - 1;43 = (2)(21) + 1;85 = (2)(43) - 1;(2)(85) + 1 = 171;missing term is 171; Answer:3. 5. 75, 105, 165, 195, , 285 (1)255(2) 235(3) 225 (4) 215 **Reason:**75=(15)(5); 105=(15)(7); 165=(15)(11);195=(15)(13);255=(15)(17); 285=(15)(19); missing term is 255; Answer:1 6. $\frac{3}{5}, \frac{5}{9}, \frac{9}{13}, \frac{13}{17}, \dots, \frac{27}{33}$ (1) $\frac{11}{13}$ (2) $\frac{17}{27}$ (3) $\frac{15}{19}$ (4) $\frac{21}{23}$ Answer:2

7. (1,Z), (8,Y), (27,X), (125,W), _____ (1) (243,U) (2) (243,V) (3) (343,V) (4) (343,U)Reason: $1 = 1^3$; $8 = 2^3$; $27 = 3^3$; $125 = 5^3$; $343 = 7^3$; Z=1; Y=2; X=3; W=4; V=5 So missing term is (343,V); Answer: 3

8.AEI,CGK,___, GKO, IMQ (1) EJN (2)ENJ (3)EIM (4) EMI Reason: ABCDEFGHI; EFGHIJKLMNOPQ; IJKLMNOPQR So missing term is EIM ; Answer:3

9.If $\{a_n\}_{n=1}^{\infty}$ is such that $a_1 = a_2 = 1$ and $a_k = a_1 + a_2 + a_3 + \dots + a_{k-1}$ for $k \ge 3$, then $a_7 = (1) \ 16 \qquad (2)32 \qquad (3)64 \qquad (4) \ 128$ **Reason:** $a_3 = 1 + 1 = 2$; $a_4 = a_1 + a_2 + a_3 = 1 + 1 + 2 = 4$; $a_5 = a_1 + a_2 + a_3 + a_4 = 1 + 1 + 2 + 4 = 8$; $a_6 = a_1 + a_2 + a_3 + a_4 + a_5 = 1 + 1 + 2 + 4 + 8 = 16$; $a_7 = a_1 + a_2 + a_3 + a_4 + a_5 + a_6 = 1 + 1 + 2 + 4 + 8 + 16 = 32$. Answer:2

10. The n th term in the sequence 1, -2, 3, -4, 5, -6, 7, -8, 9, is Answer:4 (1) (-1)ⁿn (2)-n (3)n (4) (-1)^{n-r}.n

Reasoning (sequence and series) ICET- 2013:

Note: In each of the questions numbered 1 to 10 follow a definite pattern. Observe the same and fill in the blanks with suitable answers.

1.
$$\frac{1}{2}, \frac{8}{5}, \frac{27}{10}, \dots, \frac{125}{26}, \frac{216}{37}$$

(1) $\frac{36}{17}$ (2) $\frac{64}{17}$ (3) $\frac{32}{13}$ (4) $\frac{81}{25}$

Reason: In each term numerators are in the form n^3 and the denominators in the form $n^2 + 1$.

So the missing term is
$$\frac{64}{17}$$
; Answer:2

2. 4, 1, 9, 3, 16, 6, 25, 10, 36, _____ (1) 15 (2) 20 (3) 25 (4) 30 Reason: 4, 9, 16, 25, 36; 1,1+2=3, 3+3=6, 6+4=10, 10+5=15 So the missing term is 15; Answer:1

3. 1, 4, 27, 256, _____ (2)3152 (3)1024 (4) 3125
Reason:
$$1 = 1;2^2 = 4;3^3 = 27;4^4 = 256;5^5 = 3125$$
. **Answer:4**

4. 1,
$$\frac{1}{2}$$
, $\frac{1}{6}$, $\frac{1}{24}$, ..., $\frac{1}{720}$, $\frac{1}{5040}$ Answer:2
(1) $\frac{1}{100}$ (2) $\frac{1}{120}$ (3) $\frac{1}{72}$ (4) $\frac{1}{240}$
Reason: $\frac{1}{2} = \frac{1}{1 \times 2}$, $\frac{1}{6} = \frac{1}{2 \times 3}$, $\frac{1}{24} = \frac{1}{4 \times 6}$, $\frac{1}{120} = \frac{1}{5 \times 24}$, $\frac{1}{720} = \frac{1}{6 \times 120}$, $\frac{1}{5040} = \frac{1}{7 \times 720}$.
5. 4, 7, 12, 19, 28, ..., 52 Answer:1
(1) 39 (2) 40 (3)41 (4) 42
Reason: 4; 4+3=7; 7+5=12; 12+7=19, 19+9=28; 28+11=39; 39+13=52. Observe the pattern
.
6. 1x 8, 3 v 6, 5 t 4, ...
(1) 7 r 3 (2) 7 r 2 (3)7 v 2 (4) 7 v 3
Reason: 1 -, 3 - 5 - 7; x - v - t - r; 8 - 6 - 4 - 2 Observe the pattern . Answer:2
7. 1, 2, 3, 5, 8, 13, 21, ...
(1) 24 (2) 26 (3)29 (4) 34
Reason: 1, 2; 1+2=3; 2+3=5; 3+5=8; 5+8=13; 8+13=21; 13+21=34
So the missing term is 34 ; Answer:4

8. 5, 6, 10, 19, 35, 60, _____(1) 85 (2) 92 (3)96 (4) 105 **Reason:** 5, $5 = 5 + 1^2 = 6$; $10 = 6 + 2^2$; $19 = 10 + 3^2$; $35 = 19 + 4^2$; $60 = 35 + 5^2$; $96 = 60 + 6^2$;

Answer:3

Answer:1

 $9.\frac{1}{5}, \frac{5}{10}, \frac{10}{17}, \frac{17}{26}, \dots, \frac{37}{50}$ $(1)\frac{26}{37} \qquad (2)\frac{36}{37} \qquad (3)\frac{26}{50} \qquad (4)\frac{36}{49}$ $n^{2} + 1$

Reason: The series is in the form of $\frac{n^2 + 1}{(n+1)^2 + 1}$

| 10. 6,12,20,30,, | 56 | | | Answer:4 |
|-------------------------|----------------|--------------|----------------|------------------------|
| (1) 50 | (2) 48 | (3)44 | (4) 42 | |
| Reason: 6; 6+6=1 | 12; 12+8=20; 2 | 0+10=30; 30+ | 12=42; 42+14=5 | 6. Observe the pattern |

ICET-2013

Observe the pattern.

<u>Note:</u> In each of the questions numbered 1 to 15 a sequence of numbers or letters that follow a definite pattern is given. Each question has a blank space. This has to be filled by the correct answer from the four given options to complete the sequence without breaking the pattern.

1. ABCD : ZYXW :: : : VTUS (1)EFHG (2) EHGF (3) EGFH (4) EFGH **Reason:** A=1,Z=26; B=2,Y=25; C=3, X=24; D=4,W=23; Answer:3 E=5, V=22; G=7, T=20; F=6, U=21; H=8, S=19. Sum of corresponding two letters is 27. 2. Tiger : Goat :: : : Herbivore (1)Carnivore (2) omnivore (3) parasite (4) insectivore Answer:1 3. Quadrilaterial : Square :: Triangle : Answer:1 (2) isosceles triangle (3) scalene triangle (4) Right-angled triangle (1)Equilateral triangle 4. 122 : 145 :: 257 : (2) 299(3)401 (4) 497 (1) 290**Reason:** 122=11²+1; 145=12²+1; 257=16²+1;17²+1=289+1=290; **Answer:1** 5. 1001 : 1332 :: : 2198 (1) 1728(2) 1729 (3)2413 (4) 2528 **Reason:** $1001=10^{3}+1$; $1332=11^{3}+1$; $1728=12^{3}+1$; $2198=13^{3}+1$. Answer:2

6.
$$\frac{n(n+1)}{2}$$
: $\sum n$:: _____: $\sum n^2$
(1) $\frac{n^2(n-1)^2}{4}$ (2) $\frac{n^2(n+1)^2}{4}$ (3) $\frac{n(n-1)(2n-1)}{6}$ (4) $\frac{n(n+1)(2n+1)}{6}$
Reason: $\sum n = \frac{n(n+1)}{2}$ and $\sum n^2 = \frac{n(n+1)(2n+1)}{6}$ Answer:4
7. ABCDEFG : STUVXYZ :: GECA : _______(1)ZXUC (2) ZXSU (3) ZSXU (4) ZSUX
Reason: A=1,Z=26; B=2,Y=25; C=3, X=24; D=4, W=23; Answer:1 E=5, V=22; G=7, T=20; F=6, U=21; H=8, S=19 .
8. Volume of a cylinder : Area of curved surace of the cylinder :: $\pi r^2 h$:
(1) πrh (2) $2\pi rh$ (3) $\frac{2}{3}\pi rh$ (4) $\frac{1}{2}\pi r^2 h$
9. Wood : Chair :: _____: Ornament Answer:2 (1)Coal (2) Gold (3) Hammer (4) Bauxite Wood is used to make chair. Gold is used to make ornament.
10. Ice : Water :: _____: Ghee Answer:2 (1)Milk (2) Curd (3) Butter (4) Oil

Ice on heating becomes water. Butter on heating becomes Ghee.

Reasoning (sequence and series) ICET- 2012:

Note: In each of the questions numbered 1 to 15 a sequence of numbers or letters that follow a definite pattern is given. Each question has a blank space. This has to be filled by the correct answer from the four given options to complete the sequence without breaking the pattern. 1. 10, 30, 150, , , 11550, 150150

(1) 1050 (2) 1500 (3) 1005 (4) 5100**Reason:**Given sequence is in the form 10, $10x3=30, 30x5=150, \underline{150x7=1050}, 1050x11=11550, 11550x13=150150$. So the missing term is 11550;Answer:1

2. TUW, VWY, XYA, ZAC, (1) CDK (2) BDK (3) BCE (4) CDF Reason: TU<u>V</u>W, VW<u>X</u>Y, XY<u>Z</u>A, ZA<u>B</u>C, BCE. So the missing term is BCE; observe that underlined letter is deleted. Answer:3 3. KNIP:PINK:: : (1) TCA: CAT (2) YOB : OBY (3) DAER : READ (4) TIGRE : TIREG Reason: KNIP:PINK:: DAER : READ observe the pattern. Answer:3 4. 2, 10, 30, 68, , 222 (1) 96 (2) 112 (3) 130(4) 196 **Reason:** The given series is in the form n^3+n ; $2=1^3+1$, $10=2^3+2$, $30=3^{3}+3$, $68=4^{3}+4$, **130** = $5^{3}+5$, $222=6^{3}+6$. So the missing term is 130; Answer:3 5. PRT : OPQ :: GIK : (3) FGH (2) FGI (1)EGH (4) FHH **Reason:** M=13, N=14, O=15, P=16, Q=17, R=18, S=19, T=20 is the order. Observe the pattern. P R T : O P Q :: G I K : F G HAnswer:3 16 18 20: 15 16 17 7 9 11 6 7 8 6. 2, 6, 12, 20, ____, 42, 56, 72 (1)30(2)31(3)32(4) 36**Reason:**2, 6=(2+4), 12=(6+6), 20=(12+8), <u>30=(20+10)</u>, 42=(30+12), 56=(42+14), 72=(56+16) **OR** $2=1^{2}+1$, $6=2^{2}+2$, $12=3^{2}+3$, $20=4^{2}+4$, $30=5^{2}+5$, $42=6^{2}+6$, $56=7^{2}+7$, $72=8^{2}+8$ So the missing term is 30; Answer:1 7. Reading : Knowledge :: : (1) Swimming : Exercise (2) Pleasure : Playing (3)Adventure : Touring (4)Working : Experience **Reason:**Reading is for Knowledge; Working is for Experience So the missing term is Working : Experience; Answer:4 8. 10, 100, 110, 111, 1000, (1) 1001(1)1101(1)1110(1)1111

9. April: 64 :: July : (1)512(2)729(3)343 (4) 216 **Reason:** The given series is in the form n^3 ; April is 4^{th} month. 64=4³, July is 7^{th} month. 7³=343. So the missing term is 343; Answer:3 10. 0, 15, 80, ,624 (1)95(2)110(3)205 (4)255**Reason:**0=1²-1, 15=4²-1, 80=9²-1, 16²-1=255, 624=25²-1. So the missing term is 255; Answer:4 11. YXDCPO, WVFENM, UTHGLK, (1) SRJINM (2) UTJIJI (3)SRJIJI (4) UTJINM **Reason:**YX,WV,UT,SR=Y-X-W-V-U-T-S-R; DC,FE,GH,JI=; PO,NM,LK,JI=P-O-N-M-L-K-J-I So the missing term is SRJIJI; Answer:3 12. AEF : BIJ :: : OUV (1) NOP (2)MPQ(3)NOQ(4)NQR**Reason:**A=1, E=5, F=6, B=2, I=9, J=10, N=14,Q=17,R=18 O=15,U=21,V=22 observe the $A^{+1}=B, E^{+4}=I, F^{+4}=J; N^{+1}=O, Q^{+4}=U, R^{+4}=V;$ So the missing term is NQR ; Answer:4 13. 120 : 60 :: 24 : _____(1) 3 (2)4 (3)5 (4)6**Reason:** $120:60::24: \Rightarrow 10x12:5x12::4x6:2x3$ So the missing term is 6; Answer:4 14.121, 112, ____, 97, 91, 86 (1)99(2)101(3)102 (4)104Reason:121, 112=121-9, <u>112-8=104</u>, 97=104-7, 91=97-6, 86=91-5 So the missing term is 104; Answer:4 15.4, 8, 12, 24, 36, 72, (1)108(2)106(3)98 (4)96**Reason:**4, 8=4x2, 12=8x2-4, 24=12x2, 36=24x2-12, 72=36x2, 72x2-36=144-36=108 So the missing term is 108; Answer:1

Reasoning (sequence and series) ICET- 2011:

Note: In each of the questions numbered 16 to 30 a sequence of numbers or letters that follow a definite pattern is given. Each question has a blank space. This has to be filled by the correct answer from the four given options to complete the sequence without breaking the pattern. 16. 5, 10, 30, 150, 1050, _____,

(1) 10550 (2) 11000 (3) 11525 (4) 115500 **Reason:**Given sequence is in the form 5, 5x2=10, 10x3=30, 30x5=150, 150x7=1050, 1050x11=11550. So the missing term is 11550;Answer:4

17.
$$1\frac{8}{9}, 2\frac{2}{9}, 2\frac{5}{9}, \ldots, 3\frac{2}{9}$$

(1) $2\frac{3}{9}$ (2) $2\frac{5}{9}$ (3) $2\frac{7}{9}$ (4) $2\frac{8}{9}$
Reason: $1\frac{8}{9} = \frac{17}{9}, 2\frac{2}{9} = \frac{20}{9}, 2\frac{5}{9} = \frac{23}{9}, \frac{26}{9} = 2\frac{8}{9}$, $3\frac{2}{9} = \frac{29}{9}$. So the missing term
is $2\frac{8}{9}$; Answer: 4

19.
$$\frac{1}{2}$$
, $\frac{8}{5}$, $\frac{27}{10}$, $\frac{64}{17}$, ..., $\frac{216}{37}$
(1) $\frac{35}{16}$ (2) $\frac{125}{26}$ (3) $\frac{75}{18}$ (4) $\frac{81}{19}$
Reason: Given sequence is in the form $\frac{n^3}{n^2 + 1}$.
 $\frac{1}{2} = \frac{1^3}{1^2 + 1}$, $\frac{8}{5} = \frac{2^3}{2^2 + 1}$, $\frac{27}{10} = \frac{3^3}{3^2 + 1}$, $\frac{64}{11} = \frac{4^3}{4^2 + 1}$, $\frac{125}{26} = \frac{5^3}{5^2 + 1}$, $\frac{216}{37} = \frac{6^3}{6^2 + 1}$
So the missing term is $\frac{125}{26}$; **Answer:2**
20. The value of the 13th term in the sequence 1, 3, 6, 10, 15,,
(1)97 (2)91 (3)89 (4)85
Reason: The given series is 1, 1+2, 1+2+3, 1+2+3+4, 1+2+3+4+5,
The 13th term in the series

$$=1+2+3+4+5+6+7+8+9+10+11+12+13=\frac{13\times14}{2}=13\times7=91.$$

So the missing term is 91; Answer:2

22. DFIK, GILN, JLOQ, (2)MORP (3)MRPO (4) MORT (1) MPRO Reason: In each term each letter is forwarded by 3 steps ; i.e. first letter in each term $D^{+3}=G^{+3}=J^{+3}=M;$ second letter in each term $F^{+3}=I^{+3}=O$;third letter in each in each term $K^{+3}=N^{+3}=O^{+3}=T$; So the missing term $I^{+3}=L^{+3}=O^{+3}=R$; fourth letter term is MORT; Answer:4 23. 2A4, 3E5, 4I6, , 6Q8 (2) 5N7 (3) 5P7 (1) 5M7 (4) 5S7 **Reason:** In each term first digit is 2,3,4,5,6 second letter in each term $A^{+4}=E^{+4}=I^{+4}=M^{+4}=Q$; third digit 4,5,6,7,8; So the missing term is 5M7; Answer:1 24. BDYZCA, CEXYDB, DFWXEC, (3) EGVWDF (4) BDVWCF (1)BDVWFC (2)EGVWFD **Reason:** In each term first letter B,C,D,E; second letter in each term D,E,F,G; third letter in each term Y,X,W,V; fourth letter in each term Z,; So the missing term is MORT;Answer:4 25. ABDH, DEGK, GHJN, ____, MNPT (2) JLNP (1)JKOM (3) JKMO (4) JLPN **Reason:** In each term each letter is forwarded by 3 steps ; i.e. first letter $A^{+3}=D^{+3}=G^{+3}=J^{+3}=M$; second letter $B^{+3}=E^{+3}=H^{+3}=\mathbf{K}^{+3}=N$;third letter $D^{+3}=G^{+3}=J^{+3}=\mathbf{M}^{+3}=P$; fourth letter $H^{+3}=K^{+3}=N^{+3}=Q^{+3}=T$; So the missing term is JKMQ;Answer:3 26. 50:65::290: (1)170(2)226 (3)260(4)325**Reason:** 50:65::290: \Rightarrow $7^2+1:8^2+1::17^2+1:18^2+1$; So the missing term is 18²+1=325;Answer:4 27. 289:324:: :64 (1)36(2) 49 (3) 55 (4)76**Reason:**289:324:: :64 \Rightarrow 17²:18²::7²:8²; **So the missing term is** 7²=49;**Answer:**2 28. L X M:12 X 13:: U X W: (1) 21 X 23 (2) 21 X 22 (3) 21 X 31 (4) 24 X 26 Reason:LXM:12X13::UXW:21X23; So the missing term is 21X23;Answer:1 In English alphabets L=12; M=13; U=21; W=23; 29. Foot:Inch::Year: (2) Week (3) Month (4)Decade (1) Day **Reason:**12 Inch makes one Foot:. 12 months makes one Year. So month is answer; Answer: 3 In English alphabets L=12; M=13; U=21; W=23; 30. 441:961::21: (3) 61 (4) 41 (1)11(2)31

Reasoning (sequence and series) ICET- 2010:

Note: In each of the questions numbered 31 to 45 a sequence of numbers or letters that follow a definite pattern is given. Each question has a blank space. This has to be filled by the correct answer from the four given options to complete the sequence without breaking the pattern. 31. ABD, EFH, _____, MNP, ORT

(1) GHI (2) IJK (3) IJL (4) JKM **Reason:**In each term each letter is forwarded by 4 steps ;i.e. first letter in each term $A^{+4}=E^{+4}=\underline{I}^{+4}=M^{+4}=Q$; second letter in each term $B^{+4}=F^{+4}=\underline{J}^{+4}=N^{+4}=R$;third letter in each term $D^{+4}=H^{+4}=\underline{L}^{+4}=P^{+4}=T$; **So the missing term is IJL;Answer:3**

32. 99:120:: :63

(1)36 (2) 48 (3) 50 (4)52 **Reason:**In the given series is $(10^2-1):(11^2-1)::(7^2-1):(8^2-1)$; So the missing term is 48 ;**Answer:2** OR 99=9x11, 120=10x12; <u>6x8=48</u>,63=7x9;**So the missing term is** 48;**Answer:2**

33. T, W, Z, C, __,I
(1)D
(2) E
(3)F
(4)H
Reason: The given sequence is T, W, Z, C, __,I. In the sequence each letter is forwarded by 3 steps to its previous letter. So the missing term is F;Answer:3 OR
T=20, W=23, Z=26, C=3, <u>F=6</u>, I=9. So the missing term is F;Answer:3

34. 5, 10, 26, 50, 122, ___,290, 362

(1) 140

(2)170

(3) 184 (4) 226

Reason: Given sequence is in the form of n^2+1 , n is a prime; $5=2^2+1$, $10=3^2+1$, $26=5^2+1$, $50=7^2+1$, $122=11^2+1$, $170=13^2+1$, $290=17^2+1$, $361=19^2+1$, **So the missing term is 170; Answer:2**

Reason: Given sequence is in the form of (n^2+1,n^2-1) n is an integer. (2, 0)= $(1^2+1,1^2-1)$, (5, 3)= $(2^2+1,2^2-1)$, (10, 8)= $(3^2+1,3^2-1)$, (17,15)= $(4^2+1,4^2-1)$ **So the missing term is** (17,15); Answer:2 37. 4, 7, 19, 67, __, 1027 (1) 108 (2)148 (3)259 (4) 617 38. $\frac{3}{5}, \frac{8}{10}, -, \frac{24}{26}, \frac{35}{37}$ $(1)\frac{9}{11}$ $(2)\frac{11}{13}$ $(3)\frac{13}{15}$ $(4)\frac{15}{17}$ **Reason:** $\frac{3}{5} = \frac{2^2 - 1}{2^2 + 1}, \frac{8}{10} = \frac{3^2 - 1}{3^2 + 1}, \frac{15}{17} = \frac{4^2 - 1}{4^2 + 1}, \frac{24}{26} = \frac{5^2 - 1}{5^2 + 1}, \frac{35}{37} = \frac{6^2 - 1}{6^2 + 1}$; **Answer:**4 39. $2 + \sqrt{5}, 9 + 4\sqrt{5}, \dots, 161 + 72\sqrt{5}$ (1) $18+16\sqrt{5}$ (2) $38+17\sqrt{5}$ (3) $64+32\sqrt{5}$ (4) $72+64\sqrt{5}$ **R** e a s o n : $2+\sqrt{5} = (2+\sqrt{5}), 9+4\sqrt{5} = (2+\sqrt{5})^2, (2+\sqrt{5})^3 = 38+17\sqrt{5},$ $161 + 72\sqrt{5} = (2 + \sqrt{5})^4$ So the missing term is $38+17\sqrt{5}$; Answer:2 40. 25, 49, 121, 225, (2)256(3)529 (1)361 (4)676**Reason:** The given series is in the form $(2n+1)^2$ where n is a prime. $25=(2x^{2}+1)^{2}, 49=(2x^{3}+1)^{2}, 121=(2x^{5}+1)^{2}, 225=(2x^{7}+1)^{2}, 529=(2x^{1}+1)^{2}$; Answer: 3 41. 1800:1675::3600:____ (2)3450(1) 3275 (3)3350 (4)3375**Reason:**1800:1675::3600: <u>=</u>1800:1675::2(1800):2(1675);**Answer:3** 42. 2, -1, 5, -7, __, -31 (1) 9 (2)11 (3) 15 (4) 17 **Reason:**2, -1, 5, -7, <u>17</u>, -31. -3 6 -12 24 -48 Double the value with alternate -ve and +ve signs. So the missing term is 17; Answer:4 43. BAT, EDW, IHA, (2) MNF (3) NME (1) NMG (4) NMF **Reason:** In each term first letter $B^{+3}=E^{+4}=I^{+5}=\underline{N}$; second letter $A^{+3}=D^{+4}=H^{+5}=\underline{M}$; third letter T⁺³=W⁺⁴=A⁺⁵=<u>F</u>; So the missing term is NMF;Answer:4 44. ____, IHN, SRX, CBH (3) XYD (4) YXF (1)YXE (2) YXD **Reason:** In each term first letter $\underline{\mathbf{Y}}^{+10}=\mathbf{I}^{+10}=\mathbf{S}^{+10}=\mathbf{C}$; second letter $\underline{\mathbf{X}}^{+10}=\mathbf{H}^{+10}=\mathbf{R}^{+10}=\mathbf{B}$; third letter $\underline{\mathbf{D}}^{+10} = \mathbf{N}^{+10} = \mathbf{X}^{+10} = \mathbf{H}$; So the missing term is YXD; Answer: 4 Note: 10 letter cycle. 45. ABC:ZYX::EFG: (1) ECB (2) DCB (3) DCA (4) FCB Reason: A B C:Z Y X::E F G: = 1 2 3 :26 25 24::5 6 7 :

Reasoning (sequence and series) ICET- 2009:

Note: In each of the questions numbered 46 to 60 a sequence of numbers or letters that follow a definite pattern is given. Each question has a blank space. This has to be filled by the correct answer from the four given options to complete the sequence without breaking the pattern.

46. 50, 65, ____, 290, 325 (1)75 (2) 95 (3) 176 (4) 145 **Reason:**Given sequence is in the form $50=7^{2}+1$, $64=8^{2}+1$, <u>145</u>=12²+1, 290=17²+1, 325=18²+1.

So the missing term is 145;Answer:3

47. $(25, 1), (23, 2), (20, 4), _, (11, 16)$ (1) (16, 4) (2) (16, 6) (3) (16, 8) (4) (16, 10) **Reason:** In the given sequence 25, 25-2=23, 23-3=20, <u>16=20-4</u>, 11=16-5; 1=2⁰, 2=2¹, 4=2², **8=2³**, 16=2⁴. **So the missing term is (16, 8); Answer:3**

48.
$$11\frac{1}{9}, 12\frac{1}{2}, 14\frac{2}{7}, 16\frac{2}{3}, \dots$$

(1) $18\frac{1}{3}$ (2) 20 (3) $17\frac{1}{3}$ (4) 24
Reason: $11\frac{1}{9} = \frac{100}{9}, 12\frac{1}{2} = \frac{25}{2} = \frac{100}{8}, 14\frac{2}{7} = \frac{100}{7}, 16\frac{2}{3} = \frac{50}{3} = \frac{100}{6}, \frac{100}{5} = 20.$
So the missing term is $\frac{100}{5} = 20$; **Answer:2**
49. The value of the 13th term in the series 1, 1+2, 1+2+3, 1+2+3+4, \dots...
(1) 97 (2) 91 (3) 89 (4) 85
Reason: The 13th term in the series 1, 1+2, 1=2+3+4, \dots...
(1) 97 (2) 91 (3) 89 (4) 85
Reason: The 13th term in the series 1, 1=2, 1=3\times7 = 91.

So the missing term is 91; Answer:2

50. A, D, I, P, _____(1) X (2) Y (3) Z (4) U Reason:1²=1=A, 2²=4=D, 3²=9=I, 4²=16=P, 5²=25=Y. So the missing term is Y; Answer:2

51. DFIK, GILN, JLOQ,

(1) MORP (2) MPRO (3) MORT (4) MROP **Reason:**In each term each letter is forwarded by 3 steps ;i.e. first letter in each term $D^{+3}=G^{+3}=J^{+3}=\underline{M}$; second letter in each term $F^{+3}=I^{+3}=L^{+3}=\underline{O}$; third letter in each term $I^{+3}=L^{+3}=O^{+3}=R$; fourth letter in each term $K^{+3}=N^{+3}=Q^{+3}=T$; **So the missing term is MORT;Answer:3** 53. 625 : 5 :: 1296 : (1)9 (2)7 (3)6 (4)8**Reason:** In the given anology $625(=5^4):5::1296(=6^4):6;$ 54:5::64:6 So the missing term is 6 ;Answer:3 54. PALE : LEAP :: : SHOP (3)POSH (1) SOAP (2)PSOH (4) SAOP **Reason:**PALE : LEAP :: : SHOP PALE : LEAP :: POSH: SHOP 5⁴:5::6⁴:6 So the missing term is POSH ;Answer:3 55. Professor : Lecture::Doctor : (1) Hospital (3) Treatment (4) Patient (2) Disease Doctor gives Treatment. Answer:3 **Reason:**Proffessor gives Lecture. 56. 6, 15, 35, 77, (1) 141(2) 142(3) 143 (4) 144**Reason:** Given sequence is in the form of product of consecutive primes; 6=2x3, 15=3x5, 35=5x7, 77=7x11, 143=11x13, . So the missing term is 143; Answer:3 57. CEGK, EGKM, ,KMQS (1) GJKM (2) GKMQ (3) GLMQ (4)GMQS **Reason:**CEGK, 2nd term=last three letters of the first term and fourh letter is forwarded by 2 steps=EGKM(here K⁺²=M. So 3rd term=last three letters of the second term and fourh letter is third letter of the given fourth term=GKMQ. So the missing term is GKMQ; Answer:2 58. 15, 24, 35, 48, 63, , 99 (2) 80(1)72(3) 84 (4)90**Reason:** $15=4^{2}-1$, $24=5^{2}-1$, $35=6^{2}-1$, $48=7^{2}-1$, $63=8^{2}-1$, $9^{2}-1=81-1=80$, $99=10^{2}-1$ So the missing term is 80; Answer:2 59. 18, 50, 98, , 338 (1) 121 (2) 169(3) 189 (4) 242**Reason:**18=3²X2, 50==5²X2, 98=7²X2, 242=11²X2, 338=13²X2 So the missing term is 242; Answer:4 60. 2, 10, 30, , 130 (1)40(2)50(3) 68 (4)90**Reason:** The given series is in the form $n^{3}+n$; $2=1^{3}+1$, $10=2^{3}+2$, $30=3^{3}+3$, $68=4^{3}+4, 130=5^{3}+5.$ So the missing term is 120; Answer:1

Reasoning (sequence and series) ICET- 2008:

Note: In each of the questions numbered 61 to 75 a sequence of numbers or letters that follow a definite pattern is given. Each question has a blank space. This has to be filled by the correct answer from the four given options to complete the sequence without breaking the pattern. $61.6, 27, 128, \ldots, 3130$

(1) 209 (2) 369 (3) 629 (4) 1031 **Reason:**Given sequence is in the form $6=5^{1}+1$, $27=5^{2}+2$, $128=5^{3}+3$, $629=5^{4}+4$, $3130=5^{5}+5$. **So the missing term is 629;Answer:3**

62. 7, 19, 37, 61, ____, 127

(1) 91 (2) 101 (3) 111 (4) 121

Reason:Given sequence is in the form 7, 7+12=19, 19+18=37, 37+24=61, <u>61+30=91</u>, 91+36=127

So the missing term is 91;Answer:1

63. 99, 9999, 999999, _____, 9999999999

64.
$$\frac{3}{4}, \frac{15}{16}, \frac{63}{64}, \dots, \frac{1023}{1024}$$

(1) $\frac{127}{128}$ (2) $\frac{255}{256}$ (3) $\frac{511}{512}$ (4) $\frac{711}{712}$
Reason: $\frac{3}{4} = \frac{4^1 - 1}{4^1}, \frac{15}{16} = \frac{4^2 - 1}{4^2}, \frac{63}{64} = \frac{4^3 - 1}{4^3}, \frac{4^4 - 1}{4^4} = \frac{256 - 1}{256} = \frac{255}{256}, \frac{1023}{1024} = \frac{4^5 - 1}{4^5}$
So the missing term is $\frac{4^4 - 1}{4^4} = \frac{256 - 1}{256} = \frac{255}{256}$; Answer:2

Double the value with alternate -ve and +ve signs. So the missing term is 17; Answer:4

66. DFI, EG J, FHK, ____, HJM

(1) GIM (2) GIL (3) HJN (4) HIM

Reason: In each term each letter forwarded by 1 steps ;i.e.first letters D,E,F,<u>G</u>,H; second letters in each term F,G,H,<u>I</u>,J; third letters in each term I,J,K,<u>L</u>,M; **So the missing term is GIL** ;**Answer:2**

67.
$$4 + \sqrt{13}, 9 + \sqrt{10}, _, 25 + \sqrt{4}$$

(1) $14 + \sqrt{7}$ (2) $15 + \sqrt{7}$ (3) $16 + \sqrt{7}$ (4) $19 + \sqrt{7}$

68. A9Z, B7Y, C5X, ____, E1V

(1) D2W (2) D4W (3) D3U (4) D3W **Reason:**In each term each letter forwarded by 1 steps ;i.e.first letters A,B,C,<u>D</u>,E; second letters in each term 9,7,5,<u>3</u>,1; third letters in each term Z,Y,X,<u>W</u>,V; **So the missing term is D3W** ;Answer:4

69.8:81::6:_

(1) 25 (2) 36 (3) 49 (4) 64 **Reason:** In the given anology $8:(8+1)^2::6:(6+1)^2$; **So the missing term is 49 ;Answer:3**

70.99:120::__:63

(1) 48 (2)42 (3) 36 (4) 24 **Reason:** In the given series is $(10^2-1):(11^2-1):(7^2-1):(8^2-1)$; **So the missing term is 48** ;**Answer:1 OR** 99=9x11, 120=10x12; <u>**6x8=48**</u>,63=7x9;**So the missing term is 48**;**Answer:1**

71. 22:2222::222:

(1) 22222 (2) 2222 (3) 22222 (4) 222222 **Reason:** In the given anology there are 2 twos in the first term and 4 twos in the second. Similarly there are 3 twos in the next half, so 222222(6 times) is the second term.
So the missing term is 222222 ;Answer:3

72. LFHW, KEGV, JDFU,

(1) ITCE

(2) ICET (3) IECT (4) ETCI

Reason: In each term each letter bachwarded by 1 steps ;i.e.first letters L,K,J,<u>I</u>; second letters in each term F,E,D,<u>C</u>; third letters in each term H,GF,<u>E</u>; fourth letters in each term W,V,U,<u>T</u>

So the missing term is ICET ;Answer:2

73. 11, 101, 1001, _____, 100001, 1000001 (1) 1001 (2) 10001 (3) 10000001 (4) 100000 Reason:11=10+1, 101=10²+1,1001=10³+1,10001=10⁴+1,100001=10⁵+1,1000001=10⁶+1, So the missing term is 10001 ;Answer:2

74. 2, 3, 5, 11, 13, ___, 19, 23 (1) 14 (2)15 (3) 16 (4) 17 **Reason:** The given series is series of prime numbers. **So the missing prime is 17 ;Answer:4**

75.T, W, Z, C, ___,I

(1) D (2)E (3) F (4) H **Reason:** The given sequence is T, W, Z, C, ___, I. In the sequence each letter is forwarded by 3 steps to its previous letter. **So the missing term is F ;Answer:3 OR** T=20, W=23, Z=26, C=3, <u>F=6</u>, I=9. **So the missing term is F ;Answer:3**

Reasoning (sequence and series) ICET- 2007:

Note: In each of the questions numbered 76 to 90 a sequence of numbers or letters that follow a definite pattern is given. Each question has a blank space. This has to be filled by the correct answer from the four given options to complete the sequence without breaking the pattern. 76. 2, 8, 18, 32, ___, 72, 98

(1) 46(2)52(3) 42(4)50Reason:2, 8=(2+6),18 = (8 + 10),32=(18+14), <u>50=(32+18)</u>, 72=(50+22), 98=(72+26) So the missing term is 50; Answer:4 77. 4, 13, 28, 49, __, 109, 148 (1)76(2)70(4)74(3)72Reason:4, 13=(4+9), 28=(13+15), 49=(28+21), <u>76=(49+27)</u>, 109=(76+33), 148=(109+39) So the missing term is 76; Answer:1 78. 0010,0011,,,, 0111,1011, $(3) 0101_{2}$ $(4) 0110_{2}$ $(1) 1010_{2}$ $(2)1000_{2}$ **Reason:**In decimal system 0010,=2, 0011,=3, 0101,=5, 0111,=7, 1011,=11. So 0101, is the missing term Answer:3 79. 0, 7, 26, 63, , 215, 343 (1) 126(2) 124 (3) 125 (4) 127 **Reason:** The given series is in the form $n^{3}-1$; $0=1^{3}-1$, $7=2^{3}-1$, $26=3^{3}-1$, $63=4^{3}-1$, $124 = 5^{3} - 1, 212 = 6^{3} - 6, 343 = 7^{3} - 1$. So the missing term is 124; Answer:2 80. ACEG, IKMO, , YACE (1) QSUW (2) PRTV (3) OSUV (4) QSVX **Reason:** In each term each letter forwarded by 8 steps ; i.e. $A^{+8}=I^{+8}=Q^{+3}=Y$; $C^{+8}=K^{+8}=S^{+8}=A; E^{+8}=M^{+8}=U^{+8}=C; G^{+8}=O^{+8}=V^{+8}=E;$ So the missing term is **QSUV**;Answer:3 81. 6, 15, 35, , 143, 221 (1) 81(2)93(3)78(4)77**Reason:** Given sequence is in the form of product of consecutive primes; 6=2x3, 15=3x5, 35=5x7, 77=7x11, 143=11x13, 221=13x17. So the missing term is 77; Answer:4 82. 5, 10, 26, ___, 122, 170 (1) 48(2)50(3) 49 (4) 53 **Reason:** Given sequence is in the form of n^2+1 , n is a prime; $5=2^2+1$, $10=3^2+1$, $26=5^2+1$, **50=7²+1**, $122=11^{2}+1$, $170=13^{2}+1$. So the missing term is 50;Answer:2 83. ABC, DEF, IJK, ,YZA (3) NOP (4) POR (1) MNO (2)LMN**Reason:**Observe the increments given for each term and each term has three consecutive alphabets. ABC_{+1} , DEF_{+3} , IJK_{+5} , PQR_{+7} , YZA. So the missing term is **PQR**; Answer: 4

84. 6:35::77: (1) 135(2)221(3)225(4)321**Reason:** Given are in the form of product of primes; 6=2x3, 35=5x7, 77=7x11, 221=13x17. So the missing term is 221;Answer:2 85. 8:16::125: (2)138 (1)426(3)625 (4)526**Reason:** Given are in the form $2^3:2^4::5^3:5^4$; So the missing term is 54=625;Answer:3 86. AEI, CGK, ____, GKO, IMQ (1)EIM(2)EIN(3)DHL (4)EJM**Reason:**Each ter is forwarded 2 steps to its previous term. $AEI_{+2} = CGK_{+2} = \underline{EIM}_{+2} = GKO_{+2} = IMQ; A_{+2} = C_{+2} = C_{+2} = G_{+2} = I,$ Similarly the other two. So the missing term is EIM; Answer:1 87. A, H, A, L, , H, E (1) S(3)V (4)U (2)T**Reason:** In the series 1st, 3rd, 7th terms are vowels. So the 5th term is also a vowel. So the missing term is U;Answer:4 OR 88. 216, 343, , 729 (1)470(2)512(3)570(4)626**Reason:** The given series is in the form n³; 216=6³, 343=7³, **512=8**³, 729=9³ So the missing term is 512;Answer:2 89. BDF, DHL, HPX, , FLR (1) JFV (2)PGV (3)PFV (4)PFU Reason: BDF, DHL, HPX, PFV, FLR 2 4 6, 4 8 12, 8 16 24, <u>16 32 48</u>, 32 64 96 because 32=32-26=6=F, 64=64-52=12=L, 48=48-27=21=V, 96=96-78=18=R, here we are using the cycling technique. So the missing term is PFV;Answer:3 OR $B^{x2}=D^{x2}=H^{x2}=P^{x2}=F$, because B=2, D=4, H=8, P=16. Similarly $D^{x2}=H^{x2}=P^{x2}=F^{x2}=L; F^{x2}=L^{x2}=X^{x2}=V^{x2}=R$ So the missing term is PFV;Answer:3 90. 05-01-1996, 27-01-1996, 18-02-1996, _____, 02-04-1996 (3)12-03-1996 (1) 08-03-1996 (2) 28-02-1996 (4)11-03-1996 **Reason:** There is a difference is 22 days between any two consequence dates of the given series 22+05-01-1996=27-01-1996; 22+27-01-1996=18-02-1996, 22+18-02-1996=11-03-1996 [because 1996 is a leap year and hence in February there

will be 29 days] 22+11-03-1996=02-04-1996 So the missing term is 11-03-1996; Answer:4

Reasoning (sequence and series) ICET- 2006:

Note: In each of the questions numbered 91 to 105 a sequence of numbers or letters that follow a definite pattern is given. Each question has a blank space. This has to be filled by the correct answer from the four given options to complete the sequence without breaking the pattern. 91. V2I, W3G, X5E, Y7C, ,A13Y

(1)Z11B (2) Z9B (3)Z9A (4) Z11A **Reason:** In each term 1st letter forwarded by 1 steps and 2nd is a prime number and 3rd letter backwarded by 2 steps; i.e. $V^{+1}=W^{+1}=X^{+1}=Y^{+1}=\underline{Z}^{+1}=A; 2, 3, 5, 7, \underline{11}, 13; I^{-2}=G^{-2}=E^{-2}=C^{-2}=\underline{A}^{-2}=Y;$ So the missing term is Z11A; Answer: 4

92. ACZY, CEYX, EGXW, , IKVU (1) GIZY (2) GIWV (3) GIVU (4) GIWU Reason: AC, CE, EG, GI, IK (the first two letters); ZY, YX, XW, WV, VU (the last two letters); So the missing term is GIWV;Answer:2 93. Z0A, Y3C, ,W15G, V24I (1) X9E (2)X8F (3)X8E (4) X9F **Reason:**Z, Y, X, W, V (the first letter); $0=1^2-1$, $3=2^2-1$, $8=3^2-1$, $15=4^2-1$, $24=5^2-1$. A, C, E, G, I (the last letter); So the missing term is X8E; Answer: 3 94. DFIK, GILN, JLOQ, (1)MORT (2)MOQS (3) MNRT (4) MNOT **Reason:** In each term each letter is forwarded by 3 steps ; i.e. $D^{+3}=G^{+3}=J^{+3}=M$; $F^{+3}=I^{+3}=L^{+3}=O$; $I^{+3}=L^{+3}=O^{+3}=R$; $K^{+3}=N^{+3}=O^{+3}=T$; So the missing term is MORT; Answer:1 95. ZYX, WVU, , QPO, NML, KJI (2) TSR (3) TRS (4)RST (1) SRT **Reason:** In letter forwarded by 3 steps ; i.e. $Z^{-3}=W^{-3}=T^{-3}=Q^{-3}=K$; $Y^{-3}=V^{-3}=S^{-3}=P^{-3}=M^{-3}=J; X^{-3}=U^{-3}=R^{-3}=O^{-3}=L^{-3}=I;$ So the missing term is TSR ;Answer:2 96. 3, 5, 7, 11, 13, 17, 19, ,29 (1) 21 (2) 25(3) 23(4) 27 **Reason:** The series is prime number series. So the missing term is 23: Answer:3 97. 5, 7, 12, 19, 31, ____, 81, 131 (1)36 (2)40 (3)48 (4) 50**Reason:**Every term of the sequence is sum of its previous two terms. 5, 7, (5+7)=12, (7+12)=19, (12+19)=31, (19+31)=50, (31+50)=81, (50+81)=131 So the missing term is 50 ;Answer:4 98. 15, 32, 66, , 270 (1)136(2) 134(3) 140 (4) 138

Reason:Every term of the sequence is in the for 2(previous term)+2.

99. (0,1), (1, 2), (2, 5), (3,10), ___,(5, 26) 1) (4, 17) (2) (4, 15) (3) (4, 19) (4) (4, 21)**Reason:** $(0,1)=(0,0^{2}+1);$ (1, 2)=(1, 1²+1); $(2, 5)=(2, 2^{2}+1);$ (3,10)=(3, $3^{2}+1);$ $(4, 4^2+1)=(4, 17);$ $(5, 26)=(5, 5^2+1);$ So the missing term is (4, 17);Answer:1 100. 2, 6, 12, 20, 30, ,56 (3) 42 (1)38(2) 40(4) 44Reason:2, 6=(2+4), 12=(6+6), $20=(12+8), \quad 30=(20+10), \quad 42=(30+12),$ 56=(42+14) **OR** $2=1^2+1$, $6=2^2+2$, $12=3^2+3$, $20=4^2+4$, $30=5^2+5$, $42=6^2+6$, $56=7^{2}+7$. So the missing term is 42; Answer:1 101. EJO, DHL, CFI, BDF, (1)ABC(2)ACE (3) ABD (4)ABE **Reason:** In each term 1st letter backwarded by 1 steps and 2nd is letter backwarded by 2 steps and 3^{rd} letter backwarded by 3 steps; i.e. $E^{-1}=D^{-1}=E^{-1}=A$; $J^{-2}=H^{-2}=F^{-2}=D^{-2}=B$; O $^{3}=L^{-3}=I^{-3}=F^{-3}=C$ So the missing term is ABC; Answer:1 102. HLTX, JMSV, LNRT, NOQR, (1)PPOR (2) RPPP (3) QPPQ (4)PPPP **Reason:** In each term 1st letter forwarded by 2 steps; 2nd is letter forwarded by 1 step; 3rd letter backwarded by 1 step and the 4th letter backwarded by 2 step; i.e. $H^{+2}=J^{+2}=L^{+2}=N^{+2}=\underline{P};$ $L^{+1}=M^{+1}=N^{+1}=O^{+1}=\underline{P};$ $T^{-1}=S^{-1}=R^{-1}=Q^{-1}=\underline{P};$ $X^{-2}=V^{-2}=T^{-2}=R^{-2}=\underline{P}.$ So the missing term is **PPPP**; Answer:4 103. 0,6, 24, 60, ,210 (1)120(2) 126 (3) 164 (4) 172 **Reason:** The given series is in the form n^3-n ; $0=1^3-1$, $6=2^3-2$, $24=3^3-3$, $60=4^3-4$, $120 = 5^{3} - 5$. $210=6^{3}-6.$ So the missing term is 120 : Answer:1 104. 3, 5, 9, 17, 33, (2) 65(3) 57 (4) 87 (1)67**Reason:**Each term of the sequence =2(previous term) -1; 3, 5=2(3)-1, 9=2(5)-1, 17=2(9)-1, 33=2(17)-1, 65=2(33)-1. So the missing term is 65; Answer:2 105. $\frac{1}{2}$, $\frac{8}{3}$, $\frac{27}{5}$, ..., $\frac{125}{11}$, $\frac{216}{13}$ (1) $\frac{81}{7}$ (2) $\frac{64}{7}$ (3) $\frac{81}{9}$ (4) $\frac{64}{9}$ **Reason:** In each term numerarors are in the form n³ and the denominators are prime numbers. $\frac{1}{2} = \frac{1^3}{2}, \ \frac{8}{2} = \frac{2^3}{2}, \ \frac{27}{5} = \frac{3^3}{5}, \ \frac{64}{7} = \frac{4^3}{7}, \ \frac{125}{11} = \frac{5^3}{11}, \ \frac{216}{13} = \frac{6^3}{13}$

Reasoning (sequence and series) ICET- 2005:

Note: In each of the questions numbered 106 to 120 a sequence of numbers or letters that follow a definite pattern is given. Each question has a blank space. This has to be filled by the correct answer from the four given options to complete the sequence without breaking the pattern. 106. 0010, 0011, 0101, _____, 1011

 $(1)\ 0001$ (2)0111 (3) 1010 (4) 1111 **Reason:**In decimal system 0010=2, 0011=3, 0101=5, <u>0111=7</u>, 1011=11. So 0111 is the missing term Answer:2 107. 1, 2, 3, 5, ____, 10, 15, 30 (1)6(2)11(3)7(4)8**Reason:** The sequence represents the factors of 30 in ascending order. So the missing term is 6; Answer:1 108. AZBY, CXDW, ____, GTHS (2)EVFU (3) EVRU (4) EVSU (1) EXUV Reason: In each term 1st and 3rd letters forwarded by 2 steps and 2nd and 4th letters backwarded by 2 steps; $A^{+2}=C^{+2}=E^{+2}=G$; $Z^{-2}=X^{-2}=V^{-2}=T$; $B^{+2}=D^{+2}=F^{+2}=H$; $Y^{-2}=W^{-2}=U^{-2}=S$; Answer:2 109. 9, 19, 40, ____, 146 (1) 70 (2) 59 (4) 64(3) 69 Reason: The sequence represents ; Answer:3 110. 7:13::21: (2)27(3) 23(1) 31(4) 17**Reason:**7⁺⁶=13;21⁺⁶=27.So the missing term is 27; **Answer:2** 111. 8:27:: :343 (1) 125(2)216(3) 124 (4) 163 **Reason:** $8=2^3$;27= 3^3 ;343= 7^3 . So the missing term is $5^3=125$; **Answer:1** 112. $11\frac{1}{9}, 12\frac{1}{2}, 14\frac{2}{7}, 16\frac{2}{3}, __$ (1) $18\frac{2}{3}$ (2) $18\frac{2}{7}$ (3) $17\frac{1}{6}$ (4) 20 **Reason:** $11\frac{1}{9} = \frac{100}{9}$, $12\frac{1}{2} = \frac{25}{2} = \frac{100}{8}$, $14\frac{2}{7} = \frac{100}{7}$, $16\frac{2}{3} = \frac{50}{3} = \frac{100}{6}$, $\frac{100}{5} = 20$. So the missing term is $\frac{100}{5} = 20$; Answer:4 113. 165, 195, ____, 285, 345 (1) 235 (2) 245 (3) 275 (4) 255

Reason:165, 195=(165+30),[195+40=235], [235+50=285], [285+60=345]. So the missing term is 235; Answer:1

114. 09:25::49:(1) 64 (2)81 (3) 36 (4) 68 **Reason:** $9=3^2;25=5^2;49=7^2$.So the missing term is $9^2=81$; **Answer:2**

115. 13, 29, ___, 125, 253 (1) 49 (2)59 (3) 61 (4) 72 **Reason:**Each term of the sequence=2(previous term) + 3. So the missing term is 2(29)+3=58+3=61; **Answer:3**

116. 583:283::488: (1) 387 (2)378 (3) 478 (4) 368 **Reason:**;583+283=866; So 488+**378**=866. **Answer:2**

117. CAT, FDW, IGZ, ____, (1) LIC (2) MJC (3) LJBH (4) LJC **Reason:** In each term 1st, 2nd and 3rd letters forwarded by 3 steps .C⁺³= $F^{+2}=I^{+3}=L$; A⁺³= $D^{+3}=G^{+3}=J$; T⁺³=W⁺³=Z⁺³=C; So the missing term is LJC ; **Answer:4**,

118. 82:122:: ____:226 (1) 154 (2)145 (3) 185 (4) 170 Reason:Each term is in form (odd)²+1. 82=81+1=9²+1; 122=121+1=11²+1;226=225+1=15²+1; So the missing term is 13²+1=169+1=170; Answer:4

120. D4V, F6T, _____, J10P (1) K7P (2)L8P (3) H8R (4) H9S Reason:D, F, <u>H</u>, J : 4, 6, <u>8</u>, 10 ; V, T, <u>R</u>, P : 22, 20,<u>18</u>, 16.So the missing term is H8R; Answer:3

Number Analogy

| 1. | 11529 : 72135 : : 152943 : ? | | | | | | | | |
|-----|------------------------------|-----------------|---------------|------------------|--|--|--|--|--|
| | A. 213549 | B. 203448 | C. 163044 | D. 62034 | | | | | |
| 2. | 42:56::110:? | | | | | | | | |
| | A. 18 | B. 126 | C. 132 | D. 140 | | | | | |
| 3. | 26:5:65:? | | | | | | | | |
| | A. 6 | B. 7 | C. 8 | D. 9 | | | | | |
| 4. | 20:11::102:? | | | | | | | | |
| | A. 49 | B. 52 | C. 61 | D. 98 | | | | | |
| 5. | Given set :(12, 20, | . 28) | | | | | | | |
| | A. (5,10,5) | B. (13,21,29) | C. (17,27,5) | D. (20,15,25) | | | | | |
| 6. | Given set :(18, 9, 2 | 2) | | | | | | | |
| | A. (3,7,1) | B. (11,12,10) | C. (17,9,3) | D. (24,12,2) | | | | | |
| 7. | Given set :(63,48,3 | 35) | | | | | | | |
| | A. (72,40,24) | B. (72, 48, 24) | C. (64,40,28) | D. (80,63,48) | | | | | |
| 8. | 6542 : 5431 : : 467 | 73:? | | | | | | | |
| | A. 2367 | B. 3562 | C. 2531 | D. None of these | | | | | |
| 9. | 125:217::343:? | | | | | | | | |
| | A. 730 | B. 346 | C. 512 | D. 513 | | | | | |
| 10. | 9:90::12:? | | | | | | | | |
| | A. 124 | B. 148 | C. 156 | D. 172 | | | | | |
| 11. | 7:56::9:? | | | | | | | | |
| | A. 48 | B. 60 | C. 64 | D. 72 | | | | | |

| 12. | 49:81::100:? |
|-----|--------------|
|-----|--------------|

| | A. 64 | B. 144 | C. 169 | D. 199 |
|-----|------------|--------|--------|--------|
| 13. | 2:8::5:? | | | |
| | A. 5 | B. 125 | C. 50 | D. 125 |
| 14. | 4:8::9:? | | | |
| | A. 17 | B. 19 | C. 21 | D. 27 |
| 15. | 5:130::6:? | | | |
| | A. 220 | B. 216 | C. 222 | D. 36 |
| 16. | 3:11::7:? | | | |
| | A. 11 | B. 18 | C. 20 | D. 51 |

KEY

Ans is A 1. First number + 60606 is the second number 11529 + 60606 = 72135Same as 152943 + 60606 = 72135 2. Ans is C $6^2 + 6: 7^2 + 7:: 10^2 + 10: 11^2 + 11$ Ans C 3. $\sqrt{26-1} = 5 Sameas \sqrt{65-1} = 8$ Ans B 4. $\frac{20}{2}$ +1=11 Same as $\frac{102}{2}$ +1=52 5. Ans B 12 + 8 = 20; 20 + 8 = 28 Same as 13 + 8 = 21; 21 + 8 = 29Ans D 6. The product of 2nd and 3rd numbers is 1st number Ans D 7. $8^2 - 1$, $7^2 - 1$, $6^2 - 1$ same as $9^2 - 1$, $8^2 - 1$, $7^2 - 1$ Ans B 8. First number – 1111 is the second number 9. Ans D $5^3: 6^3 + 1$ same as $7^3: 8^3 + 1$

10. Ans C 9:9²+9::12:12²+12 11. Ans D First number multiply with 8 is second number 12. Ans B 7²:9²::10²:12² 13. Ans B 2:2³::5::5³

14. Ans D

 $2^2: 2^3:: 3^2: 3^3$

15. Ans C

 $5:5^3+5::6:6^3+6$

16. Ans D

 $3: 3^2 + 2: 7: 7^2 + 2$

WORD ANALOGY

| 1. | As 'Wheel' is related to 'Vehicle' similarly 'Clock' is related to what? | | | | | | | |
|----|---|--------------------------|--------------------------|---------------|--|--|--|--|
| | (A) Needle | (B) Nail | (C) Stick | (D) Pin | | | | |
| | (E) None of these | | | | | | | |
| 2. | As 'Plateau' is related | d a 'Mountain', simila | rly 'Bush' is related to | what? | | | | |
| | (A) Plants | (B) Field | (C) Forest | (D) Trees | | | | |
| | (E) Stem | | | | | | | |
| 3. | As 'Astronomy' is related to 'Planets', similarly 'Astrology' is related to what? | | | | | | | |
| | (A) Satellites | (B) Disease | (C)Animals | (D) Coins | | | | |
| | (E) None of these | | | | | | | |
| 4. | As 'Earthquake' is re | lated to 'Earth', simila | rly 'Thundering' is rel | ated to what? | | | | |
| | (A) Earth | (B) Sea | (C) Fair | (D) Sky | | | | |
| | (E) None of these | | | | | | | |
| 5. | As'Author' is related | to 'Writing', similarly | 'Thief is related to wh | nat? | | | | |
| | (A) To night | (B) To feel | (C) To steal | | | | | |

| | (D) To wander | (E) None of these | | |
|-----|--------------------------|---------------------------|--------------------------|---------------------------|
| 6. | As 'Magazine' is rela | ated to 'Editor' in the s | ame way 'Drama' is r | elated to what? |
| | (A) Hero | (B) Heroine | (C) Co-actor | (D) Villain |
| | (E) None of these | | | |
| 7. | As 'Steal' is related t | to 'Factory' in the sam | e way 'Wheat' is relat | red to what? |
| | (A) Field | (B) Sky | (C) Godown | (D) Market |
| | (E) None of these | | | |
| 8. | As 'Cricket' is relate | d to 'Bat' in the same | way, 'Tennis' is related | d to what? |
| | (A) Game | (B) Stick | (C) Court | (D) Hand |
| | (E) None of these | | | |
| 9. | As 'Football' is related | ed to 'Field' in the sam | ne way, 'Tennis' is rela | ted to what? |
| | (A) Court | (B) Net | (C) Fieldq | (D) Racket |
| | (E) None of these | | | |
| 10. | As 'Tennis' is related | l to 'Racket' in the san | ne way 'Hockey' is rel | ated to what? |
| | (A) Ball | (B) Stick | (C) Field | (D) Player |
| | (E) None of these | | | |
| 11. | As 'Mosque' is relate | ed to 'Islam' in the san | ne way 'Church' is rel | ated to what? |
| | (A) Hinduism | (B) Sikhism | (C) Christianity | (D) Buddhism |
| | (E) None of these | | | |
| 12. | As 'Hindu worshiper | ' is related to 'Temple | 'in the same way 'Ma | ulvi' is related to what? |
| | (A) Monastery | (B) Church | (C) Mosque | (D) Sikh temple |
| | (E) None of these | | | |
| 13. | As 'Hungry' is relate | ed to 'Food' in the sam | e way 'Thirsty' is rela | ted to what? |
| | (A) Drink | (B) Tea | (C) Coffee | (D) Juice |
| | (E) Waler | | | |
| 14. | As 'Fly' is related to | 'Parrot' in the same w | vay 'Creep' is related t | to what? |
| | (A) Snake | (B) Rabbit | (C) Fish | (D) Crocodile |
| | | | | |

| (E) | Sparrow |
|-----|---------|
|-----|---------|

| 15. | As 'Needle' is related to 'Thread' in the same way 'Pen' is related to what? | | | | | | | | | | |
|-----|--|-------------|-----------|----------------|--------------|----------|---------------|------------|------------|-----------------|--|
| | (A) W | ord | | (B) To w | (B) To write | | (C) Cap | | (D) l | nk | |
| | (E) Pa | per | | | | | | | | | |
| 16. | As 'Ci | rcle' is r | related | to 'Circu | mferenc | e' in th | ne same w | ay 'Squ | are' is re | elated to what? | |
| | (A) Di | agonal | | (B) Perin | neter | (| C) Circun | nference | (D) / | Area | |
| | (E)An | gle | | | | | | | | | |
| 17. | As 'Be | ell' is rel | ated to | 'Sound' | in the sa | ıme wa | ay 'Lamp' | is relate | d to wh | at? | |
| | (A) Fla | ame | | (B) Light | t | (| C) Wick | | (D) (| Dil | |
| | (E) Go | ong | | | | | | | | | |
| 18. | As 'Oi | il' is rela | ted to a | n 'Oilma | ın', in th | e same | e way 'Mil | lk' is rel | ated to v | vhat? | |
| | (A) Water | | | (B) Blacksmith | | (| (C) Shoemaker | | (D) N | (D) Milkman | |
| | (E) No | one of th | ese | | | | | | | | |
| 19. | As 'Fu | ırniture' | is relat | ed to 'Be | nch' in t | the sam | ne way 'St | tationary | ' is rela | ted to what? | |
| | (A) Godown | | | (B) Room | | (| (C) Pen | | (D) (| (D) Chair | |
| | (E) Office | | | | | | | | | | |
| 20. | CTPN | : DSQN | /I : : MU | JSK:? | | | | | | | |
| | (A) N | VTL | | (B) NIT. | J | (| C) NTTL | | (D) I | LTRJ | |
| | (E) None of these | | | | | | | | | | |
| | | | | | | KE | Y | | | | |
| | 1.A | 2.C | 3.E | 4.D | 5.C | 6.E | 7.A | 8.E | 9.A | 10.B | |
| | 11.C | 12.C | 13.E | 14.A | 15.D | 16.B | 17.B | 18.D | 19.C | 20.B | |

In the following questions pick the odd thing out.

1.(1)Fish (2) Frog (3) Crocodile (4) Turtle Ans:(1) Fish is odd, because the remaing all can live both in water and on land.

2.(1) $x^2 - 1 = 0$ (2) $x^2 - 4 = 0$ (3) $x^2 - 9 = 0$ 4) $x^2 - 12 = 0$ Ans:(4); $x^2 - 12 = 0$ is odd , because the remaining are of the form $x^2 - a^2 = (x+a)(x-a)$ type.

3.(1) Parallelogram (2) Rectangle (3) Rhombus (4) Square **Ans:(1);** Parallelogram is odd, because the remaining all have 90^o angles.

4. (1) 43 (2) 63 (3) 33 (4) 93 Ans: (1); 43 is odd and 43 is prime and the remaining are all not primes. 63=7x9;33=3x11;93=3x31

5. (1) 16 (2) 25 (3) 36 (4)48 Ans: (4); 48 is odd, because the remaining are all squares .16=4x4;25=5x5;36=6x6;

6. (1) 13 (2) 21 (3) 48 (4) 232 Ans: (1); 13 is prime and the remaining are all not primes

7. (1)0.01 (2)0.001 (3) 0.0001 (4) 0.000001 Ans: (2);0.001 is odd, because the remaining all have odd number of zeros.

8. (1) $\frac{3}{7}$ (2) $\frac{11}{13}$ (3) $\frac{17}{19}$ (4) $\frac{21}{23}$

Ans: (1); $\frac{3}{7}$ is odd , because in the remaining fractions the difference between numerator and denominator is 2.

9.(1) $\frac{15}{19}$ (2) $\frac{18}{19}$ (3) $\frac{21}{19}$ (4) $\frac{11}{19}$

Ans: (4); $\frac{11}{19}$ is odd, because in the remaining fractions the numerator is not a prime number.

10. (1) 24 (2) 121 (3)720 (4) 5040 Ans: (2); 121 is a perfect square; 121=11x11. The remaining are all not perfect squares.

11. (1) 35 (2) 77 (3)117 (4) 143 Ans: (3);35=5x7;77=7x11;117=9x13;143=11x13. 117 is not product of primes.

12. (1) 14 (2) 34 (3)62 (4) 96 Ans: (4);14=2x7;34=2x17;62=2x31;96=2x3x4x4. 96 in not product of primes. 13. (1) (2,3,13) (2) (3,4,25) (3)(4,5,41) (4) (5,6,71) **Ans:** (4); $2^2+3^2=13$; $3^2+4^2=25$; $4^2+5^2=41$; $5^2+6^2=61$ but it was given as 71 and hence it is odd.

14. (1) July(2) August(3) September(4) OctoberAns: (3); September is odd because the remaining all has 31 days in a month.

15. (1) 11 (2) 111 (3)11111 (4) 11111111 Ans: (1); 11 because the remaining all has odd number of 1's.

16. (1)
$$\frac{19}{15}$$
 (2) $\frac{13}{11}$ (3) $\frac{7}{5}$ (4) $\frac{3}{2}$

Ans: (1); $\frac{19}{15}$ denominator 15 is not prime. $\frac{3}{2} = 1.5$; $\frac{19}{15} = 1.26666..; \frac{13}{11} = 1.181818...; \frac{7}{5} = 1.4$

 $\begin{array}{rcl} 17.(1) & (0111)_2 & (2) & (1101)_2 & (3) & (1111)_2 & (4) & (10001)_2 \\ \textbf{Ans: (3);} & (1111)_2 & \text{is odd because the remaining all has at least one zero. OR} \\ & (0111)_2 = 0 + 4 + 2 + 1 = 7, \text{a prime;} & (1101)_2 = 8 + 4 + 0 + 1 = 13, \text{a prime;} \\ & (1111)_2 = 8 + 4 + 2 + 1 = 15, \text{not a prime;} & (10001)_2 = 16 + 0 + 0 + 1 = 17, \text{a prime;} \end{array}$

18. (1) 2W3 (2) 1Q7 (3)1M3 (4) 1R9 Ans: (4);In English alphabets W=23; Q=17; M=13; And R=18 but not 19.

19.(1) $x^{2}+4x+5 = 0$ (2) $x^{2}+4x+4 = 0$ (3) $x^{2}-4x+4 = 04$) $x^{2}+2x+1 = 0$ **Ans:** (1); $x^{2}+4x+4 = (x+2)^{2}$; $x^{2}-4x+4 = (x-2)^{2}$; $x^{2}+2x+1 = (x+1)^{2}$; $x^{2}+4x+5$ cannot be written as a square.

20. (1) 37 (2) 47 (3)57 (4) 67 Ans: (3);57=3x19 is not a prime, the remaining are all primes.

21. (1) 80 (2) 99 (3)120 (4) 163 Ans: (4);80=8x10; 99=9x11;120=10x12;163 is a prime, the remaining are all not primes.

22. (1) Bus complex (2) Cinema hall (3) Railway station (4) Aerodrome **Ans: (2);** Cinema hall is odd, because the remining all are useful for travelling.

23. (1) 2T1 (2) 2V2 (3)2X4 (4) 2Z6 Ans: (1);In English alphabets T=20 but not 21; V=22; Z=26; X=24.

24.(1) Hand (2) Eye (3)Ear (4)Mouth **Ans: (1);**Hand is foldable the remaining are not.

25.(1) $x^{2}+1=0$ (2) $x^{2}+3x+6=0$ (3) $x^{2}+2x+5=0$ 4) $x^{2}-x-12=0$ Ans: (1); $x^{2}+=0$ has real factors, the remaining all have real factors. 26.(1) K (2) C (3)G (4) T Ans: (4);In English alphabets K=11;C=3;G=7,these there are primes. But T=20 not a prime

27. (1)Violin (2) Veena (3)Mandolin (4)Flute Ans: (4);Flute is played with the help of mouth and hands is odd, because the remining all are played with only hands.

28.(1)35 (2)46 (3)72 (4)91 Ans: (3);72 is odd, because 72=2x2x2x3x3, cannot be expressed as product of two primes; 35=5x7; 46=2x23; 91=7x13.

29.(1)28 (2)65 (3)126 (4)216 Ans: (2);65 is odd number,the remaining are all even numbers.

30.(1)FIHG(2)KNML(3)RTUS(4)VYXWAns: (3);RTUS is not in the same manner as the remaining.FGHI;KLMN;VWXY

31. (1)River (2)Lake (3)Dam (4)Pond Ans: (1);Except river all other bodies contain still water.

32.(1) E (2)G (3)K (4)P Ans: (1 OR 4);In English alphabets K=11;E=5;G=7,these there are primes. But P=16 not a prime OR E is the vowel the remining are all consonents.

33.(1) Cap(2) Turban(3) Helmet(4) VeilAns: (4); Except Veil all other are Head wears.

 34.(1) JLNQ
 (2) FHKU
 (3)CEHL
 (4) NPSW

 Ans: (1);In English alphabets
 J L N Q=10 12 14 17;
 F H K U=6 8 11 15;

 C E H L=3 5 8 12; N P S W=14 16 19 23
 observe the difference and increase.

35.(1) 576 (2) 225 (3)672 (4)961 Ans: (3);576=24x24; 225=15x15; 961=31x31 We cannot write 672 as a square.

36. (1) (14,3,4) (2) (26,4,6) (3)(37,5,7) (4) (70,8,9) **Ans: (4);** (14=3x4+2,3,4);(26=4x6+2,4,6);(37=5x7+2,5,7);We cannot 70 as the earlier. (70=-X-+2,8,9);

37.(1)17 (2)13 (3)11 (4)2 Ans: (4);Except 2 all other are odd primes and have two place values.

 38.(1)LUNG
 (2)EYE
 (3)HEART
 (4)EAR

 Ans: (3);Except HEART are all pairs.
 39.(1)31
 (2)41
 (3)51
 (4)61

 Ans: (3);51=3x17 is odd number,the remaining are all prime numbers.

41. (1)57 (2)67(3)77 (4)87 **Ans: (2);**Except 67 all are not primes.57=3x19;77=7x11;87=3x29 42.(1)25 (2)49(3)64(4)81 Ans: (3);Except 64 all are squares of odd primes.25=5x5;49=7x7;81=9x9 43.(1)30 (2)12(3)20(4)8Ans: (1 OR 4); Except 30 all are divisible by 4. $30=5^2+5$: $20=4^{2}+4;$ $8 = 2^{3}$ $12=3^2+3;$ (3)8044.(1)10 (2)28(4)244Ans: (3): Except 80 all are in the form $3^{n}+1$; $10=3^{2}+1$; $28=3^{3}+1$; $244=3^{5}+1$ (3) 0.000145.(1)0.01 (2)0.001(4) 0.000001Ans: (2);0.001 is odd, because the remaining all have odd number of zeros. $0.01 = 10^{-2}$; $0.001 = 10^{-3};$ $0.0001 = 10^{-4};$ $0.000001 = 10^{-6}$ 46.(1) FG (2) HI (3)KL (4) OQ Ans: (4);In English alphabets except OQ, the remaining letters are consecutive. (4)FU 47.(1)AZ (2) CX(3)DV Ans: (3); In English alphabets except DV, the remaining are oppositive pairs. С D F G Η Ι J Κ А В E L M Ζ Y Х W V U Т S R Q Р O N. 48.(1) BAT (2)CAT(3)RAT (4)MATAns: (4); Except MAT, the remaining are living. 49.(1) 289 (2) 361 (3)529 (4)441**Ans:** (4);441=21², not a prime square; 289=17²; 361=19²: $529=23^2$: 50.(1) 15 (2)77(3)117(4)221Ans: (3); Except 117=9x13, the remaining 15=3x5; 77=7x11; 221=13x17 are all products of consecutive primes. 51.(1)2(2)3(3)5(4)7Ans: (1); Except 2, the remaining are all odd primes. 52.(1) 46 (2)58(3)69 (4)34Ans: (3); Except 69=3x23, the remaining are all even numbers. (3)91 53.(1) 35 (2)77(4)63Ans: (4): Except 63=9x7, the remaining 35=7x5; 77=7x11; 91=13x7 are all products of consecutive primes. 54.(1) 180 (2)247(3)246(4)147Ans: (3); Except 247=19x13, the remaining are all divisible by 3.

55.(1) 29(2)47(3)51(4)67**Ans:** (4); Except 51=3x17, the remaining all are primes.56.(1) 95(2) 91(3)92(4)97

Ans: (3 OR 4);92 is even the remaining are all odd OR 97 is prime, the remaining are all not primes.

57.(1)B (2)D (3)I (4)P Ans: (3);In English alphabets B=2;D=4;I=9, P=16. I is the vowel the remining are all consonents.

58.(1) BAT (2)CAT (3)DOT (4)PAT Ans: (3);Except DOT, the remaining have A in the middle.

59.(1) 5 (2)50 (3)122 (4)169 **Ans: (4);**Except $169=13^3$, $5=2^2+1$; $50=7^2+1$; $122=11^2+1$ 169 is a perfect square the remaining are not.

60.(1) 961 (2)531 (3)169 (4)841 Ans: (2);Except 531, the remaining are perfect squares.961=31²;169=13²;841=29²

61.(1)AXZT (2)XZTA (3)ZTAX (4)TAZX Ans: (4);Places between A,X,Z,T are cyclic except TAZX.

62.(1)67 (2)57 (3)47 (4)37 Ans: (2);Except 57,the remaining are all prime numbers. 57=3x19.

 $64.(1)\frac{15}{14} \qquad (2)\frac{2}{3} \qquad (3)\frac{23}{24} \qquad (4)\frac{31}{35}$

Ans: (4); Except $\frac{31}{35}$, the remaining fractions have consecutive numbers.

65.(1)Fish (2)Frog (3)Crocodile (4)Turtle Ans: (1);Except Fish ,all the remaining can live in both water and on earth.

66.(1)August (2)July (3)May (4)June Ans: (4);Except June all the remaining months has 31 days.

67.(1)216 (2)343 (3)516 (4)729 Ans: (3);216=6³;343=7³;516 is not a cube ; 729=9³ 71.(1)65 (2)126 (3)217 (4)343 Ans: (4); Except 343, the remaining are in the form $n^3+1.65=4^3+1$; 126=5³+1;216=6³+1

72.(1) $\frac{15}{19}$ (2) $\frac{11}{13}$ (3) $\frac{3}{7}$ (4) $\frac{2}{5}$

Ans: (1); Except $\frac{15}{19}$, the remaining fractions both numerator and denominator is prime.

73.(1)345 (2)143 (3)567 (4)789 Ans: (2);Except 143,in the remaining the middle is the average of the extremes.

74.(1)169 (2)961 (3)132 (4)625 Ans: (3);Except 132,the remaining are squares. 169=13²; 961=31²; 625=25²

75.(1)DELM (2)BDIJ (3)GHRS (4)PQAB Ans: (2);Except BDIJ,the remaining the first two and the last two are consecutive.

76.(1)BFH (2)MQS (3)GJL (4)NRT
Ans: (3);Except GJL, in the remaining there is 3 letters between first two letters.
B F H=2 6 8;M Q S=13 17 19;G J L=7 10 12;N R T=14 18 20. Observe the difference.

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
|----|----|----|----|----|----|----|----|----|----|----|----|----|
| А | В | С | D | Е | F | G | Η | Ι | J | Κ | L | М |
| 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 |
| Ν | 0 | Р | Q | R | S | Т | U | V | W | Х | Y | Ζ |

77.(1)Planet (2)Satellite (3)Sky (4)Star Ans: (3);Except Sky,the remaining lies in the sky.

78.(1)Bat(2)Fat(3)Eat(4)Pot**Ans: (4);**Except Pot,the remaining have A as the middle letter.

79.(1)697(2)957(3)894(4)876**Ans: (1);**Except 697, the remaining sum of the digits is 21.

80.(1)96 (2)64 (3)48 (4)78 **Ans: (2);**Except 64, the remaining are divisible by 3.

In the following questions pick the odd thing out.

ICET-2013

1. (1)ABYZ (2) CDWX (3) EFUV (4) GHTS Ans:(4) A=1, B=2, Y=25, Z=26; C=3,D=4, W=23, X=24; E=5,F=6,U=21, V=22; G=7,H=8,T=20, S=19. It should be GHST

2. (1) $x^3 - 4 = 0$ (2) $x^3 - 3 = 0$ (3) $x^3 - 2 = 0$ (4) $x^3 - 1 = 0$

Ans:(4); $x^3 - 1 = 0$ can be resolved into real factors.

3. (1) (5,6,11) (2) (6,7,13) (3) (7,8,15) (4) (8,9,19) **Ans: (4)** (5,6+11; 6+7=13; 7+8=15; 8+9=17 but it was given as 19 and hence it is odd.

4. (1) $\sin^2 x + \cos^2 x$ (2) $\sec^2 x - \tan^2 x$ (3) $\tan^2 x + \cot^2 x$ (4) $\cos ec^2 x - \cot^2 x$ **Ans: (3);** $\sin^2 x + \cos^2 x = 1$; $\sec^2 x - \tan^2 x = 1$; $\cos ec^2 x - \cot^2 x = 1$; $\tan^2 x + \cot^2 x \neq 1$

5. (1) Eagle (2) vulture (3) owl (4) crow **Ans: (3);** owl is odd, because it will fly during night only.

ICET-2014

1. (1) 147 (2)125 (3) 103 (4) 84 Ans: (3); 103 is prime and the remaining are all not primes

2. (1)(3,4,5) (2)(5,12,13) (3)(6,8,10) (4)(10,12,15) Ans: (3);6,8,10 are all the three are even.

3. (1)April (2)May (3) November (4)September Ans: (1);May is odd ,because the remaining have 30 days in a month, but May has 31 days.

4.
$$(1)\frac{19}{15} (2)\frac{13}{11} \qquad (3)\frac{7}{5} \qquad (4)\frac{3}{2}$$

Ans: (1); $\frac{19}{15}$ is odd, because in the remaining fractions numerator and denominator are consecutive primes.

5. (1) C 4 E (2) G 8 I (3)L 15 N (4) T 21 V Ans: (3); C=3, 4 E=5; G=7, 8, I=9; <u>L=12 15 N=14</u>; T=20, 21, V=21

Telangana ICET-2015

- 1. (1)36 (2) 28 (3) 126 (4) 343 **Ans:**(4) $36 = 2^2 x 3^2$; $28 = 2^2 x 7$; $126 = 2 x 3^2 x7$; $343 = 7^3$. Hence 343 is odd
- 2. (1) 87 (2) 77 (3) 67 (4) 57 **Ans:(3)** 87 = 3×29 ; 77= 11×7 ; 67 is a prime; 57= 3×19 . Hence 67 is odd.
- 3. (1) $x^{2}+4x+4$ (2) $x^{2}-2x+1$ (3) $x^{2}+2x+1$ (4) $x^{2}+2x+2$ **Ans:** (4); $x^{2}+4x+4=(x+2)^{2}$; $x^{2}-2x+1=(x-1)^{2}$; $x^{2}+2x+1=(x+1)^{2}$; $x^{2}+4x+2$ cannot be written as a square. Hence $x^{2}+2x+2$ is odd.
- 4. (1) 1993 AD (2) 1994 AD (3) 1995 AD (4) 1996 AD Ans:(4) 1996 AD is odd because it is a Leap year and the remaining are non-leap years.
- 5. (1) Standard deviation (2) Variance (3) range (4) Mode Ans:(4) Mode is odd because it is a measure of central tendency and the remaining are measures of dispersion.

A.P. ICET-2015

| 1. | (1)Goat | (2) Cow | (3) Cat | (4) Camel |
|----|----------------|------------------|--------------------|---------------------|
| | Ans:(3) Cat. T | he remaining are | e Herbivore i.e tl | hey eat grass only. |

- 2. (1) Chlorine (2) Bromine (3) Iodine (4) Methane Ans:(4) Methane is used as cooking gas.
- 3. (1) 15 (2)35 (3)77 (4)99 **Ans: (3 OR 4);** 15 = 3 x 5; 35 = 5 x 7; 77 = 7 x 11; 99 = 3x 3 x 11
- 4. (1) (2, 3, 7) (2) (3, 5, 8) (3) (5, 7, 12) (4) (7, 11, 16) **Ans:(1)** In each triple there is one non-prime. But 2, 3, 5 are primes.
- 5. (1) 25 (2)81 (3)121 (4)289 Ans: (2); 25 = 5 x 5; 81 = 3 x 3 x 3 x 3; 121 = 11 x 11; 289 = 17 x 17.
Data Analysis: Study the following Pie diagram and answer the questions.



1. The miscellaneous charges amount Rs. 10,000 and a total of 13,000 copies of the book are printed. What is the cost of each copy at which the book must be priced, if the publisher desires a profit of 4%?

1. Rs.40 2. Rs.36 3. Rs.52 4. Rs.48 **Solution:**
$$2\% = \text{Rs.10,000}$$
. So $100\% = 5,00,000$. Profit = $4\% = 20,000$.

So cost of each book = $\frac{5,20,000}{13,000}$ = Rs.40. So the answer is 1.

2. If the transportation charges are reduced by half, then how much is the saving if the binding charges amount to Rs. 60,000?

1. Rs.15,000 2. Rs.30,000 3. Rs. 25,000 4. Rs. 20,000 **Solution:** Binding charges = 12%, which is equal to Rs. 60,000.

So saving = $\frac{4}{12} \ge 60,000 = \text{Rs. } 20,000$. So the answer is 4.

3. If the author's royalties amount to Rs. 30,000/- more than the printing charges, how much will be the amount for advertisement charges ?

1. Rs.60,000 2. Rs.45,000 3. Rs.75,000 4. Rs.90,000 **Solution:** Author's royalties - printing charges = 6%. So 6% = 30,000.

The amount for advertisement charges = $\frac{18}{6}$ X 30,000 = 90,000. So the answer is 4.

4. What is the angle of the sector for miscellaneous charges?

1. $6^{0}36'$ 2. $7^{0}24'$ 3. $7^{0}12'$ 4. $6^{0}12'$ Solution: $100\% = 360^{\circ}$. So misllaneously charges = 2%, which is = $\frac{2}{100}$ x $360 = 7.2^{\circ} = 7^{\circ}12'$. So answer is 3.

5. If the cost of the paper and the transportation put together amounts of Rs.70,000, then the total expenditure incurred in bringing out the book is (in rupees)

1. 6,00,000 2. 5,00,000 3. 5,40,000 4. 4,50,000Solution: Cost of paper + transport = 14%. Which was given as 70,000.

So total expenditure incurred in bringing out the book = $\frac{100}{14} \ge 70,000 = 5,00,000$

So the answer is 2.

In the bar diagram given below, the frequency distribution of workers in a factory is given according to the number of dependents they have. Answer the questions.



- 1. The total number of dependent that all the workers have 1. 560 2. 650 3. 580 4. 540 **Solution:** 40(1) + 60(2) + 35(3) + 40(4) + 15(5) + 10(6)= 40 + 120 + 105 + 160 + 75 + 60 = 560. **So the answer is 1.**
- 2. What is the percentage of illiterate workers among the total workers ? 1. 48 2. 47.5 3. 48.5 4. 52.5 **Solution:** Total workers = 40 + 60 + 35 + 40 + 15 + 10 = 200. Number of illiterate workers = 15 + 25 + 20 + 20 + 10 + 5 = 95.

So percentrage of illiterate workers among the total workers = $\frac{95}{200} \times 100 = 47.5$.

So the answer is 2.

- 3. The total number of workers in the organization is 1. 150 2. 200 3. 250 4. 300 **Solution:** Total number of workers = 40 + 60 + 35 + 40 + 15 + 10 = 200. **So the answer is 2.**
- 4. The ratio of literate workers to illiterate workers is

 2. 20:21
 2. 20:21
 2. 21:19
 19:21

 Solution: Total number of workers = 200. Total number of illiterate workers = 95. Total number of literate workers = 105. So required ratio = 105 : 95 = 21 : 19. So the answer is 3.
- 5. The number of literate workers with at least 3 dependents is 1. 50 2. 55 3. 65 4. 45 Solution: 15 + 20 + 5 + 5 = 45. So the answer is 4.

Data Analysis: Study the following table and Pie chart and answer the questions.

B: Canteen

- C: Medical Expenses D: Insurance and Social Security
- E: Miscellaneous

A: Salaries

The above diagram shows the heads of expenditure

under various categories in percentages in a budget of

Rs. 2,880 lakhs of an industry?

1. From the total budget, if the canteen and insurance and social security heads are reduced by 5% and 10% respectively, then what saving could be achieved, in lakhs of rupees? 1. 93.6 2. 28.8 3. 57.6 4. 43.2

Solution: Savings in canteen budget = $\frac{15}{100} \times 2800 \times \frac{5}{100} = 21.6$ lakhs.

Savings in insurance and social security = $\frac{25}{100} \times 2800 \times \frac{10}{100} = 72$ lakhs.

So total savings = 21.6 + 72.0 = 93.6. So the answer is 1.

2. If the total budget is Rs. 8640 lakhs instead of Rs. 2,880 lakhs, then how much amount will be increased on canteen budget, in lakhs of rupees?

4. 864 1. 764 2. 1152 3. 1296 **Solution:** Canteen budget = 15% of total amount.

If the total amount = 8640, then canteen budget = $\frac{15}{100}$ x 8640 = 1296

If the total amount = 2880, then canteen budget = $\frac{15}{100}$ x 2880 = 432

So increase = 1296 - 432 = 864. So the answer is 4.

3. How much money, in lakhs of rupees, is ear-marked towards the salaries for the employees? 2. 1252 3. 1100 1. 1152 4. 1052

Solution: Salaries = $40\% = \frac{40}{100} \times 2880 = 1152$. So the answer is 1.

4. If the insurance premiums during the year amount to 15% of the insurance and social security budget, then how much money, in lakhs of rupees, is left for spending on social security? 1. 108 2. 720 3. 612 4. 288

Solution: Insurance and social security budget = 25% of $2880 = \frac{25}{100} \times 2880 = 720$

Out of the 720 lakhs 85% of it is for spending on social security = $\frac{85}{100}$ x 720 = 612.

So answer is 3.

- 5. How much amount, in lakhs of rupees, is saved if miscellaneous allocation is not utilised and 10% of the canteen budget is over spent?
 - 1. 197.2 2. 187.2 3. 273.6 4. 207.6 Solution: Not utilized miscellaneous allocation = 8%. 10% of canteen budget over spent =
- 10% of 15 = 1.5%. So saved = 8% 1.5% = 6.5% of 2880 = 187.2. So the answer is 2. **ICET**



| Year | 1970 | 1975 | 1980 | 1985 | 1990 | 1995 |
|-------|------|------|------|------|------|------|
| Party | · | | | | | |
| X | 20 | 60 | 50 | 40 | 35 | 26 |
| Y | 200 | 160 | 180 | 220 | 224 | 140 |
| Z | 80 | 70 | 60 | 40 | 31 | 138 |
| Α | 35 | 50 | 40 | 20 | 25 | 36 |
| В | 15 | 10 | 20 | 30 | 35 | 10 |

Study the following table carefully and answer the questions.

This table shows the number of elected members from various parties in a State Assembly.

1. In the year 1975, what percentage of seats did the party B get with respect to party Y?

1. 6.5 2. 5.25 3. 6 4. 6.25

Solution: In 1975 party B get 10, party Y get 160, so required percentage = $\frac{10}{160} \times 100 =$

6.25. So the answer is 4.

2. Which of the two parties could join to form a government in 1995 if Y and Z are opposed to each other?

1. Y and X 2. Z and A 3. Z and X 4. Y and A **Solution:** In 1995 Y and X got 26 + 140 = 166, in 1995 Z and A got 138 + 36 = 174, in

1995 Z and X got 138 + 26 = 164, in 1995 <u>Y and A got 140 + 36 = 176</u>. In 1995 total members = 26 + 140 + 138 + 36 + 10 = 350. To form a government minimum

required = 176. So the answer is 4.

3. How many more seats did the party A get over the party B in all the elections put together?

1. 76 2. 86 3. 40 4. 65 Solution: In all elections party A get 35 + 50 + 40 + 20 + 25 + 36 = 206. In all elections party B get = 15 + 10 + 20 + 30 + 35 + 10 = 120. So party A get 86 seats more than party B. So the answer is 2.

4. What percentage of growth did the party A gain in 1995 over the previous election?
1. 40
2. 42
3. 44
4. 46

Solution: In 1990 party A get 25 seats and in 1996 it get 36 seats. So growth percentage by party A in 1995 = $\frac{36-25}{2} \times 100 = 44$. So the answer is 3

- party A in 1995 = $\frac{36-25}{25}$ x 100 = 44. So the answer is 3.
- 5. What percentage of seats did party Y get in 1990?

1. 70 2. 64 3. 68 4. 62

Solution: In 1990 total number of seats = 35 + 224 + 31 + 25 + 35 = 350.

Seats secured by party Y in 1990 = 224. So the required percentage = $\frac{224}{350}$ x 100 = 64%. So the answer is 2.

Data Analysis:

| www.r.m. | <i>J</i> 515 | | | | | |
|---------------|---------------------|--------------|----------|--------------------------|-------------|------------|
| udy the follo | owing table and Pie | chart and ar | nswer th | e questions. | | |
| umber of S | (C | A | | | | |
| Level | Percentage of | Out of | fwhich | | 26% | 人 40%) |
| | Total students | Boys | Girls | | \setminus | \sum |
| Primary | 30% | 40% | 60% | | \bigvee | B 30% |
| Middle | 40% | 60% | 40% | | | 0/0 |
| High | 30% | 55% | 45% | Division of stude | nts into th | ree groups |
| - | | | | | | |

The above percentage are applicable for all groups. The total number of students in the school is

| | 5000. Primary students = $\frac{30}{100}$ x 5000 = 1500, Primary boys = $\frac{40}{100}$ x 1500 = 600, Primary |
|----|--|
| | girls = 900, Middle school students = $\frac{40}{100}$ x 5000 = 2000, Middle boys = $\frac{60}{100}$ x 2000 = |
| | 1200, Middle girls = 800, Highschool students = $\frac{30}{100}$ x 5000 = 1500, Highschool boys = |
| | $\frac{55}{100}$ x 1500 = 825, Girls = 675. A group students = $\frac{40}{100}$ x 5000 = 2000, B group students |
| | $=\frac{30}{100} \ge 5000 = 1500$, C group $= 1500$ |
| 1. | What is the difference between the number of students belonging to group A and B? |
| | 1. 400 2. 450 3. 350 4. 500 |
| | Solution: $2000 - 1500 = 500$. So the answer is 4. |
| 2. | Which number of the following is the highest? |
| | 1. Boys in the high school2. Girls in the primary school |
| | 3. Girls in the middle school4. Boys in the middle school |
| | Solution: Boys in the high school $=$ 825, Girls in the primary school $=$ 900, |
| | Girls in the middle school = 800 , Boys in the middle school = 2000 . So the answer is 4. |
| 3. | What is the percentage excess of the number of boys in the primary school to those in the |
| | middle school |
| | 1. 85% 2. 100% 3. 90% 4. 80% |
| | Solution: The number of boys in primary school = 600, number of boys in middle school = |
| | 600 |
| | 1200. So percentage excess = $\frac{100\%}{600}$ x 100 = 100%. So the answer is 2. |
| 4. | What is the total number of girl students in the middle school |
| | 1. 850 2. 1000 3. 800 4. 940 |
| | 40 40 |
| So | lution: Girl students in the middle school = $\frac{100}{100} \times \frac{100}{100} \times 5000 = 800$. So the answer is 3. |
| 5. | What is the number of girls belonging to group A and the High School? |
| | <u>1. 270</u> <u>2. 380</u> <u>3. 460</u> <u>4. 480</u> |

Study the following pie chart and answer the questions. Expenditure pattern of Mr. Jaideep. Monthly salary of Mr. Jaideep is Rs.24,000 in 2006



1. If Mr. Jaideep's salary increases by 10% and income tax also increases by 10% over its existing rate then what will be his new savings, given that all other components have the same percentage as in 2006.

1. Rs.1940 2. Rs.2080 3. Rs.2240 4. Rs.1848 Solution: After 10% increase salary = $\frac{110}{100}$ x 24000 = 26,400.

Income tax increase by 10%. So the new rate of income tax = $\frac{110}{100}$ x 30 = 33%.

So new savings = 7% of $26400 = \frac{7}{100} \times 26400 = 1848$. So the answer is 4.

2. What is the ratio of the amount meant for others to that of food?1. 7:152. 17:303. 15:74. 3:4

Solution:
$$4\frac{2}{3}: 10 \Rightarrow \frac{14}{3}: 10 \Rightarrow 14: 30 \Rightarrow 7: 15$$
. So the answer is 1.

- 3. What is the amount of rent paid by the Mr.Jaideep per month? 1. Rs.7500 2. Rs. 8000 3. Rs.8500 4. Rs.9000 Solution: $\frac{24000}{100} \times \frac{100}{3} = 8000$ (because $33\frac{1}{3} = \frac{100}{3}$). So the answer is 2.
- 4. Mr. Jaideep could not go to work for six days in June 2006 due to ill health and it was a loss of pay during that period. At the end of that month, what was his net salary after payment of income tax?

Solution: In June 2006, he was absent for 6 days. He worked for 24 days.

So his 24 days salary = 24000 x $\frac{24}{30}$ = 19,200. Income tax = 30% = $\frac{30}{100}$ x 19,200 = 5,760. His net salary after payment of income tax = 19,200 - 5,760 = 13,440. So the answr is 2.

- 5. What is the angle made by the sector representing the transport expenditure?
 - 1. 41.8° 2. 42.2° 3. 43.2° 4. 38.2°

Solution: 100% means 360° . Transport expenditure = 12%. So the angle made by the

sector representing the transport expenditure =
$$\frac{12}{100} \times 360 = 43.2^{\circ}$$
. So the answer is 3.

| Stu | idy the following tab | ole carefully & ar | nswer th | e questi | ons.Per | tormanc | e of stuc | ients of a | acollege |
|-----|--|--------------------------------------|----------------|----------------------|----------------------|--------------------|----------------|------------|-----------|
| Y | ear | | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
| Ν | o. of students | Appeared | 750 | 780 | 840 | 960 | 1040 | 1200 | 1430 |
| N | o.of students passed | with distinction | 150 | 130 | 142 | 127 | 308 | 246 | 397 |
| N | o. of students passe | d | 300 | 390 | 278 | 483 | 472 | 354 | 323 |
| 1 | T 1'1 .1 1' | ,• ,• , | | | 0 | | | | |
| 1. | In which year the di | stinction percent | age 1s m | a_{2001} | 1? | 4 200 | 0 | | |
| | 1. 2004 | 2. 2006 | 3. | 2001 | | 4. 200 | 0 | | |
| | Solution:In 2004, | $\frac{308}{1040}$ x100=29.0 | 6% ; In | $2006, \frac{3}{14}$ | $\frac{97}{430}$ x10 | 0=27.89 | %; | | |
| | In 2001, $\frac{130}{780}$ x100 | =16.7%; | In | $2000, \frac{1}{7}$ | $\frac{50}{50}$ x100 | 0=20%. | So ans | wer is 1 | • |
| 2. | If the policy of the | college is to giv | e Rs. 1 | ,000 as j | orize to | each of | the stud | lents pas | ssed with |
| | distinction, then in v | which year the co | ollege ha | as spent | maximu | im on th | is accou | nt? | |
| | 1. 2003 | 2. 2004 | 3. | 2005 | | 4. 200 | 6 | | |
| | Solution:In 2003, students. So answe | 127 students; In
e r is 4. | 2004,3 | 08 stud | ents ;In | 2005,24 | 46 stude | ents ;In 2 | 2006,397 |
| 3. | In which year the fa | ilure percentage | is least | | | | | | |
| | 1. 2003 | 2. 2001 | 3. | 2000 | | 4. 200 | 4 | | |
| | Solution:In 2003, | $\frac{350}{960}$ x100=38.9 | % {Be | cause to | tal faile | d in 200 | 3=960- | 127-483 | 3=350}. |
| | In 2001, $\frac{360}{780}$ x100 | =46.2% {Becar | use tota | l failed | in 2001 | = 780-1 | 30-390= | =360}. | |
| | In 2000, $\frac{300}{750}$ x100 | =40% {Becaus | e total f | ailed in | 2000= | 750-150 |)-300=3 | 00}. | |
| | In 2004, $\frac{260}{1040}$ x100 |)=25% {Becau | se total | failed ir | n 2004= | 1040-3 | 08-472= | =260}. | |
| | So answer is 4. | | | | | | | | |
| 4. | The percentage of s | tudents who hav | ve passe | d with c | istinctio | on in the | year 20 | 06is | |
| | 1. 26.76% | 2. 28.64% | 3. | 27.76% | 0 | 4. 28% | 0 | | |
| | Solution: $\frac{397}{1430}$ x1 | 00=27.76%. So | answe | r is 3. | | | | | |
| 5. | The percentage of s
1. 74% | students who hav
2. 75% | ve passe
3. | ed or wit
76% | h distin | ction in
4. 77% | the year
⁄₀ | 2004 | |
| | Solution:Students | who have passe | d or wit | th distin | ction in | the year | 2004=3 | 808+47 | 2=780. |
| | So the percentage= | $= \frac{780}{1040} \times 100 = 7$ | '5%. So | answe | r is 2. | | | | |

.11. $f_{0}11$ tabl f.11. 8. -+i. ...fc fatudanta of C+ duth • +h р

An automobile company manufactures vehicles as given in the following Pie diagram study this carefully and answer questions 51 to 55.



1. In a period, if the total number of vehicles manufactured by the company is 7200, then the number of 1000 cc cars among them is

1. 12002. 14003. 10004. 1500Solution: $360^{\circ} = 7200$ vehicles.

1000 cc cars = $360^{\circ} - 120^{\circ} - 30^{\circ} - 90^{\circ} - 30^{\circ} - 20^{\circ} = 70^{\circ} = \frac{70}{360} \times 7200 = 1400.$

So answer is 2.

- 2. The ratio of the 4-wheelers and 2-wheelers produced by the company is 1. 13:5 2. 4:9 3. 9:4 4. 5:13 **Solution:** Ratio of the 4-wheelers = 100° ; Ratio of 2-wheelers = 260° . So $100:260 \Rightarrow 5:13$. **So answer is 4.**
- 3. The ratio of the 75cc 2-wheelers and 50cc 2-wheelers is 1. 2:1 2. 1:2 3. 3:2 4. 2:3 Solution: Ratio of 75cc 2-wheelers = 30° ; Ratio of 50cc 2-wheelers = 20° . So $30:20 \Rightarrow 3:2$. So answer is 3.
- 4. The percentage of 150cc motor bikes in the total production by the company is

1. 30% 2.
$$33\frac{1}{3}\%$$
 3. $32\frac{1}{3}\%$ 4. 32%

Solution: Ratio of 150cc motor bikes = 120° .

So the percentage of 150cc motor bikes in total production = $\frac{120}{360} \times 100 = 33\frac{1}{3}\%$

So answer is 2.

5. If the number of 75cc 2-wheeler manufactured in a month is 2700, then the total number of vehicles manufactured by the company in the month is

1. 32400 2. 30860 3. 32600 4. 33800Solution: Ratio of 75cc 2-wheelers is $30^0 = 2700$ vehicles.

The total number of vehicles manufactures that month = $\frac{360}{30}$ x2700 = 32400

So the answer is 1.

The following pie chart shows how the municipal funds are spend under different heads in a year. Study the chart carefully and answer equations.



The following figure has three intersecting circles, each representing a group of students who got first class marks in the subject shown against it. Study the figure carefully and answer the questions.



1. The number of students who got first class marks in more than one subject?1. 82. 123. 94. 10

1. 8 2. 12 3. 9 4. 1 Solution: 2+4+3+0=9 (intersection part of the circles). So the answer is 3.

2. How many students got first class marks in Science?
1. 6
2. 8
3. 7
4. 4
Solution: 0+4+3+1=8 (numbers in Science circle)

So the answer is 2.

3. How many students got first class marks in all the three?

 1. 1
 2. 2
 3. 3
 4. 4

Solution: 4 (the intersection part of all the 3 circles).

So the answer is 4.

4. How many students gor first class marks only in Mathematics?

1. 1 2. 2 3. 3 4. 4

Solution: 3 (the number in Mathematics circle which out of the intersecting part). **So the answer is 3.**

5. The percentage of students who got first class marks in English among students who got first class marks in atleast one of the three subjects?

1.
$$68\frac{2}{11}$$
 2. $48\frac{2}{11}$ 3. $58\frac{2}{11}$ 4. 62

Solution: Total students = 9 + 2 + 3 + 0 + 4 + 3 + 1 = 22.

The number of students who got first class marks in English = 9 + 2 + 4 + 0 = 15

So the required percentage =
$$\frac{15}{22} \times 100 = 68 \frac{2}{11}$$
.

So the answer is 1.

| Туре | Α | В | С | D | Е | Total |
|------|----|----|----|----|----|-------|
| Year | | | | | | |
| 1996 | 18 | 23 | 21 | 12 | 40 | 114 |
| 1997 | 20 | 18 | 24 | 14 | 35 | 111 |
| 1998 | 18 | 21 | 20 | 18 | 42 | 119 |
| 1999 | 22 | 26 | 19 | 21 | 44 | 132 |
| 2000 | 25 | 30 | 22 | 25 | 48 | 150 |
| 2001 | 28 | 34 | 26 | 30 | 52 | 170 |

Study the following table carefully and answer the questions. The following table gives the number of cars of different models A, B, C, D, E, manufactured by a company in the years 1996 to 2001.

1. In what type of cars the percentage of increase is more from 1998 to 1999?

1. B 2. D 3. E 4. C
Solution: B type cars percentage of increase =
$$\frac{26-21}{21} \times 100 = 23.80$$

Similarly D type cars percentage of increase = 16.66

and E type cars percentage of increase = 4.76

C type cars percentage of increase = negative increase. So the answer is 1.

2. In 1999, which type of cars constitue approximataly 20% of the total number of cars produced in that year?

 1. E
 2. B
 3. C
 4. D

 Solution: Total cars produced in 1999 = 132.

20% of
$$132 = \frac{20}{100} \times 132 = 26.4$$
. So the answer is 2. (because B type cars produced = 26)

3. In the years 1996 and 2000 put together, which type of cars constitute approximately 20% of the total number of cars produced in the two years?

1. E 2. C 3. B 4. D Solution: Total number of cars produced in 1996 and 2000 = 114 + 150 = 164.

20% of
$$164 = \frac{20}{100} \times 164 = 52.8$$
. So the answer is 3.

(because E type cars produced = 40 + 48 = 88; C type cars produced = 21 + 22 = 43; B type cars produced = 23 + 30 = 53; D type of cars produced = 12 + 25 = 37)

4. The approximate percentage of increase in the total production of cars in the year 2001 over the year 1996 is

1. 40% 2. 45% 3. 50% 4. 55%
Solution:
$$\frac{170-144}{114}$$
 x100 = 50% approximate. So the answer is 3.

5. In which year the percentage increase of total number of cars manufactured is more?1. 19982. 19993. 20004. 2001

Solution: In 1998,
$$\frac{119-111}{111}$$
 x100 = 7.2%; In 1999, $\frac{132-119}{119}$ x100 = 10.9%;

In 2000,
$$\frac{150-132}{132}$$
 x100 = 13.6%, In 2001, $\frac{170-150}{150}$ x100 = 13.3%. So the answer is 3.

Directions: Below is given a figure with four intersecting circles, each representing a group of persons having the quality written against it. Study the figure carefully and answer the questions.



A=Only Hardworking; C=Only Intelligent; J=Only Truthful; L=Only Honest;

- B=Hardworking and Intelligent; D=Hardworking and Truhful; K=Truthful and Honest;
- G = Intelligent and Honest; M = Hardworking and Intelligent and Honest;
- F = Hardworking and Intelligent and Truthful; I = Hardworking and Truthful and Honest;
- H=Honest and Truthful and Intelligent; E=All four qualities.
- 1. The region which represents people who are not honest but possess all other three qualities, is denoted by

1. B 2. F 3. D 4. M Answer is 2.

The region which represents the people who are neither honest nor truthful but are intelligence and hard working, is denoted by
 A 2. C 3. D 4. B

Answer is 4.

- 3. The people possessing all the four qualities are represented by
 1. E
 2. F
 3. I
 4. H
 Answer is 1.
- 4. The honest people who are not possessing any of the other three qualities are represented by
 1. K
 2. H
 3. G
 4. L
 Answer is 4.
- The region which represents the people who are intelligent, honest and truthful but not hard working is denoted by
 Example 2 Example 2 Honest 4 Hone

1. F 2. E 3. H 4. I Answer is 3. **Directions:** The following Pie diagram shows the marks secured by a student in different subjects in an examination. If the student scored 135 marks in Mathematics, answer the following questions after studying the Pie-chart



- 1. What is the total number of marks secured by the student in all the subjects put together? (1) 360 (2) 450 (3) 540 (4) 720 **Solution:** $90^{0} \Rightarrow 135$ marks. So $360^{0} \Rightarrow 135 \times 4 = 540$ marks. **Answer is 3.**
- 2. How many marks did he score in Science ? (1) 108 (2) 114 (3) 120 (4) 136 Solution: $90^{\circ} \Rightarrow 135$ marks. So $76^{\circ} \Rightarrow 114$ marks. Answer is 2.
- 3. How many more, marks did the student score in Science and English pat together than he scored in Social Studies and Hindi put together?
 (1) 9 (2) 18 (3) 27 (4) 45
 Solution: Science + English = 76⁰ + 62⁰ = 138⁰. Hindi + Social studies = 60⁰ + 72⁰ = 132⁰. Therefore difference = 6⁰. 90⁰ ⇒ 135 marks. So 1⁰ ⇒ 1.5 marks. Therefore 6⁰ = 1.5 x 6 = 9 marks. Answer is 1.
- 4. The ratio of the marks scored by him in Hindi to the marks scored in Social Studies, is (1) 2:3 (2) 3:4 (3) 4:5 (4) 5:6 **Solution:** Hindi: Social studies = 60° : 72° = 5:6 (dividing with 12). **Answer is 4.**
- 5. Out of the total marks scored by him in the examination, the percentage of marks scored in Social Studies is C
 (1) 15 (2) 20 (3) 25 (4) 30

(1) 15 (2) 20 (3) 25 (4) 3 **Solution:** $90^{0} \Rightarrow 135$ marks. Social studies = 72⁰.

The percentage of marks scored in Social studies = $\frac{72^0}{360^0}$ x 100 = 20. Answer is 2.

Notes for the following five Questions : Each of the integers from 1 to 16 are to be placed on the Venn diagram given below in the appropriate regions A to H. Take

- $S = \{$ the set of Integers from 1 to 16 $\}$
- $I = \{The set of odd integers from 1 to 16\}$
- II = {The set of perfect square integers from 1 to 16}
- III = {The set of prime integers from 1 to 16}

 $H = S - \{I II III\}$

.



| Answ | er the following five q | uestions based on this | data. | | | | |
|---|---|--------------------------------------|----------------------------|---------------------------------|--|--|--|
| I. Wh | inch regions in the diagra | am are empty (not repres | sented)? | Answer is 4. | | | |
| | (I) Gonly | (2) C and G only | (3)A and F only | y (4) G and F only | | | |
| 2. Whi | ch regions contain a sing | gle integer? | | Answer is 3. | | | |
| | (1) B and D only | (2) G and D only | (3)A and C onl | y (4) E and B only | | | |
| 3. Whi | ch regions contain five i | ntegers ? | | Answer is 1. | | | |
| | (1) E and H only | (2) D and B only | (3)Bonly | (4) A and C only | | | |
| 4. Whi | ch regions contain two i
(1) E and F only | ntegers ?
(2) B and D only | (3) A and E onl | Answer is 2.
y (4) C only | | | |
| 5. The | number of elements cor
(1) 5 | ntained in the regions E a
(2) 6 | and D put togethe
(3) 7 | er is Answer is 3. (4) 8 | | | |
| $S = \{t\}$ | ne set of Integers from 1 | to 16 = {1,2,3,4,5,6,7, | 8,9,10,11,12,13 | ,14,15,16} | | | |
| I={Th | e set of odd integers fro | om 1 to 16}= $\{1,3,5,7,9,$ | 11,13,15} | | | | |
| $II = {T}$ | he set of perfect square | integers from 1 to 16}= | ={1,4,9,16} | | | | |
| $III = \{$ | The set of prime integer | s from 1 to 16 }={2,3,5, | 7,11,13} | | | | |
| H = S- | $\{I \cup II \cup III\} = \{6, 8, 10, 1\}$ | $2,14\} \Rightarrow$ H contains five | e elements | | | | |
| $D=I \cap$ | II= $\{1,9\} \Rightarrow D$ contains | two elements | | | | | |
| $E=I \cap I$ | $III=\{3,5,7,11,13\} \Longrightarrow E c$ | ontains five elements | | | | | |
| $G=I \cap II \cap III=\{\}=Nill \text{ or empty.}$ | | | | | | | |
| $F=II \cap III=\{\}=Nill \text{ or empty.}$ | | | | | | | |
| $A=I-(D \cup E \cup G)=\{15\} \Longrightarrow A \text{ contain one element}$ | | | | | | | |
| B=II - | $(D \cup F \cup G) = \{4, 6\} \Longrightarrow F$ | 3 contains two elements | | | | | |
| C=III - | C=III - $(D \cup E \cup F) = \{2\} \Rightarrow$ A contain one element | | | | | | |
| $D \cup E = \{1,3,5,7,9,11,13\} \Rightarrow$ number of elements in the regions E and D put together is 7. | | | | | | | |

The following Pie-chart gives the percentages of various items manufactured by an electronic company in a particular year. Based on this diagram, answer the questions from 1 to 5.

| Major appliances | :40% | DVD players |
|------------------|------|------------------|
| Computers | :25% | Computers |
| Televisions | :17% | Televisions |
| DVD Players | :10% | Miscella- Major |
| Miscellaneous | :8% | neous appliances |
| | | |

1. If 50% of the miscellaneous amount is Rs 180 lakhs, then the total investment in that year (in crores of rupees) is

1. 35 2. 40 3. 45 4. 48 Solution: Miscellaneous = 8%, 50% of this is 4%. Given that 4% is Rs. 180 lakhs. So total investment = $100\% = 25 \times 4\% = 25 \times 180$ lakhs = 4500 lakhs = 45crores. Ans. is 3.

2. The ratio of the number of computers produced to the number of DVDs produced in that year is

1.
$$25:17$$
2. $8:5$ 3. $5:2$ 4. $5:4$ Solution: Computers : DVD $\Rightarrow 25:10 \Rightarrow 5:2$. Answer is 3.

3. If 10% of the major appliances cost is towards manufacturing the accessories and if the total investment in that year is Rs. 32 crores, the cost of producing the accessories (in crores of rupees) is

1. 2.562. 1.283. 0.644. 0.32Solution: Given the total investment = Rs. 32 crores. i.e. 100% is 32 crores.Major appliances = 40%. So 10% of 40% = 4%

So the cost of producing the accessories = $\frac{4}{100} \times 32 = \frac{32}{25} = 1.28$ crores. Answer is 2.

4. If the company produced 12000 computers in that year, how many televisions it has manufactured during that year.

1. 81602. 72603. 63604. 5460Solution: Computers produced = 12,000. i.e. 25% means 12,000.

No. of Televisions manufactured = $\frac{17}{25}$ x12,000 = 8160. Answer is 1.

5. If the company manufactured 3400 televisions and the manufcturing cost of a DVD player is Rs.3400, then money invested (in Lakhs of Rupees) for DVD players by the company is
1. 60
2. 62
3. 64
4. 68
Solution: Television manufactured = 3,400. i.e. 17% means 3,400. So 10% = 2,000. Cost of one DVD Player = Rs. 3,400. So Cost of 2,000 DVD Players = 2,000 x 3,400 = 68,00,000 = 68 lakhs. Answer is 4.

In the diagram given below, the square represents women, the triangle represents government service employees, the circle represents educated persons and the rectangle represents persons working in private sector. Each section of the diagram is numbered.

Read the diagram and answer the questions from 1 to 5.

- 1. The region numbered 10 represents
 - 1. Educated women working in private sector
 - 2. Uneducated men in government service
 - 3. Educated men working in private sector
 - 4. Educated men working in private sector and in government service

Solution: 10 = circle + triangle + rectangle - square. Answer is 4.

- 2. Region 2 represents
 - 1. Educated women without job
 - 2. Uneducated women without job
 - 3. Educated men working in government service
 - 4. Uneducated men working in government service

Solution: 2 = circle + square. **Answer is 1.**

3. The number of region that represents uneducated women who are in government service and in the private sector is

| 1. 4 | 2. 6 | 3. 9 | 4. 12 |
|-----------------------|-----------------|--------------|------------------------------------|
| Solution: 4 = tri | angle + square; | 6=triangle | + square $+$ circle $+$ rectangle. |
| 9 = triangle + square | uare + circle; | 12 = triangl | le + rectangle. Answer is 3. |

4. The region representing the educated persons without job is

1. 72. 23. 7 and 24. 8 and 9Solution: 7 = circle;2 = circle + square.8 = circle + rectangle;9 = triangle + square + rectangle.Answer is 3.

5. The number of the region representing educated women in government service, is
1. 2
2. 3 and 6
3. 4
4. 6 and 9
Solution: 2 = square + circle; 3 = triangle + square + circle.
6 = triangle + square + circle + rectangle.
9 = triangle + square + rectangle. Answer is 2.

Note: Square = Women Triangle = Government service employees i.e.(Government service Men + Government service Women)

Circle = Educated persons i.e. (Educated men + Educated Women)

Rectangle = Persons working private sector i.e. (Private service Men + Private service Women)



The amounts spent by a person under various heads in a month is given in the following Pie Chart. Based on this information answer the following questions.

S - Savings E - Entertainment CE - Childeren Education F - Food H - House Rent M - Miscellaneous T - Travel



- The amount spent on children education is equal to the amounts spent on which of the following two heads ?

 Entertainment and miscellaneous
 Savings and travel

 Travel and miscellaneous
 Savings and entertainment
- 2. If the amount spent on house rent in a month is Rs. 5,000 more than the amount spent on travel and savings put together, then the monthly income in (Rs.) of the person is [2]
 1.25,000 2.90,000 3.1,00,000 4.45,000
- 3. Monthly savings percefrcage is [1] $1.13\frac{8}{9}\%$ $2.13\frac{2}{9}\%$ $3.13\frac{1}{9}\%$ 4.14%
- 4. If the monthly income of the person is Rs. 54,000, then the difference between the amounts spent on travel and food per month (in Rs.) is [3]
 1.21,600 2.16,200 3.6,000 4.12,000
- 5. If the amounts spent on savings and children education put together is Rs. 22,000, then the monthly income of the person (in Rs.) is [3]
 1.75,000 2.66,000 3.72,000 4.36,000

In a group of 75 students 28 students study Mathematics (M), 32 study Physics (P), 30 study Chemistry (C) and 15 students study none of these; 13 study both M and P, 12 study P and C and 10 study C and M. Based on this information answer the following <u>*TWO*</u> questions

| The number o | nistry is | [1] | | |
|--------------|--|--|---|---|
| 1.13 | 2.14 | 3.15 | 4.16 | |
| | | | | |
| | | | | |
| The number o | one is | [3] | | |
| 1.10 | 2.13 | 3.12 | 4.15 | |
| | The number of 1.13
The number of 1.10 | The number of students who1.132.14The number of students who1.102.13 | The number of students who study only Chen1.132.143.15The number of students who study Physics al1.102.133.12 | The number of students who study only Chemistry is1.132.143.154.16The number of students who study Physics alone is1.102.133.124.15 |

NOTE: The following table gives the details of the 5 commodities A, B, C, D, E required, with their costs, for a family in a month. Study the table and answer the following 3 questions.

| Commodity | Quantity required/month (in kg) | Rate/kg in Rs. | | |
|-----------|---------------------------------|----------------|-----------|--|
| | | Year 1990 | Year 1995 | |
| А | 10 | 70 | 100 | |
| В | 15 | 40 | 45 | |
| С | 8 | 35 | 40 | |
| D | 25 | 50 | 60 | |
| E | 5 | 58 | 62 | |

1.The amount (in Rs.) spent extra on commodities B and C in the year 1995 than in the year
1990 is
1.1152.2303.2604.180[1]

2. The total amount (in Rs.) spent on all the 5 commodities by the family in 1990 is [add score]
1.253 2.315 3.302 4.312

 3.
 The percentage of increase (per kg) in the rate of the commodity E from 1990 to 1995 is

 [2]
 1.20.3%
 2.6.89%
 3.34.5%
 4.17.8 %

Data Analysis

(Marks : 10)

Note : An automobile company produces four types of vehicles (Cars, Motor bikes; Scooters and Mopeds) at different branches in the country. The production at these units from 2007 to 2012 are given in the table below. Answer the questions 1 to 3 using the table.

| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 |
|-------------|--------|-------|-------|-------|-------|-------|
| Cars | 3600 | 6300 | 8100 | 10800 | 16200 | 19800 |
| Motor bikes | s 7000 | 12250 | 15750 | 21000 | 31500 | 38500 |
| Scooters | 8000 | 14000 | 18000 | 24000 | 36000 | 44000 |
| Mopeds | 9000 | 15750 | 20250 | 27000 | 40500 | 19500 |

- The ratio of the number of Cars produced in 2008 to the number of Scooters produced in 2011 is
 (1) 37:40
 (2) 27:40
 (3) 17:40
 (4) 7:40
 Answer 4
- 2. In which year the total number of the four types of vehicles produced was 62100?
 (1) 2007
 (2) 2008
 (3) 2009
 (4) 2010 Answer 3
- 3. If k : 1 is the ratio of the number of Scooters produced in the year 2011 to the number of
Scooters produced in 2007, then k =Answer 3(1) 3(2) 4(3) 9/2(4) 2/9
- Note: Given that $A = \{n : n \text{ prime}, l \le n \le 20\};$ $B = \{n : n \text{ odd}, l \le n \le 20\}$ and $C = \{n : n \text{ square}, 1 \le n \le 20\}.$ Using this answer the questions 4 and 5.
- 4. $B \cap C =$ Answer 4 (1) {1,4,9,16} (2) {1,3,5,79,11,13,15,17,19} (3) Φ (4){1,9}
- 5. The number of integers between 1 and 20 which do not lie in $A \cup B \cup C$ is (1) 8 (2)7 (3) 6 (4) 5 Answer 2.

Note: The expenditure under six heads A, B, C, D, E and F in an year are as given in the following Pie diagram. Answer the questions 1-5 using the diagram.

If the total expenditure in an year is Rs.54,00,000, then the expenditure (in rupees) under the head E in that year is

 (1) Rs.3,60,000
 (2) Rs.4,20,000
 (3) Rs.6,30,000
 (4) Rs.7,20,000

В

35%

С

А

F 35°

E

 42°

850 950

480

D

- If the expenditure under the heads A and B together is Rs.18,00,000 in an year, then the expenditure under the head D in that year is Answer 2

 (1)Rs.4,20,000
 (2)Rs.4 80,000
 (3)Rs.5,50,000
 (4)Rs.8,50,000
- 3. If the difference in the expenditure under the heads A and B in an year is Rs.2.5 lakhs, then the total expenditure (in lakhs of rupees) in that year is (1) 90 (2) 81 (3) 72 (4) 63
- 4.I f the expenditure under the head E in an year is Rs.3.5 lakhs, then the expenditure (in lakhs of rupees) under the head D in that year is (1)3
 (2) 3.5
 (3)4
 (4) 4.5
- 5. In any year the expenditure under the heads C and F together is equal to **Answer 3**
 - (1) half of the expenditure on B and F together.
 - (2)double the expenditure on C.
 - (3) the expenditure on D and E.
 - (4) the expenditure on A.

Telangana ICET-2015

<u>Note:</u> The following Pie diagram illustrate the yearly expenditure of an educational institution towards six heads: A-Staff salaries, B-Maintenance, C-Laboratories, D- Learner activities, E-Examinations and F-Miscellaneous.Using the data given answer the five questions.



| 1. | In a year total expe | nditure incurred to | owards E is 20 lacs | of rupees. Then the expenditure |
|----|----------------------|---------------------|---------------------|---------------------------------|
| | towards D (in lacs) | is | | Answer 4 |
| | (1) 30 | (2) 35 | (3) 45 | (4) 40 |
| 2. | The sectorial angle | corresponding to A | A is | Answer 3 |
| | $(1)105^{\circ}$ | $(2)120^{\circ}$ | $(3)126^{\circ}$ | $(4) 145^{\circ}$ |
| | | | | |

- 3. The total sectorial angle corresponding to the heads C, D and E is $(1)125^{\circ}$ $(2)108^{\circ}$ $(3)120^{\circ}$ $(4)90^{\circ}$
- 4. If in a year the expenditure under B is 30 lac more than the expenditure under E, then the total expenditure (in Lacs) for that year is (1)200 (2) 185 (3)175 (4) 150
- 5. If the annual expenditure is 200 lacs, then the expenditure towards F (in lacs) is Answer 2 (1)25 (2) 30 (3)32 (4) 35

Coding and Decoding ICET- 2014:

The letters A, B, C, ...,Z of the English alphabet are NUMBERED AS 1,2,3,...,26 respectively. A code is designed by shifting r^{th} letter to $(14 - r)^{th}$ letter if $1 \le r \le 13$ and s^{th} letter to $(40 - s)^{th}$ letter if $14 \le r \le 26$. The reverse process is used for decoding. Based on this coding and decoding system answer the following 10 questions.

| 1.The code word for 'HYDER | ABAD' is | | ANSWER:1 |
|--|--------------------------------|--|------------------------------|
| (1) FOJIVMLMJ | (2)FJOIVMJM | L (3)FIJOVML | MJ (4)FIOJMVLMJ |
| 2. The code word for 'WAR | ANGAL' is | | ANSWER:2 |
| (1) QMUMZBGM | (2)QMVMZGI | MB (3) QVMZM | BGM (4) QVMZMGBM |
| 3.Which word is coded as | 'IPKFMZGI'? | | ANSWER:3 |
| (1)ENTRANCE | (2)ELEGANC | E (3)EXCHAN | GE (4)EMPATHIE |
| 4. Which word is coded as | 'UIBIKTEYZ'? | | ANSWER:2 |
| (1) SEDUCTION | (2) SELECTIC | N (3)SUGGES | FED (4)SHOCKINGS |
| 5. The word for 'TIRUPAT'
(1)TEMXVSTE (2) | I' is
) TESVXMTE | (3)TESVMXTE | ANSWER:4
(4)TVSXMTE |
| 6. If 'TEACHER' is coded as 'U
(1)QSBOFU (2) QB | UFBDIFS' then t
SFOU (3)RBS | he code word for 'PAR
ENU (4)QRAESU | ENT' isANSWER:2 |
| 7.If 'BOMBAY' is coded as 'C
(1)QRYVU (2) QY | DBZONL', then
RUV (3)QRY | the code for 'DELHI' i
(4)RQ | sANSWER:3 |
| 8. If COMMERCE is coded as | DONNESDE, tl | nen the code for BIOL | OGY isANSWER:2 |
| (l)CJPMPHZ (2) | CIOMOHZ | (3)CIOOMHZ | (4)CIOMOZH |
| 9. If FILURE is coded as EZH
(1)RSDDFRR (2) H | KTQD, then the
RTDDFRR | code for SUCCESS i
(3)RTBBDRR | sANSWER:3
(4)RTCBRDR |
| 10. If TRIANGLE is coded as U
(1)TRUBSF (2) TR | JSJBOHMF, the
RVSBF | n the code word for SQ
(3)TRUSBF | UARE isANSWER:4
(4)TRVBSF |

Coding and Decoding ICET- 2013:

The letters of the English alphabets are arranged cyclically. Then the letters are coded as follows: (i) a vowel is to be coded as the second vowel after it in the clockwise direction. and (ii) a consonent is to be coded as the second consonent after it in the clockwise direction. For decoding, the inverse process is to be followed. Based on this coding and decoding system answer the following 5 questions.

| 1.The | .The code word for 'LEAVE' is | | | | | | | | AN | SWE | R:1 | |
|----------|-------------------------------|----------|-----------|----------|-----------|----------------------|-----------|---------|------------|-----------------|-------|-------------|
| | (1) N | OIXO | (2) N | IOIXU | (3) J | UOTO | (4) J | UOTU | | | | |
| 2.The | word | that is | coded a | as 'RNI | VO' is | | | | | AN | ISWE | R:3 |
| | (1) T | LATE | (2)PI | LATA | (3) P | LASE | (4) T | QUXA | | | | |
| 3.The | word | that is | coded a | ıs 'QUI | EUE' is | | | | | ANS | SWER | :3 |
| | (1)NI | OIO | (2) S | EOEO | (3)N | IUIU | (4) S | SIOIO | | | | |
| 4. Co | de woi | rd for ' | HAND |)' is | | | | | | ANS | WER | :4 |
| | (1) K | IQH | | (2) k | KIQF | QF (3) KIPG (4) KIQG | | | | | | |
| 5. Th | e word | that is | coded | as 'RI | UT' is | | | | | AN | SWEF | {: 1 |
| | (l)PA | IR | (2) PAI | W (3) | PAAR | (4) P | UIR | | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| А | В | С | D | Е | F | G | Н | Ι | J | Κ | L | М |
| L | S | Z | G | Ν | U | В | Ι | Р | W | D | Κ | R |
| 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 |
| Ν | 0 | Р | Q | R | S | Т | U | V | W | Х | Y | Ζ |
| Y | F | М | Т | А | Н | 0 | V | С | J | Q | Х | Ε |
| 6. If | the wo | rd 'CEI | NTRAL | is code | ed as 'LA | ARTNE | C', then | the cod | e word | for 'SEI | MINA | R'is |
| (1) RI | NAME | S (2 |)RANM | 1IES | (3) R | AMNI | ES | (4)R | ANIME | ES AN | SWE | R:4 |
| 7. If tł | ne word | 'FLUT | 'E' is co | ded as ' | EJRPZ' | , then th | ne code v | word of | 'PLANI | E'is Al | NSWE | R:1 |
| | (1)OJ | XIZ | | (2) (2) | JXKZ | | (3) C | JXLZ | | (4) C | JXLA | |
| 8. If tl | ne code | word fo | or 'VIC' | TORY' | is 'XKV | /OTA' tl | hen the | code wo | ord for 'S | SUCCE | SS'IS | |
| (1) U | WEEGU | JU | (2)V | XFFHV | V (3) | UWEEO | GVV | (4)U | JWEEH | UU AI | NSWE | R:1 |
| 9 If th | e word | COMP | UTER | is coded | l as RFI | IVONP | C the c | ode wor | rd for M | FDICIN | JF is | |
| (1) EC | DJDJEF | FM | (2)El | MIDIFE | EM (3) | EOKDI | KFEM | (4)E | OLDLF | EDICII
EM Al | NSWE | R:3 |
| 10 I£4 | howe | | VDCIII | Lisoch | od og DI | IGINIES | S than | iord MA | NACE | MENIT | icod | d ac |
| (1)KZ | | XCLR (2 | 2)KXL | XECKC | LR(3)K | YLYEO | CKCLR | (4) KYI | LEDKD | LR A | NSWE | R:3 |

Coding and Decoding ICET- 2012:

In a certain code the m^{th} letter of the English alphabet is coded as the n^{th} letter where n is the remainder obtained when 7m + 5 is divided by 26, $1 \le n \le 26$. For example, the third letter C becomes $(7 \times 3 + 5) = 26^{\text{th}}$ letter Z in the coded language. For decoding, the reverse process is followed. Based on this information, answer the following five questions.

| 1.Th | e code v | vord for ' | BUST | ' is | | | | | | ANS | SWEF | R:2 |
|-------|----------|------------|-----------|------------|---------|--------------|-------|------|----|-----|------|------------|
| | (1) S | UGP | (2) S | VHO | (3) S | WIQ | (4) T | ЈНО | | | | |
| 2.Th | e word t | hat is co | ded as ' | BLPY' is | | | | | | AN | SWE | R:2 |
| | (1) | GAIL | (2)G | AIN | (3)R | AIN | (4) G | ARE | | | | |
| 3.Wł | nich wo | rd is cod | ed as 'F | RNLKH'? | ' | | | | | AN | SWE | R:1 |
| | (1)M | EALS | (2) T | RIMS | (3) M | IEATS | (4) T | RAIN | | | | |
| 4. Th | e numb | er of let | ters that | t are inva | riant i | n this cod | e is | | | AN | ISWE | CR:4 |
| | (1) 3 | | (2) 2 | | (3) 1 | | (4)0 | | | | | |
| 5. Tl | ne code | e word f | or 'FR | AME' is | | | | | | AN | ISWE | R:3 |
| | (1)U. | AMSO | (2) | TZKQM | (3) | UALRN | (4) T | ZMSO | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| А | В | С | D | E | F | G | Η | Ι | J | Κ | L | Μ |
| L | S | Ζ | G | Ν | U | В | Ι | Р | W | D | Κ | R |
| 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 |
| Ν | 0 | Р | Q | R | S | Т | U | V | W | Х | Y | Ζ |
| Y | F | Μ | Т | А | Н | Ο | V | С | J | Q | Х | E |

Note: Based upon the following coding system and the conditions (i), (ii), (iii), given below answer the following five questions.

Number/Symbol:7 3 & 6 % 2 # 8 4 @ 1 + 5 \$ Code :S H P W L D K J X Z Q T N F Conditions:

(i) If the first element is a symbol and the last element is a number, then the codes for both elements are to be interchanged

(ii) If both the first and the last elements are symbols, then the last elements code is to be taken as the code for the first element.

(iii)If the group of elements contain only one symbol, then that symbol is to be coded as A.

- 6. What is the code word for '45631#'? ANSWER:3 (by applying condition-iii) (1) ANWHQX (2) XNWHQX (3) XNWHQA (4) XNHWQA
- 7. What is the code word for '3+5641'?ANSWER:1 (by applying condition-iii)(1) HANWXQ(2) QANWXH(3) HANXWQ(4) HANWXW
- 8. What is the code word for '@4153+'? ANSWER:1 (by applying condition-ii)
 (1) TXQNHT (2) ZQXNHZ (3) TQXNHT (4)ZXQNHZ
- 9. What is the code word for '2@7\$4&' ? **ANSWER:2** (No condition)DIRECT (1) DASFXP (2) DZSFXP (3) PZSAXD (4) DZSXFP
- 10.What is the code word for '%82 & 47'? **ANSWER:3** (by applying condition-i) (1) LDJPXS (2) SJDXPL (3LSJDPXL (4) LJDPXS

| | ng and | Decoal | ng iti | E I - 201 | I: Inac | oue, me | n ^m letter | 'ın Eng | lish alpr | nabet is c | coded t | $\mathbf{o} \mathbf{k}^{\text{th}}$ |
|--|---|---|--|---|--|--|--|--|---|---|---|-------------------------------------|
| letter | , where | $k \equiv 3n$ | +2 (mod) | 126), 1 <u><</u> | <u><</u> k <u><</u> 26.F | or exam | ple, the | 5 th lette | er E is co | oded as | Q sinc | e |
| 3x5- | +2 =17 | ≡ 17 (1 | nod 26) | and Q | is the 1 | 7 th letter | r. The re | everse o | of this p | rocess i | s used | l for |
| decoc | ling. Ba | used on t | his codiı | ng and d | ecoding | process | es, answ | er the fo | ollowing | g five qu | estion | s: |
| 11. | The co | ode wor | d for S | TATE i | S | | | | -ANSV | VER:4 | | |
| | (1) | GJEJG | (2)C | JEJF | (3) | GJEJP | (4) G | JEJQ | | | | |
| 12.TI | he code | e word | for MC | USE is | ; | (2) 01 | | (1) (1) | -ANSW | ER:2 | | |
| 12 TI | (1)
ha aadi | OUMQ | G = (2 | | JQ | (3)01 | UGMQ | (4)0 | UGQM | D.2 | | |
| 13.11 | (1) | e word
DASSV | (2) F | LI 1S
LIDDI | (2) F | | (A) E(| <i>P</i> | VINO M I | L R:3 | | |
| 14 TI | (1)
he wor | d codec | (2)1
1 as XF | D1 is | (3)1 | | (4)1(|)LLI
A | NSWF | | | |
| 17.11 | (1) | POLE | (2) F | PALE | (3)P/ | ARK | (4) PF | ERK | | | | |
| 15.Tł | ne numl | ber of le | tters that | t are inv | ariant ir | this coo | le is | AN | SWER | R:2;The | v are I | L,Y |
| | (1) | 1 | (2) | 2 | (3) | 3 | (4) | | | | , | _,_ |
| | | | | | | | | | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| А | В | С | D | E | F | G | Η | Ι | J | Κ | L | Μ |
| E | Η | Κ | Ν | Q | Т | W | Ζ | С | F | Ι | L | 0 |
| | | | . – | 10 | 10 | • | | | • • | | ~ - | • |
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| | | | n + 17, | if 1 | $\leq n \leq 9$ | 0 | | | | | | |
| defin | ed by | $f(n) = \begin{cases} \\ \\ \\ \end{cases}$ | n - 1, | if = 10 | $\leq n \leq 1$ | 8 . Fa | or decod | ling, th | e rever | se proc | ess is | |
| | | l | n - 10, | <i>lj</i> 19 | $\leq n \leq 2$ | 0 | | | | | | |
| used | . Based | on this | coding | and de | coding | process | . answei | rthe fo | ollowin | g five q | uestio | ns : |
| 16.TI | he code | a mond | tor MA | NGO 1 | | | , uns | | | SXX/ED. | - | |
| | (1) | | | | S | | (1) I | | ANS | 5 W E.K. | 2 | |
| 1 7 T1 | (1) | LSOYN | $\sqrt{(2)}$ | RMXN | .s
(3)Kl | RLXN | (4) k | KTPFN | AN | | 2 | |
| 17.Tl | (1) he code (1) | LSOYN
e word | for RH (2) P | RMXN
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| 17.Tl
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(4) Q | XTPFN
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ISWER
ISWER
R:2
11
K
I | 2
:4
:1
:3
12
L
L | 13
M
O |
| 17.Tl
18.Tl
19.Tl
20.W
1
A
E
14 | (1) | e word
LSOYN
e word
QZGNV
d that is
APNW
e word
ZUWC
etter is
F
3
C
K
16 | V (2)LI
for RH
V (2) P
s coded
(2) AN
for ICE
(2) ZV
coded a
(2) G
4
D
N
17 | RMXN
YME i:
YGMU
as RO
VPW
T is
TD (:
s X?
5
E
Q
18
P | (3)K
(3)K
(3)
(3)
(3)
(3)
(3)
(3)
(3)
(3)
(3)
(3) | RLXN
QYILV
OMW
B
7
G
W
20
T | (4) F
(4) Q
(4) AN
(4) ZU
(4) C
8
H
Z
21 | ATPFN
YGLV
MNU
JTD
AN
9
I
C
22
V | AN
AN
AN
NSWEI
10
J
F
23
W | ISWER
ISWER
ISWER
ISWER
R:2
11
K
I
24
Y | 2
:4
:1
:3
12
L
L
25
V | 13
M
O
26
7 |
| 17.Tl
18.Tl
19.Tl
20.W
1
A
E
14
N
R | (1) | e word
LSOYN
e word
QZGNV
d that is
APNW
e word
ZUWC
etter is
F
3
C
K
16
P
x | N (2)LI
for RH
V (2) P
s coded
(2) AN
for ICE
(2) ZV'
coded a
(2) G
4
D
N
17
Q
A | RMXN
YME is
YGMU
as ROI
JPW
T is
TD (:
s X?
5
E
Q
18
R
D | (3)K
(3)K
(3)
(3)
(3)
(3)
(3)
(3)
(3)
(3)
(3)
(3) | RLXN
QYILV
OMW
B
7
G
W
20
T
I | (4) F
(4) Q
(4) AN
(4) ZU
(4) C
8
H
Z
21
U
M | ATPFN
YGLV
MNU
JTD
AN
9
I
C
22
V
P | AN
AN
AN
NSWEI
10
J
F
23
W
S | SWER
SWER
SWER
SWER
SWER
R:2
11
K
I
24
X
V | 2
:4
:1
:3
12
L
L
25
Y
V | 13
M
O
26
Z
B |

Coding and Decoding - ICET-2010: In a code, the nth letter in English alphabet is coded to Kth letter, where $K \equiv 3n+2 \pmod{26}$, $1 \le K \le 26$. For example, the 9th letter I is coded as C, since 3x 9 + 2 = 29 $\equiv 3 \pmod{26}$ and C is the third letter. The reverse of this process is used for decoding. Based on these coding and decoding processes, answer the five questions.

| he wor | d coded | as DE | ENCU is | | | | | AN | SWER | :1 | |
|--------|---|---|---|--|---|---|--|--|--|--|---|
| (1) | RADIO | (2) E | DANCE | (3) | RADIC | (4) | DELHI | | | | |
| he wor | d coded | as KU | JOXMJQ | QD is | | | | AN | SWER | :2 | |
| (1) | COMPL | EXS (| 2) COM | PUTE | ER (3) CO | OMM | ENCE | (4) | COMPL | LETE | |
| The c | ode word | d for I | CET is- | | | | | AN | SWER | :4 | |
| (1) | СКРЈ | (2) (| CKQI | (3) | CKQK | (4) | CKQJ | | | | |
| The co | ode word | l for J | OLLY is | | | | | AN | ISWER | :3 | |
| (1) | SILLY | (2) S | ORRY | (3) | FULLY | | (4) F | PETTY | | | |
| The w | vord cod | ed as | GJEJQ i | s | | | | AN | ISWER | R:2 | |
| (1) | STATD | (2) | STATE | (3) | STBTE | (4) | STATF | | | | |
| 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| В | С | D | E | F | G | Η | Ι | J | Κ | L | М |
| Η | K | Ν | Q | Т | W | Ζ | С | F | Ι | L | 0 |
| 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 |
| 0 | Р | Q | R | S | Т | U | V | W | Х | Y | Ζ |
| U | Х | A | D | G | J | Μ | Р | S | V | Y | В |
| | he wor
(1)
(1)
The wor
(1)
The c
(1)
The c
(1)
The w
(1)
2
B
H
15
O
U | he word coded
(1) RADIO
he word coded
(1) COMPL
The code word
(1) CKPJ
The code word
(1) SILLY
The word code
(1) STATD
2 3
B C
H K
15 16
O P
U X | he word coded as DE
(1) RADIO (2) E
he word coded as KU
(1) COMPLEXS (
The code word for I
(1) CKPJ (2) C
The code word for J
(1) SILLY (2) S
The word coded as 6
(1) STATD (2)
2 3 4
B C D
H K N
15 16 17
O P Q
U X A | he word coded as DENCU is
(1) RADIO (2) DANCE
he word coded as KUOXMJQ
(1) COMPLEXS (2) COM
The code word for ICET is-
(1) CKPJ (2) CKQI
The code word for JOLLY is
(1) SILLY (2) SORRY
The word coded as GJEJQ i
(1) STATD (2) STATE
2 3 4 5
B C D E
H K N Q
15 16 17 18
O P Q R
U X A D | he word coded as DENCU is
(1) RADIO (2) DANCE (3)
he word coded as KUOXMJQD is
(1) COMPLEXS (2) COMPUTE
The code word for ICET is
(1) CKPJ (2) CKQI (3)
The code word for JOLLY is
(1) SILLY (2) SORRY (3)
The word coded as GJEJQ is
(1) STATD (2) STATE (3)
2 3 4 5 6
B C D E F
H K N Q T
15 16 17 18 19
O P Q R S
U X A D G | he word coded as DENCU is
(1) RADIO (2) DANCE (3) RADIC
he word coded as KUOXMJQD is
(1) COMPLEXS (2) COMPUTER (3) CO
The code word for ICET is
(1) CKPJ (2) CKQI (3) CKQK
The code word for JOLLY is
(1) SILLY (2) SORRY (3) FULLY
The word coded as GJEJQ is
(1) STATD (2) STATE (3) STBTE
2 3 4 5 6 7
B C D E F G
H K N Q T W
15 16 17 18 19 20
O P Q R S T
U X A D G J | he word coded as DENCU is
(1) RADIO (2) DANCE (3) RADIC (4)
he word coded as KUOXMJQD is
(1) COMPLEXS (2) COMPUTER (3) COMM
The code word for ICET is
(1) CKPJ (2) CKQI (3) CKQK (4)
The code word for JOLLY is
(1) SILLY (2) SORRY (3) FULLY
The word coded as GJEJQ is
(1) STATD (2) STATE (3) STBTE (4)
2 3 4 5 6 7 8
B C D E F G H
H K N Q T W Z
15 16 17 18 19 20 21
O P Q R S T U
U X A D G J M | he word coded as DENCU is
(1) RADIO (2) DANCE (3) RADIC (4) DELHI
he word coded as KUOXMJQD is
(1) COMPLEXS (2) COMPUTER (3) COMMENCE
The code word for ICET is
(1) CKPJ (2) CKQI (3) CKQK (4) CKQJ
The code word for JOLLY is
(1) SILLY (2) SORRY (3) FULLY (4) F
The word coded as GJEJQ is
(1) STATD (2) STATE (3) STBTE (4) STATF
2 3 4 5 6 7 8 9
B C D E F G H I
H K N Q T W Z C
15 16 17 18 19 20 21 22
O P Q R S T U V
U X A D G J M P | he word coded as DENCU isAN
(1) RADIO (2) DANCE (3) RADIC (4) DELHI
he word coded as KUOXMJQD isAN
(1) COMPLEXS (2) COMPUTER (3) COMMENCE (4) O
The code word for ICET isAN
(1) CKPJ (2) CKQI (3) CKQK (4) CKQJ
The code word for JOLLY isAN
(1) SILLY (2) SORRY (3) FULLY (4) PETTY
The word coded as GJEJQ isAN
(1) STATD (2) STATE (3) STBTE (4) STATF
2 3 4 5 6 7 8 9 10
B C D E F G H I J
H K N Q T W Z C F
15 16 17 18 19 20 21 22 23
O P Q R S T U V W
U X A D G J M P S | he word coded as DENCU isANSWER
(1) RADIO (2) DANCE (3) RADIC (4) DELHI
he word coded as KUOXMJQD isANSWER
(1) COMPLEXS (2) COMPUTER (3) COMMENCE (4) COMPL
The code word for ICET isANSWER
(1) CKPJ (2) CKQI (3) CKQK (4) CKQJ
The code word for JOLLY is | he word coded as DENCU isANSWER:1
(1) RADIO (2) DANCE (3) RADIC (4) DELHI
he word coded as KUOXMJQD isANSWER:2
(1) COMPLEXS (2) COMPUTER (3) COMMENCE (4) COMPLETE
The code word for ICET isANSWER:4
(1) CKPJ (2) CKQI (3) CKQK (4) CKQJ
The code word for JOLLY isANSWER:3
(1) SILLY (2) SORRY (3) FULLY (4) PETTY
The word coded as GJEJQ isANSWER:2
(1) STATD (2) STATE (3) STBTE (4) STATF
2 3 4 5 6 7 8 9 10 11 12
B C D E F G H I J K L
H K N Q T W Z C F I L
15 16 17 18 19 20 21 22 23 24 25
O P Q R S T U V W X Y
U X A D G J M P S V Y |

The vowels of the English alphabet are arranged alphabetically and among these vowels, the r^{th} vowel is coded as $(r + l)^{th}$ vowel and the last as the first. The consonants of the English alphabet are arranged alphabetically and among these consonants, the r^{th} consonant is coded as $(r - l)^{th}$ consonant and the first as the last. For decoding, the inverse process is followed. Basing on these coding and decoding processes, answer the following five questions.

| | | | | | | | | | | | - | ~ |
|-----|--------|-----------|--------|----------|-------|--------|---------|-------|----------|-------|--------------|----|
| Μ | U | Ν | Р | Q | R | S | А | Т | V | W | Х | Y |
| Ν | Ο | Р | Q | R | S | Т | U | V | W | Х | Y | Ζ |
| 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 |
| E | Z | В | C | 1 | D | F | G | 0 | Н | J | K | L |
| A | В | C | D | E | F | G | H | l | J | K | L | M |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| | (1) | ITIQIRS | (2)] | ITIQIRV | (3 |) ITIQ | ERS (4) | ITIÇ | QITS | | | |
| 30. | The co | de word f | for EV | VEREST | is | | | | | ANSW | ER:1 | |
| | (1) | DISCLO | SE (| 2) DISPL | LACE | (3)DIS | SPLAYS | (4)] | DISCOV | ER | | |
| 29. | Which | word is c | oded | as CORE | BUTIC | Q ? | | | | ANSW | ER:4 | |
| | (1) | BQOBJA | AS (| 2) BQOI | BJAU | (3) H | BQOBJIS | 5 (4) | BQOBJ | AY | | |
| 28. | The co | de word f | for CI | RICKET | is | | | | <i>A</i> | ANSWE | ER:3 | |
| | (1) | RANGES | S (2 | 2)RANG | ER | (3) | PILGOP | (4) | SANGES | 5 | | |
| 27. | Which | word is c | coded | as QEM | FIQ ? | ' | | | A | NSWE | R:2 | |
| | (1) | IMIQHZ | (2 | 2) IMIQH | Х | (3) | IMISFX | (4) | IMIQFX | | | |
| 26. | The c | code word | for I | ENERGY | is | | | | A | NSWE | 2 R:4 | |

Coding and Decoding - ICET-2009: The following TEN questions are to be answered using the coding and decoding of the letters in the English Alphabet as given below :

The r^{th} letter is coded as $(r+1)^{th}$ letter if r is odd and as $(r-1)^{th}$ letter if r is even. In decoding, the inverse process is followed.

| 31.W | hat is | the cod | e letter | for T | ? | | | | | ANS | WER: | 1 |
|---------|---------------|----------|----------------|---------|---------|---------|---------|---------|---------|---------|---------|-------------|
| | (1)S | | (2)U | J | (3)V | 7 | (4)R | | | | | |
| 32.W | /hich le | etter is | coded a | as J ? | | | | | | ANSV | VER: | 2 |
| | (1)H | | (2)I | | (3)K | | (4)L | | | | | |
| 33.W | hat is | the cod | ed word | d for Q | UALIT | Y ? | | | | ANS | WER | :3 |
| | (1)F | RVBKJU | JX | (2) R | VBKJU | ΪZ | (3)R | VBKJSZ | Z | (4) R | VBKI | UZ |
| 34.W | hich w | vord is | coded a | is FWC | KBMS | ? | | | | ANS | SWER | : :4 |
| | (1) E | EXPLOI | Т | (2)EX | KPLORI | E | (3) E | XPLOE | DE | (4)E | XPLA | NT |
| 35.W | hich w | ord is | coded a | s CPN | JMP ? | | | | | AN | SWE | R:1 |
| | (1)D | OMINC |) | (2) L | DOLINC |) | (3) L | DOMAI | N | (4) L | OLM | EN |
| 36.W | hat is t | the code | e word | for HO | MOGE | NEOUS | ? | | | AN | SWEI | R:2 |
| (4)G | (1)G
PNPHF | MFPV7 | IFPV I | (2)GPI | NPHFM | FPVI | (3)GPN | PHFNI | PVI | | | |
| 37.W | hat is t | the code | e word | for GR | EGORY | 7 ? | | | | AN | SWEF | R:3 |
| | (1)H | QFHPS | Z | (2)H | PFHPQ | Ζ | (3)H | QFHPQ | QZ (4 | 4)HQFI | łPQX | |
| 38.W | /hich w | vord is | coded a | as OQP | CJHZ 🕄 | ? | | | | ANS | WER | :4 |
| | (1) F | PROVE | RB | (2)PI | RODUC | CT | (3) P | ROCU | CE | (4)PI | RODIO | GΥ |
| 39.W | hat is | the cod | e word | for EN | IGMA | ? | | | | ANS | SWER | R:2 |
| | (1) F | MJGNE | 3 (2) F | MJHNI | 3 | (3) F | MJHIB | | (4) F | MHGN | В | |
| 40. \ | Which y | word is | coded | as JNO | PTF ? | | | | | ANS | WER: | 4 |
| | (1) If | MPURE | (2) | IMMUI | NE | (3) If | MPORT | | (4) II | MPOSE | / | |
| 1 | 2
D | 3 | 4
D | 5
E | 6
E | 7
C | 8 | 9
I | 10
I | 11
V | 12 | 13
M |
| A
B | в
А | D
D | D
C | E
F | г
Е | С
Н | н
G | I
J | J
I | к
L | L
K | M
N |
| 14 | 1.7 | 16 | 17 | 10 | 10 | 20 | 21 | 22 | 22 | 24 | 25 | 2 |
| 14
N | 15
0 | 16
P | 1 /
O | 18
R | 19
S | 20
T | 21
U | 22
V | 23
W | 24
X | 25
Y | 26
7. |
| M | P | 0 | Ř | Q | T | S | V | Ū | X | W | Ż | Y |

Coding and Decoding - ICET-2008:

For the following questions in a code an English word of n letters is coded as follows.

(i) If n is even, each of the first $\frac{n}{2}$ letters of the word are shifted forward by 3 places, the last $\frac{n}{2}$ letters are shifted backward by 3 places. (ii) If n is odd, each of the first $\frac{n-1}{2}$ letters of word are shifted forward by 3 places, the last $\frac{n-1}{2}$ letters are shifted backward by 3 and the middle letter is fixed. For example POISON is coded as SRLPLK and EAMCET is coded as HPCBQ. Decoding is the inverse process of this coding. 41. The code word for TEMPLE is------ANSWER:4 (1)WHPPIB (2)WHPMIC (3)WHPMJB (4)WHPMIB 42. Which word is coded as ZENITH?------ANSWER:4 (2)WALLWK (3)WBKKWK d) WBKLWK (1)WAKLWK 43. The code word for CHIMNEY is-----ANSWER:1 (1) FKLPKBV (2) FKLMKBV (3) FKLMLBV (4) FKLPKBV 44. Which word is coded as CURIOUS?------ANSWER:3 (1) ZROLRXV (2) ZRPIRXV (3) ZROIRXV (4) ZRPLRXV 45.The code word for LOUSY is------ANSWER:4 (2) ORXPY (3) ORRPV (4) ORUPV (1) ORUOV 46. Which word is coded as HOUSE? ------ANSWER:2 (2) ELUVH (3) ELUUH (4) ELXVH (1) ELXUH 47. The code word for POTATO is------ANSWER:1 (1)SRWXQL (2)SRXXQL (3)SRWYQL (4)SRXXWL 48. Which word is coded as MAXIMA?-----ANSWER:3 (1)JXUMPD (2)LXUMPD (3)JXULPD (4)JXVLPD 49. The code word for BANARAS is-----ANSWER:3 (1)DEQDOXP (2)EDQAMXP(3)EDQAOXP (4)EDQAMWP 50. Which word is coded as LAZY? ------ANSWER:1 (1)IXCB (2)OACB (3) IXZY (4) IXCA

Coding and Decoding - ICET-2007:

In a certain code the words HONEST, EXAMINATION, BOY, RIGHT and WRONG are respectively written as UBARFG, RKNZVANGVBA, OBL, EVIUG and JEBAT, find the process of coding, answer the following ten questions.

| 51.T | he code | word | for FIG | HT is | | | | | AN | SWER | :4 | |
|-------|-----------------|------------|----------------------------|----------------|--------------------------------------|----------------|-------|----------|-------|----------------|-------------------|-----|
| | (1)TV | TUG | (2)SV | TUH | (3) S | WTUG | (4) S | VTUG | | | | |
| 52.T | he code | for IC | CET is | | | | | | A | NSWEF | R:2 | |
| | (1)UI | PRG | (2)VP | RG | (3)V | QRG | (4)V | PSG | | | | |
| 53.T | he code | for A | RMY is | | | | | | AN | NSWER | k:3 | |
| | (1)NI | EZM | (2)MI | EZI | (3) | NEZL | (4) | NFZL | | | | |
| 54.T | he code | for So | OLDIER | is | | | | | A] | NSWEI | R:1 | |
| | (1) FI | BYQVF | RE (2) I | FBYQ | VSE | (3) FI | BZQVF | RE | (4) F | BYQUF | RE | |
| 55. 7 | The cod | e for S | EVEN | is | | | | | A | NSWE | R:4 | |
| | (1) H | FRIRZ | (2) FF | LJRA | (3) F | FRIRB | (4) F | RIRA | | | | |
| 56.V | hich w | ord is o | coded as | S MIN | ISTER- | | · | | A | INSWE | R:1 | ~ |
| XX | (1)Z | VAVFC | RE | (2)Z | VAVFH | RE | (3)Z | VAVFGS | E | (4)ZV | AVF(| JRF |
| 57.V | hich w | ord is | coded as (2) | 5 KIN | G | | | (4) X7 I | A | NSWE | R: 2 | |
| 50 11 | (1)X | VAS | (2)XV | AI | (3)X | VAU | | (4)XU | AI | NOWE | D.2 | |
| 38.V | (1) U | OFA 15 (| coded as | | |
Ст | (2)]] | VECDEI | (A)U | MNSWE
VECDE | K:5
V | |
| 50 | (I)U
Which w | vrubi | oodod (| (2) | N 9 | CL | (3)0 | VFUDEI | (4)0 | | м
7 D.2 | |
| 59. | (1) | | (2)CX | IS I LF
'NR | (3)(| ννα | (4) (| 'VND | , | | 21.3 | |
| 60 1 | Which v | vord is | (2) | s OUI | ESTION | I 1 12 1
]? | (+) (| | | ANSW | ER:1 | |
| 00. | (1)D | HRFGV | /BA | (2) E | OHRFGI |
JBA | (3)D | HRFGV | CA | (4) | | |
| DHR | FGVDA | | DIT | (2)2 | ind ot | | (3)2 | ind o i | 011 | (.) | | |
| | | | | | | | | | | | | |
| Fron | n the give | en exam | ples the a | lphabe | et is code | ed as folle | ows: | | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| А | В | С | D | Е | F | G | Η | Ι | J | Κ | L | Μ |
| Ν | Ο | Р | Q | R | S | Т | U | V | W | Х | Y | Ζ |
| 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 |
| | | | | | | | | | | | | |
| code | for the | word F | IGHT | = S V ' | TUG | | | | | | | |
| code | for the v | word I (| $C \in T = V$ | /PR(| G | | | | | | | |
| code | for the v | word A | RMY = | NEZ | L
D V O | | | | | | | |
| code | for the v | word S | OLDI.
EVEN | E K = I | FBYQ | VKE | | | | | | |
| code | for the v | word S | EVEN | = F K | IKA
D = 7M | AVEC | סתי | | | | | |
| deco | de for th | e word | | SIE | $\mathbf{K} = \mathbf{Z} \mathbf{V}$ | AVFC | JKE | | | | | |
| deco | de for th | e word | HIGT | - A V
O P V | AI | GREI | r | | | | | |
| deco | de for th | e word | DIAN | = CV | | ODLI | L | | | | | |
| deco | de for th | e word | OUES | TIO | N = DI | HRFG | VRA | | | | | |
| 4000 | av ioi u | | $\sim \sim \sim \sim \sim$ | | 1 VI | | 1 1 1 | | | | | |

Coding and Decoding - ICET-2006:

Note : In a code, the rth letter is shifted to (27 - 2r)th letter for r = 1, 2, ... 13, the fourteenth letter is shifted to 26th letter and, for r = 15, 16, ... 26, the rth letter is shifted to (2r-28)th letter. For decoding the inverse process of the above is followed. Using this coding and decoding, answer the following ten questions.

| 61. | Which w | ord is | coded a | as ITAL | Y ? | | | | -ANS | WER:3 | | |
|--------------|---------------------|-------------------|----------------------|-------------------|-----------------|----------------|--------------|--------------|--------------|--------------|--------------|--------------|
| | (1) IX | TMA | (2) D | KMTY | (3) E | XMTA | (4) I | MXTY | | | | |
| 62. | Which le
(1)A | etter is
(2) N | coded
V (3) H | as Y ?
3 (4) | M | | | | ANS | WER:1 | l | |
| 63. | What is (1) J | the coc
(2) D | le letter
0 (3) I | r for P?
2 (4) | W | | | | ANS | SWER: | 2 | |
| 64. | What is t
(1) JQ | he codo
SZQH | e word
(2) JI | for SEN
RSZRH | NDER
(3) JI | ?
PZSPH | (4) J | QZSQH | ANS | SWER: | 4 | |
| 65. | What is t
(1) DI | the cod
LBY | e word
(2) D | for PO'
BYJ | TA ?
(3) E | OBLY | (4) | DLYB | ANS | WER:3 | 3 | |
| 66. | Which w
(1)CA | ord is o
APSTA | decodeo
N (2) C | d as LM
CAPITA | VIXM
L (3) C | T ?
CAPTAIN | V (4 | 4) CAPTI | AN
ON | SWER | :2 | |
| 67. | What is (1)IN | the coc
DIAN | le for I
(2) I | UPILM
NDIRA | ?
(3) II | NDUCE | (4) [] | NDICA | AN | SWER | :4 | |
| 68. | What is t
(1)AY | the cod
MQZI | e word
2 (2)A | for MA
YZMQL | GNET
(3)A | YMZQL | (4) A | YQMZL | AN | SWER | :3 | |
| 69. | What is (1) Kl | the coc
TKAT | le for H
(2) K | HIXVTA
ITPLY | (3) K | INLEY | (4) K | LINDLE | AN | ISWER | R:2 | |
| 70. | Which w
(1) TH | ord is
HINK | decode
(2) T | d as XII
IGER | OLF ?
(3) T | TISCO | (4) T | HICK | AN | SWER | :3 | |
| 1
A
Y | 2
B
W | 3
C
U | 4
D
S | 5
E
Q | 6
F
O | 7
G
M | 8
H
K | 9
I
I | 10
J
G | 11
K
E | 12
L
C | 13
M
A |
| 14
N
Z | 15
O
B | 16
P
D | 17
Q
F | 18
R
H | 19
S
J | 20
T
L | 21
U
N | 22
V
P | 23
W
R | 24
X
T | 25
Y
V | 26
Z
X |
| | | | | | | | | | | | | |

Coding and Decoding - ICET-2005:

In a code TANK is written as SZOL and FRIEND is written as EQHFOE. Find the process of coding and answer the following TEN questions.

| 71. | The code for R | ING is | | -ANSWER:2 |
|-----|-------------------------------------|----------------------------|---------------------|-----------------------------------|
| | 1. QHOG | 2. QHOH | 3.QHME | 4. PHOH |
| 72. | The code for FF | ROG is | | ANSWER:1 |
| | 1. EQPH | 2. GAPH | 3. EQNF | 4. GSNF |
| 73. | The code for ZI | ENITH is | | ANSWER:1 |
| | 1.YDMJUI | 2. ADMJUI | 3.YFMJUI | 4 ADM JUG |
| 74. | The code for PA | ARADE is | | ANSWER:3 |
| | 1. OZQZEF | 2. OZPBEJG | 3. OZQBEF | 4. OZQBFE |
| 75. | The code for Pl | IPE is | | ANSWER:3 |
| | 1.QJOD | 2.OHOD | 3. OHQF | 4. QJQF |
| 76. | Which word is c | coded as BATS ? | | ANSWER:4 |
| | 1. CBTR | 2. CZSR | 3. CBST | 4. CBSR |
| 77. | Which word is a | coded as COURSE? | | ANSWER:3 |
| | 1. DPVPRD | 2. DPUPRD | 3. DPVQRD | 4. DPVORD |
| 78. | Which word is a | coded as DEMAND? | | ANSWER:2 |
| | 1. EFNBMC | 2. EFNZMC | 3. DENZMC | 4. EFNZLC |
| 79. | Which word is a | coded as NUMBER? - | | ANSWER:4 |
| | 1. OVNBES | 2. OVADQN | 3. OVNZDQ | 4. OVNADQ |
| 80. | Which word is | coded as RATE? | | ANSWER:2 |
| | 1.SBUF | 2. SBSD | 3. SBRD | 4 SZSD |
| NO | TE:As per the giv | en directions the first ha | alf part of the giv | en word backwarded 1 step and |
| the | second half part fa | rwarded by 1 step. For | decoding the inv | erse process followed. |
| Co | de for R I N G
-1 -1 $+1$ $+1$ | =Q H O H; | Code for F R | O G = E Q P H;
+1 +1 |
| Co | de for Z E N I | $\Gamma H = Y D M J U I;$ | Code for P | A R A D E = O Z Q B E F |
| | -1 -1-1 +1+ | -1+1 | -1 - | 1 - 1 + 1 + 1 + 1 |
| Co | de for P I P E =
-1 - 1 + 1 + 1 | = O H Q F; | Decode for | r B A T S = CBSR
+1+1-1-1 |
| Dee | code for C O U R | S E = DPVQRD; | Decode for] | D E M A N D = BFNZMC |
| | +1+1+1-1- | -1-1 | + | 1 +1 +1 -1 -1 -1 |
| Dee | code for N U M B
+1+1+1_1 | E R = OVNADQ; | Decode | for R A T E = S B S D
+1+1-1-1 |
| | · 1 · 1 · 1 ⁻ 1 | | | 1111 |

CALENDER

Calender helps us in finding teh day of the week for a particular date. In order to find the day of the week, we calculate the number of odd days during that particular period.

Odd Days: The number of odd days are the days which are more than the complete weeks in a particular period.

Leap Year: Every year which is divisible by 4 such as 1964 is called a leap year. Every century such as 300, 600, 900 etc. is not a leap year where as every fourth century such as 800, 1200, 1600 etc. is a leap year.

Hints:

- 1. An ordinary year consists of 365 days, i.e., 52 weeks + 1 day. Hence, an ordinary year contains one odd day.
- 2. A leap year consists of 366 days, i.e.52 weeks + 2 days. Hence, a leap year contains 2 odd days.
- 3. 100 years = 76 ordinary years + 24 leap years. 100 years have 76 odd days + 24 x 2 odd days
 - =(76+48) odd days =124 odd days =17 weeks +5 odd days.

100 years contains 5 odd days.

- 4. 200 years contains $5 \ge 2 = 10$ odd day, i.e. 3 odd days.
- 5. 300 years contains $5 \ge 3 = 15$ odd days, i.e. 1 odd day.
- 6. 400 years contains $5 \times 4 + 1 = 21$ odd days, i.e. 0 odd days.

Since there are 5 odd days in hundred years, there should be 20 odd days in 400 hundred years. But every 4th century is a leap year. Therefore 400 years contain 21 odd days. i.e. 0 odd days.

- 7. Last day of a century cannot be either Tuesday, Thursday or Saturday.
- 8. The first of a century must be either Monday, Tuesday, Thursday or Saturday.
- 9. Ist January 1 A.D. was Monday. We must count days from Sunday. Sunday for 0 odd day, Monday for 1 odd day, Tuesday for 2 odd days ... and Saturday for 6 odd days.

CLOCKS

A clock is an instrument which indicates time at a momement. The dial of a clock is a circle which is divided into 60 equal parts which are called minute spaces.

The clock has two hands, the smaller one is called hour hand, the bigger one is a minute hand. The hours are denoted form 1 to 12 and the minute have markings from 1 to 60. In between every two successive hour markings, there are 5 minute markings.

Hints: The clock is divided into 60 equal minute spaces.

2. One minute space =
$$\frac{360^0}{60} = 60^\circ$$
.

- 3. In one hour the minute hand goes 60 minute spaces.
- 4. In one hour the hour hand goes 5 minutes spaces.
- 5. In one hour the minute hand gains 55 minute spaces over the hour hand.
- 6. In one minute, the minute hand moves 6° .

7. In one minute, the hour hand gains
$$\frac{1}{2^0}$$
.

8. In one minute, the minute hand gains
$$5\frac{1}{2^0}$$
.

- 9. In every hour, the hands coincide once.
- 10. When the hands are in opposite direction they are 30 minute spaces a part. This happens once in every hour.
- 11. When the two hands are at right angles they are 15 minute space a part. This happens twice in every hour.
- 12. The hands are in the same stgraight line when they are coincident (or) opposite to each other.
- 13. The hands coincide 11 times in every 12 hours (because between 11 and 10 0'clock, there is a common position, 12 0'clock when the hands coincide), hence 22 times in 24 hours.
- 14. The hands point towards each other 11 times in 12 hours (because between 5 and 7 0'clock there is a common position 6 0'clock when the hands straight), hence 22 times 24 hours.
- 15. The hands of clock are at right angle 22 times in 12 hours.
- 16. The hands of a clook are straigh (coincide and are in opposite direction) 22 times in 12 hours . Hence 44 times in 24 hours.

17. In a correct clock, both the hands coincide at an interval of $65\frac{5}{11}$ minutes.

18. In a clock, the angle between the hours hand and minutes hand is $\theta = 30h - \frac{11m}{2}$ degrees.

DIRECTIONS

The test is meant to judge the condidate's ability to trace, follow and sense the direction correctly. This questions describe the motion of some one in some given direction for some given directions. Mostly you will be asked to state the correct position of a moving body area a moving person with respect to the starting point.

There are four main directions

| 1. North | 2. Sourth | 3. East | 4. | West | | |
|---------------------------|---------------------------|---------------------------|----|------|--|--|
| and there are four region | IS | | | | | |
| 1. North East Region (N | E) | 2. North West Region (NW) | | | | |
| 3. South West Region (S | 4. South East Region (SE) | | | | | |
| The given figure shows t | ha faur main diracti | ong and four racion | | | | |

The given figure shows the four main directions and four regions.



First have careful look of given figure and read the mentioned points.

| North | |
|-------------------|-------------------|
| North-West Region | North-East Region |
| IInd quadrant | 1 st quadrant |
| (Upper left) | (Upper right) |
| West | East |
| South-West Region | South-East Region |
| III quadrant | IV quadrant |
| (Lower left) | (Lower right) |
| South | |

A diagnal direction in Ist quadrant means North East direction.

A diagnal direction in IInd quadrant means North West region.

A diagnal direction in IIIrd quadrant means South West region.

A diagnal direction in IVth quadrant means South East region.

BLOOD RELATIONS

Problems of this type involve analysis of certain blood relations and then inferring on the basis of the given informations.

Chart of useful Blood Relations:

The following chart is very useful to solve Blood relation problems.

- 1. Mother's or Father's Son = Brother
- 2. Mother's or Father's Daughter = Sister
- 3. Mother's or Father's Sister = Aunt
- 4. Mother's or Father's Brother = Uncle
- 5. Mother's Brother = Metarnal Uncle
- 6. Mother's or Father's Mother = Grand Mother
- 7. Mother's or Father's Father = Grand Father
- 8. Son's Wife = Daughter-in-law
- 9. Daughter's Husband = Son-in-law
- 10. Husband's or Wife's Sister = Brother-in-law
- 11. Brother's Son = Nephew
- 12. Brother's Daughter = Niece
- 13. Uncle or Aunt's Son or Daughter = Cousin
- 14. Sister's Husband = Brother-in-law
- 15. Brother's Wife = Sisten-in-law
- 16. Grand Father's only Son = Father
- 17. Grand Mother's only Son = Father
- 18. Grand Father's Son = Father or Uncle
- 19. Grand Mother's Son = Father or Uncle
- 20. Grand Father's only Daughter-in-law = Mother
- 21. Grand Mother's only Daughter-in-law = Mother

In blood relations, we should know the relation between two persons by using the information given to you.

Some important relations

| Brother or Sister | : | Onlysiblings |
|-------------------|---|---|
| Uncle | : | Mother or Father's brother |
| Aunt | : | Mother or Father's sister |
| Cousin | : | Aunt or Uncle's children or Mother or Father's brother or sister's Children |
| Brother in law | : | Wife or Husband's brother or Sister's husband |
| Sister in law | : | Wife or Husband's sister or Brother's wife |
| Mother in law | : | Wife or Husband's mother |
| Father in law | : | Wife or Husband's father |
| Son in law | : | Daughter's husband |
| Daughter in law | : | Son's wife |
| Nephew | : | Brother or Sister's son |
| Niece | : | Brother or Sister's daughter |
| Grand Father | : | Mother or Father's father |
| Grand Daughter | : | Mother or Father's mother |

Some more important relations

- 1. A male person's father or mother's only son- Him self
- 2. A male person's father or mother's only daughter His sister
- 3. A female person's father or mother's only daughter –Her self
- 4. A female person's father or mother's only son –Her brother
- 5. A male person's father or mother's only daughter in law His wife
- 6. A female person's father or mother's only son in law Her husband
- 7. Maternal–Mother side
- 8. Paternal Father side

EXERCISE - 1

Pointing a person, a man said to a lady, "His mother is the only daughter of your Father."
 How is the lady related to the person?

| a. Sister | b. Mother | c. Wife | d. Daughter |
|-----------|-----------|---------|-------------|
|-----------|-----------|---------|-------------|

2 Pointing to a lady in the photograph, Shaloo said, 'Her son's Father is the Son-in-law of my mother. How is shaloo related to the lady?

| a. Aunt b. Sister c. | . Mother | d.Cousin | | | | |
|---|---|---|---|---|---|---|
|----------------------|----------|----------|
| 3. | Pointing to a photograph, a woman says, "This man's son's sister is my moth
How is the woman's husband related to the man in the photograph? | | | | | |
|--|--|--|---|--|--|--|
| | a. Grandson | b. Son | c. Son-in-law | d. Nephew | | |
| 4 | Arun Said, ''This gir
girl? | l, ''This girl is the wife of the only grandson of my mother''. Who is Arun to the | | | | |
| | a. Father | b. Grand Father | c. Husband | d. Father-in-law | | |
| 5 | Pointing to a photograph, a lady tells Murali, ''I am the only daughter of this lady and her son is your maternal uncle." How is the speaker related to Murali's Father? | | | | | |
| | a. Sister-in-law | b. Wife | c. Either (a) or (b) | d. Neither (a) nor (b) | | |
| 6 | R's brother is Q, Q's son is P, S's brother is T, R's daughter is 'S'. Who are the cousins of 'P'? | | | | | |
| | a. R and Q | b. R and T | c. S and T | d. S and Q | | |
| 7 A is the father of B, But 'B' is not the son of 'A'. What is B to A? | | | | | | |
| | a. Son | b. Sister | c. Daughter | d. Brother | | |
| 8 | 'X' and 'Y' are two brothers. 'B' is 'A's brother and A is the mother of 'X'. What is B to Y? | | | | | |
| | a. Brother | b. Father | c. Mother | d. Uncle | | |
| 9 | 'X' is the sister of 'Y', Y is the daughter of K, K is the husband of L. What is L to Y? | | | | | |
| | a. Father | b. Mother | c. Brother | d. Sister | | |
| 10 | 'X' is the brother of Y, Y is the wife of Z, Z is the son of W and W is the wife of V. What is V to Y? | | | | | |
| | a. Father-in-law | b. Son-in-law | c. Mother-in-law | d. Brother-in-law | | |
| 11 | X is brother of Y. Y | is brother of Y. Y is the wife of Z. Z is the brother of W. What is W to X? | | | | |
| | a. Son | b. Daughter | c. Sister-in-law | d. Brother-in-law | | |
| 12 | Pointing to a gentler
father." How is the g | man, Vamshi said, "H
entleman related to va | is only brother is the f
mshi? | ather of my daughter's | | |
| | a. Grand Father | b. Father | c. Uncle | d. Brother-in-law | | |
| 13 | Pointing to the wom whose mother is my | an in the picture, Mad
wife". How is the wo | hu said, "Her mother h
man in the picture rela | as only one grandchild,
ted to Madhu? | | |
| | a. Cousin | b. wife | c. Sister | d. Data inadequate | | |

| 14 | If Surrender say's "V
related to Venkat? G | Surrender say's ''Venkat's mother is the only daughter of my mother! How is surendar elated to Venkat? Grand Father | | | | | |
|----|---|---|-------------------|------------------|--|--|--|
| | a. Father | b. Brother | c. Maternal Uncle | d. None of these | | | |
| 15 | Pointing to a photograph, Raju said, 'She is the mother of my son's wife's daughter. How is Raju related to the lady? | | | | | | |
| | a. Uncle | b. Cousin | c. Father-in-law | d. None of these | | | |

Directions (16-19) They are six children playing Cricket, namely A, B, C, D, E and F. A and F are brothers. E is the sister of F. C is the only son of A's Maternal Uncle. B and D are the daughters of the brother of C's Father.

| 16. | How is 'C' related to 'F'? | | | | | | |
|--|---|--------------|-------------|------------------------------|--|--|--|
| | a. Cousin | b. Brother | c. Son | d. Uncle | | | |
| 17. | How many male players are there? | | | | | | |
| | a. One | b. Three | c. Four | d.Six | | | |
| 18. | How many Female players are there? | | | | | | |
| | a. Three | b. Two | c. One | d. Five | | | |
| 19. | How is 'D' related to | 'A'? | | | | | |
| | a. Uncle | b. Sister | c. Niece | d. Cousin | | | |
| 20. | In a joint family, there are father, mother, three married sons and one unmarried daughters
of the sons, two have 2 daughters each, and one has a son. How many female members
are there in the family? | | | | | | |
| | a. 2 | b. 3 | c. 8 | d. 9 | | | |
| 21. In a family, there are wife and husband. They has three sons, each son has t
Then how many male and female members are there in the family? | | | | ch son has two sisters.
? | | | |
| | a. M-4, F-3 | b. M-4, F- 7 | c. M-7, F-4 | d. None of these | | | |
| 22. | In a family, there are wife and husband. They has three sons, each son has two wives.
Then how many male and female members are there in the family? | | | | | | |
| | a. M-4, F-3 | b. M-4, F- 7 | c. M-7, F-4 | d. None of these | | | |
| Directi | ions (23-27) | | | | | | |
| | i)'A\$B' means 'A is mother of B; | | | | | | |
| | ii) 'A#B' means A is father of B; | | | | | | |

| ••• | (+ O D) | · · · | 1 1 1 00 |
|------|----------------|------------|---------------|
| 111) | $\cdot A(a)B'$ | means A is | husband of B: |
| | \cup | |) |

iv) 'A%B' means A is daughter of B. Then

23. P(a)QM#T indicates what relationship of 'P with T'? a. Paternal Grandfather b. Maternal Grandfather c. Paternal Grandmother d. Maternal Grandmother 24 Which of the following expressions indicates 'R is the sister of H'? a. H\$D@F#R b. R%D@F\$H c. R\$D@F#H d. H%D@F\$R 25 If 'F(a)D%K#H', then how is F related to H? a. Brother-in-law b. Sister d. cannot be determined c. Sister-in-law 26 Which of the following expressions indicates 'H is the brother of N'? b. N%F@D\$H#R c. N%F(a)D\$H a. H#R\$D\$N d. N%F@D%H 27 If G\$M2K, how is 'K related to G'? b. Mother-in-law d. Aunt a. Daughter-in-law c. Daughter A man pointing to a photograph says, "The lady in the photograph is my nephew's maternal 28. grandmother." How is the lady in the photograph related to the man's sister who has no other sister? a. Mother b. Cousin c. Mother-in-law d. Sister-in-law 29. A woman introduces a man as the son of the brother of her mother. How is the man related to the woman? a. Son b. Nephew c. Grandson d. Cousin 30. Kiran said, "This girl is the wife of the grandson of my mother." Who is Kiran to the girl? a. Husband b. Father c. Father-in-law d. Grandfather KEY 1) b 2) b 3) a 4) d 5) b 6) c 7) c 8) d 9) b 10) a 11) d 12) c 13) b 14) c 15) c 16) a 17) b 18) a 19) d 20) d 21) a 22) b 23) a 24) b 25) a 26) b 27) a 28) a 29) d 30) c ICET CEDM 106

Date, Time, Clock, Calender , Blood Relationsand Arrangement Problems ICET - 2010

1. The number of ways of arranging 4 men 5 women alternately in a row so that the row begins and ends with a woman is,

 1. 280
 2. 720
 3. 2880
 4. 3600

 Solution: 5!x4!=120x24=2800
 Answer is 3.

 W
 M
 W
 M

2. Five persons A, B, C, D are sitting around a table such that D is in-between A and E, C is inbetween A and B. Then the person sitting between B and D is,

 1. A
 2. C
 3. D
 4. E

 Solution:Answer is 4.

3. If the first date of a month is a Sunday, then the date of the Monday that comes after the second Saturdayof that month, is

 1. 8
 2. 9
 3. 15
 4. 16

 Solution: Answer is 4.

- 4. In a leap year, if January first is a Tuesday, then March second of that year falls on
 1. Sunday
 2. Monday
 3. Tuesday
 4. Saturday
 Solution: January (30) + February (29) + March (2) = 61 = 5 odd days .
 So 5Th day after Tuesday is Sunday.
 So answer is 1.
- 5. Fifteen years ago the ages of a mother and her daughter were in the ratio 6 : 1. If the present age of th daughter is 20 years, then the mother age in years after 5 years from now is 1. 40 2. 45 3. 50 4. 55 Solution: $x - 15 : 5 = 6 : 1 \Rightarrow \frac{x - 15}{5} = \frac{6}{1} \Rightarrow x - 15 = 30 \Rightarrow x = 15 + 30 = 45.$

So present age of mother = 45. After 5 years mother age = 45 + 5 = 50. Answer is 3.

6. The operator * is defined by the equation x * y = 2x + y for all real x and y. If 2 * a = a * 3, then the value of a =

1. -1 2. 0
3. 1
4. 4 Solution: $2 * a = a * 3 \Rightarrow 2(2) + a = 2(a) + 3 \Rightarrow 4 + a = 2a + 3 \Rightarrow 4 - 3 = 2a - a \Rightarrow a = 1$. Answer is 3.

7. The number of 3 digit positive integers that leave the remainder 5 when divided by 7 is
1. 142
2. 141
3. 129
4. 128
Solution: 103 is the least 3 digit positive integer that leave remainder 5 when divided by 7.
999 is the highest 3 digit positive integer that leave remainder 5 when divided by 7.

So the number of 3 digit positive integers that leave the remainder 5 when

divided by 7 is = $\frac{999-103}{7} + 1 = \frac{896}{7} + 1 = 128 + 1 = 129$. Answer is 3.

- 8. The number of times that the hours hand and minutes hand of a clock coincide in a day, is
 1. 22
 2. 23
 3. 24
 4. 26
 Solution: Coincide once in every one hour. 24 times the hours hand and minutes hand of a clock coincide. So the answer is 3.
- 9. A person M starts walking from a point P straight towards East. After walking 100 feet he turns left and walks 45 feet straight. He again turns left and walks 45 feet straight. He again turns left and walks a distance of 60 feet straight. Then he turns to the left and walks a distance of 45 feet. The distance between M and P in feet, is

1. 60 2. 55 3. 45 4. 40

Solution: Person M started from P.



IS

From P he walked 100 feet. So he reached A.

So PA = 100 feet. From A he turn left and walks 45 feet straight.

So he reached B. So AB = 45 feet. He again turns left and walks 60 feet straight.

Now he reached C. So BC = 60 feet. Now from C he turns left and walks 45 feet.

So now he is at M. Now distance between P and M = AP - BC = 100 - 60 = 40 feet. Ans.is 4.

10. Pointing to woman, a man said "The son of her only brother is the brother of my wife". How is the woman related to the man?

1. Grand mother2. Sister3. Mother-in-law4. Sister of father-in-law.Solution: Answer is 4.

ICET - 2009

1. The director came to the office to attend a meeting at 15 minutes past 12 and he came 25 minutes before his steno who in turn was late by 30 minutes to the meting. At what time was the meeting supposed to start?

 1. 12.00
 2. 12.15
 3. 12.10
 4. 12.20

 Solution: Director at 12 - 15; Steno came at 12-40; Steno late by 30 minutes to meeting

 Meeting is 12-10.
 So the answer is 3.

2. Which will be the first leap year after 2096?
1. 2100
2. 2104
3. 2102
4. 2108
Solution: The leap year after 2096 is 2096 + 8 = 2104.

So the answer is 2.

3. In a clock, the angle between the hours hand and minutes hand at 5 hour 10 minutes is

1. 60° 2. 95° 3. 120° 4. 90° Solution: $\theta = 30h - \frac{11m}{2} = 30 \times 5 - \frac{11 \times 10}{2} = 150 - 55 = 95^{\circ}$. Answer is 2. (here h = 5; m = 10)

4. The number of ways of arranging 4 boys and 3 girls in a row so that the row begins with a boy and ends with a girl

1. 360 2. 480 3. 720 4. 1440Solution: $5! \ge 4 \ge 3 = 120 \ge 12 = 1440$. Answer is 4.

If two circles of diameters 10 cms. and 6 cms. touch externally, then the distance between their centres is
 1. 16cms.
 2. 2cms.
 3. 4cms.
 4. 8cms.

Solution: The distance between their centres = sum of their radii = 5 + 3 = 8cms. Answer is 4.

6. B is the brother of A. S is the sistter of B. E is the brother of D. D is the daughter of A. F is the father os S. Then the uncle of E is
1. A
2. B
3. F
4. D

Solution: A, B, S are Brothers and Sisters. D is Daughter of A. E is Brother of D. The uncle of E is B. **Answer is 2.**

- 7. If 9th May was Friday, then what day was February 14th of the same year? (Note: Given year is normal year)
 1. Thursday 2. Monday 3. Friday 4. Wednesday
 Solution: If given year is normal year then number of odd days from Feb 14th to 9th May is Feb - 14; March - 31; April - 30; May - 9
 9th May is Friday then February 14th is Friday. Answer is 3.
- 8. If a month in an year starts with Monday, then the date of fourth day after the second Saturday in that month, will be

1. 162. 173. 184. 19Solution:1st Month is Monday \Rightarrow 6th month is first Satuday \Rightarrow 13th month is second Saturday

 \Rightarrow 17th is the fourth day after second Saturday. **Answer is 2.**

9. The ages of a son and his father were in the ratio 2 : 5 respectively 17 years ago. If the present age of son is 35, then the present age of father in years is

1. 66 2. 65 3. 64 4. 62 **Solution:** Present age of son = 35. 17 years ago son age = 35 - 17 = 18. So $2x = 18 \Rightarrow x = 9$. 17 years ago father age = $5x = 5 \ge 9 = 45$. So present age of father is 45 + 17 = 62. **Answer is 4.**

10. If 5 @ 6= 61 and 8 @ 10 = 164, then 7 @ 9 = 1. 124 2. 120 3. 32 4. 130 Solution: 5 @ 6 = 5² + 6² = 61, 8 @ 10 = 8² + 10² = 164 7 @ 9 = 7² + 9² = 130. Answer is 4.

ICET - 2008

- 1. Four persons A, B, C and D are sitting around a square table and discussing their trades. A sits opposite to the Carpernter and B sits right to the Electrician. The Painter is on the left of Mason and D opposite to C. What are the trades of C and D?
 - 1. Electrician and Mason2. Painter and Maon
 - 3. Painter and Carpenter 4. Painter and Electrician.

Solution: As per the given directions. In C, D one of them is Painter and another is Electrician. So the answer is 4.

2. B is twice as old as A, but twice younger that F, C is half the age of A but twice older than D. Who are the oldest and youngest ?

1. F, C 2. B, D 3. F, D 4. F, A Solution: $B = 2A \Rightarrow B = 8D$; $F = 2B \Rightarrow F = 16D$; $A = 2C \Rightarrow A = 4D$ and $C = 2D \Rightarrow C = 2D$. So the oldest is F and youngest is D. Answer is 3.

3. Two circles C_1 and C_2 are such that a square S is inscribed in C_1 and C_2 is inscribed in S. Then the ratio of the aeras of C_1 and C_2 is

1. $\sqrt{2}$:1 2. 2:1 3. 2: $\sqrt{2}$ 4. 3:2

Solution: Let a be the side of square and r_1 and r_2 be the radius of C_1 and C_2 of and respectively.

From the data and by using Pythogours theorem $2r_1 = \sqrt{a^2 + a^2} = \sqrt{2}a$. So $r_1 = \frac{a}{\sqrt{2}}$.

From the data $2r_2 = 2a$. So $r_2 = \frac{a}{2}$.

Ratio of aeras of C₁ and C₂ = πr_1^2 : $\pi r_2^2 = r_1^2$: $r_2^2 = \frac{a^2}{2}$: $\frac{a^2}{4} = \frac{1}{2}$: $\frac{1}{4} = 2$: 1.Answer is 2.

4. A square sheet of paper is cut along the diagonal into two equal triangles. What is the minimum number of pieces into which one of the two triangles shall have to cut so that these pieces together with other triange could be arranged as a rectangle.

 1. 2
 2. 3
 3. 4
 4. 5

 Solution: Answer is 1.

5. If fourth day after January 6 is a Saturday, which day of the week was on December 1 of the previce year?
1. Saturday
2. Monday
3. Sunday
4. Thursday

Solution: January 10th of the month = Saturday The number of odd days from December 1^{st} 10 January 10^{th} = 40 days (i.e.) 5 odd days. December 1^{st} is Monday. **Answer is 2.**

6. The angle between the hands of a clock when the time shown is 12 minutes past 5 O' clock is 1. 78°
2. 80°
3. 84°
4. 86°
Solution: In a clock, the angle between the hours hand and minutes hand is

$$\theta = 30h - \frac{11m}{2}$$
 degrees. The angle between the hands of a clock when the clock shows 12

minutes past 5 =
$$30 \ge 5 - \frac{11}{2} \ge 150 - 66 = 84^{\circ}$$
. Answer is 3.

7. In a village ¹/₄ th of the youth are educated and ¹/₅ th of the youth are employed. If the number of unemployed youth is 128, how many educated youth are there is that village?
1. 50
2. 55
3. 65
4. 40

Solution: ¹/₄ th of youth - educated; ¹/₅ th of the youth - employee.

So unemployed youth = $\frac{1}{4} - \frac{1}{5} = \frac{4}{5}$. So $\frac{4}{5}$ of youth = 128.

Therefore youth = $128 \times \frac{5}{4} = 160$. Therefore educated youth = $\frac{1}{4} \times 160 = 40$. Answer is 4.

- 8. $a * b = a^2 + b^2 2ab \Rightarrow ((a * a) * (b * b)) * (c * c) = ?$ 1. 0 2. 1 3. 2 4. a + b + cSolution: $a * b = a^2 + b^2 - 2ab = (a - b)^2 \Rightarrow a * a = 0, b * b = 0, c * c = 0.$ (a * a) * (b * b) * (c * c) = 0. Answer is 1.
- 9. If *N* is the set of positive integers, then $\{n \in N | |n-2| < 3\} =$ 1. $\{1, 2, 3, 4, 5\}$ 2. $\{1, 2, 3, 4\}$ 3. $\{2, 3, 4, 5\}$ 4. $\{2, 3\}$ Solution: $|n-2| < 3 \Rightarrow -3 < n-2 < 3 \Rightarrow -1 < n < 5$ and $n \in N \Rightarrow n \in \{1, 2, 3, 4\}$.

Answer is 2.

10. Twenty years back, the ratio of the ages of a father and his son was 11:3. If the ratio of their present ages is 2 : 1, then the age of the son is

1. 30 2. 35 4. 32 3. 34 **Solution:** Son presented age = x, father presented age = 2x.

20 years ago their ages are 2x - 20 and x - 20. From the data we have $\frac{2x - 20}{x - 20} = \frac{11}{3} \Rightarrow$ $6x - 60 = 11x - 220 \Rightarrow 11x - 6x = 220 - 60 \Rightarrow 5x = 160 \Rightarrow x = 32$. Answer is 4.

ICET - 2007

1. The time on the clock is 3.00p.m. If the hours hand is pointing towards West, then the direction of the minutes hand is

1. North 2. South 3. South-West 4. East

Solution: In a clock, the angle between the hours hand and minutes hand is $\theta = 30h$ -

 $\frac{11m}{2}$ degrees. $30 \ge 30^{\circ}$. The hour hand pointing towards West.

The minute hand points towards South. Answer is 2.

2. If the first day of June is a Saturday, then the date on which the last Saturday of that month falls iS

1. 22 2. 28 3. 29 4. 30 Solution: Ist June is Saturday. The Saturday falls on 1, 8, 15, 22, 29. The last Saturday falls on 29th. So the answer is 3.

- 3. If 9th March of 1995 is a Saturday, then the 9th March of 1996 is a 1. Wednesday 2. Tuesday 3. Sunday 4. Monday Solution: The given period represents a Leap year (ie) Number of days = 2 9^{th} March 1996 = 2 days after Saturday = Monday. So the answer is 4.
- 4. The ratio of the present age of a father and his son is 2:1. If the ratio 10 years ago is 5:2, then the present age of the son is 1. 30 2. 25 3. 24 4. 32 **Solution:** Son presented age = x, father presented age = 2x. 10 years ago their ages are 2x - 10 and x - 10. From the data we have $\frac{2x - 10}{x - 10} = \frac{5}{2} \Rightarrow$

 $4x - 20 = 5x - 50 \implies 5x - 4x = 50 - 20 \implies x = 30$. Answer is 1.

5. A is the father of B and C, E is the mother of C and D is the wife of F. If F is the brother of E,

then how D is related to B?

- 1. Maternal grand-mother 2. Maternal aunt
- 3. Paternal grand-mother 4. Paternal aunt

Solution: From the given data D is wife of the Brother of B's Mother \Rightarrow D is maternal Aunt of B.

So the answer is 2.

- 6. $a \Delta b = a^2 ab + b^2 \Rightarrow (a \Delta a) \Delta (a \Delta a) = ?$ 1. a^6 2. a^3 3. a^4 4. a^8 Solution: $a \Delta a = a^2 - a^2 + a^2 = a^2 \Rightarrow (a \Delta a) \Delta (a \Delta a) = (a^2)^2 = a^4$. So the answer is 3.
- 7. If $a * b = (a + b 3)^3 + a b \Rightarrow 1 * 2 =$ 1. 3 * 2 2. -(2 * 3) 3. 2 * 1 4. -(2 * 1)Solution: $1*2 = (1 + 2 - 3)^2 + 1 - 2 = -1$ and $2*1 = (2 + 1 - 3)^2 + 2 - 1 = 1 \Rightarrow 1*2 = -(2*1)$. So the answer is 4.
- 8. The number of 3's that are proceeded by 5 but not followed by 2 in the following squence of digits is 3147531245321887538162537531675324
 1. 7
 2. 5
 3. 4
 4. 6
 Solution: 314
 7531
 24532
 18875381
 62537
 531675324

There is four times occurs 3 preceeded by 5 but not followed by 2. Answer is 3.

9. If N is the set of positive integers, then $\{n \in N \mid |n-4| \le 2\} =$ 1. $\{3, 4, 5\}$ 2. $\{2, 3, 4, 5, 6\}$ 3. $\{2, 3, 4, 5\}$ 4. $\{3, 4, 5, 6\}$

Solution: $|n - 4| \le 2 \Longrightarrow -2 \le n - 4 \le 2 \Longrightarrow 4 - 2 \le 4 + n - 4 \le 4 + 2$

$$\Rightarrow 2 \le n \le 6 \text{ and } n \in N \Rightarrow n \in \{2, 3, 4, 5, 6\}.$$
 Answer is 2.

10. If January 1st falls on Saturday in a year, then the number of Saturdays in that year is
1. 52
2. 51
3. 54
4. 53
Solution: January 1st is Saturday ⇒ December 30 or 31st is also Saturday ⇒ There is 53 Saturdays in that year. So the answer is 4.

Previous ICET Questions

1. In a clock, what is the angle between the two hands at 5 hours 10 minutes? 1. 60° 2. 95° 3. 90° 4. 100° **Solution:** In a clock, the angle between the hours hand and minutes hand is $\theta = 30h - \frac{11m}{2}$ degrees.

The angle between the hands of a clock when it shows $5: 10 = 5 \times 30 - 10 \times \frac{11}{2} = 95^{\circ}$.

Answer is 2.

2. The time on the watch is 9-15 and the hour -hand points towards west. The direction of the minutes hand is

1. North2. South3. East4. WestSolution: The hour hand points towards West. The minute hand points to wards South.Answer is 2.

3. A clock is set right at 5 am. The clock loses 16 min. in 24 hours. What will be the true time when the lock indicates 10 p.m. on the fourth 1-day?

1. 10:30 pm 2. 11 pm 3. 11:30 pm 4. 10:45 pm **Solution:** 1440 min. of the correct clock = 1424 min. of this clock.

The time period from 5am to 10pm of fourth day = $3\frac{1}{2}$ days + 5 hours = 89 hours.

89 hours of this clcok = $\frac{89}{1424}$ x 1440 = 90 hours.

The correct clock shows 5am + 90 hours = 11pm. Answer is 2.

4. If 8th March falls three days after Sunday on what day will the last day of that month fall?
1. Wednesday 2. Thursday 3. Friday 4. Saturday
Solution: 8th March falls on Wednesday. The number of odd days from March 8th March 31 = 2

March 31 is Friday. Answer is 3.

5. The last day of February 2006 was a

1. Monday2. Tuesday3. Wednesday4. ThursdaySolution: Number odd days is 2005 years = 0 + 6 = 61n 2006, January -3 odd days; February - 0 odd days.The total odd days = $6 \div 3 = 2$. The last day of February 2006 was Tuesday. Answer is 2.

- 6. On July 2, 1985, it was Wednesday. The day of the B-week on July 2, 1984 was
 1. Monday 2. Tuesday 3. Wednesday 4. Saturday
 Solution: The number of odd days from 2nd July 1985 to 2nd July 1984 = 1 and 2nd July 1985 Wednesday ⇒ 2nd July 1984 is Tuesday. Answer is 2.
- 7. Which of the following is true if $a = \frac{3}{4}$, $b = \frac{4}{5}$ and $c = \frac{5}{6}$? 1. a < c < b 2. a < b < c 3. c < a < b 4. b < a < cSolution: $a = \frac{3}{4} = 0.75$; $b = \frac{4}{5} = 0.8$; $c = \frac{5}{6} = 0.83$. a < b < c. Answer is 2.
- 8. In the array 48392874362754869364, the number of instances where an even number is followed by two odd number is
 1. 1
 2. 2
 3. 3
 4. 4

Solution: 4 8 <u>3 9 2</u> 8 7 4 3 6 2 <u>7 5 4</u> 8 6 9 <u>3 6 4</u> In 3 instances an even number is followed by two odd numbers. **Answer is 3**.

- 9. How many integers from 1 to 100 exist such that each is divisible by 5 and also has 5 as a digit?
 1. 10
 2. 11
 3. 12
 4. 20
 Solution: The numbers from 1 to 100 such that each divisible by 5 and 5 as a digit = {5, 15, 25, 35, 45, 50, 55, 65, 75, 85, 95}. Answer is 2.
- 10. $a^*b = a^2 ab + 2 \Rightarrow 2^*(3^*4) = ?$ 1. 24 2. 16 3. 9 4. 8 Solution: $2^*(3^*4) = 2^*(3^2 - 12 + 2) = 2^*(9 - 10) = 2^*(-1) = 2^2 - 2(-1) + 2 = 8$. Answer is 4.
- 11. Sekhar was A years old P years ago. How old was he T years ago?
 1. A P + T
 2. P A + T
 3. A + P T
 4. A P T
 Solution: Sekhars present age = A + P. T years go his age = A + P- T. Answer is 3.
- 12. 2/3 of the members of a committee are women, 1/4 male members of the committee are married. If there are 9 unmarried male members in the committee, how many members are there in the committee?
 1. 32
 2. 36
 3. 28
 4. 42

Solution:Let the total members of committee = x. Male members of committee = $x - \frac{2x}{3} =$

$$\frac{x}{3}$$
.
 $\frac{1}{4}$ th male are married ⇒ unmarried male = $\frac{3}{4}$. $\frac{x}{3} = 9x = 36$. Answer is 2.

13. While climbing a 40 feet tall pole, a monkey ascends 4 feet in a single jump, but slips down 2 feet immediately. How many jumps does it require to reach the top of the pole?
1. 10
2. 2
3. 20
4. 19

Solution: The number of Jumps required to reach the top = $\frac{40+2}{2}+1=19$. Answer is 4.

- 14. If $a^*b = (a + b 5)$ and $a \Delta b = ab$, then $(3^*4) A(4^*5) = ?$ 1. 64 2. 0 3. 16 4. 32 **Solution:** $a^*b = (a + b - 5)^2 \Longrightarrow (3 + 4) = (3 + 4 - 5)^2 = 4$. $4^*5 = (4 + 5 - 5)^2 = 16$. Now $(3^*4) B(4^*5) = \frac{4 \times 16}{4} = 16$. Answer is 3.
- 15. A starts from his home and goes two kilometers straight. Then he turns towards his right and goes one kilometer. He turns again towards his right and goes one kilometer. If he is North-

West from his house, then in which direction did he go in the beginning?

1. East 2. West 3. South 4. North

Solution: Direction of AD in North - West. At first he moves West. Answer is 2.

16. In a row of six persons D and C are immediate neighbours of E. B is a neighbour of A only. A is the fourth from F. Who are on the two end points?

1. F, B 2. F, C 3. B, D 4. C, A

Solution: As persons given direction, the arrangement may be as follows

BACEDF or BADECF. Hence B and F are on two ends. Answer is 2.

17. Five books are lying in a pile. E is lying on A and C is lying under B. A is lying above B and D is lying under C. Which book is lying at the bottom?

1. A 2. C 3. D 4. B

Solution: As per the given directions the arrangement is Hence D lies at the bottom. Answer is 3.

ICET - 2011 Date, Time and Arrangement Problems

- B is the brother of A, S is the sister of B, E is the brother of D, D is the daughter of A and F is the Father of S. Then the uncle of E is

 A
 B
 B
 E
 E
 F

 Solution: The uncle of E is B. Answer is 2.
- A person X is facing north. He turns 165° in the anti-clockwise direction, then 30° in the clock-wise direction and thereafter 90° in the anti-clockwise direction. Then X is facing
 North-West 2. North-East 3. South-West 4. South-East
 Solution:Answer is 4.
- 3. The ages of a son and his father was in the ratio 2 : 5 seventeen years ago. If the present age of the son is 35 years, the age of the father 5 years hence, is 1. 62 years 2. 65 years 3. 67 years 4. 68 years Solution: y - 17 : x - 17 = 2 : 5 $\frac{18}{x - 17} = \frac{2}{5} \Rightarrow 90 = 2x - 3y \Rightarrow 2x = 34 + 90 = 124 \Rightarrow x = 62.$

After 5 years \Rightarrow 62 + 5 = 67 years. Answer is 3.

4. A leap year starts with Sunday. On what day will be the second of March in that year
1. Wednesday 2. Thursday 3. Friday 4. Saturday
Solution: 1 - Sunday ⇒ 30(J) + 29(F) + 2(M) = 2 + 1 + 5 = 8.
Five days after Sunday - Friday. Answer is 3.

- 5. If $a * b = a^3 + b^3 3ab$, then $\frac{(2 * 1) * (2 * 1)}{(2 * 1)} =$ 1. 1 2. 3 3. 9 4. 27 Solution: $\frac{(2 * 1) * (2 * 1)}{(2 * 1)} = \frac{3 * 3}{3} = \frac{27 + 27 - 27}{3} = 9$. Answer is 3.
- 6. If A, M, D and S denote the usual addition, multiplication, division and subtraction recpectively, then {10 S (3 M 4) D 2} A 3, is equal to

 3
 7
 18
 75

 Solution: {10 (3 x 4) ÷ 2} + 3 = {10 12/2} + 3 = {10 6} + 3 = 4 + 3 = 7. Answer is 2.
- 7. If $a * b = a + b \frac{ab}{2}$ for all $a, b \in R$ and *e* is a non-zero real number, then the value of a for

which a * e = a is 1. 0 2. 1 3. 2 4. 3 **Solution:** $a * e = a; a + e - \frac{ae}{2} = a \Rightarrow e = \frac{ae}{2} \Rightarrow a = 2$. **Answer is 3.**

- 8. B is the father of A, C is the wife of B, D is the mother of C and E is the husband of D. Then how is E related to A?
 1. Grandfather 2. Mother 3. Brother-in-law 4. Father
 Solution: B is male. C is Mother of A. D is Grandmother of A. E is Grandfather of A. E is Husband of D. Answer is 1.
- 9. In a rwo of six persons, D and C are immediate neighbours of E, B is the only neighbour of A and C is the neighbour of F. The possible persons occupying the two end points of the row are
 1. F and B
 2. A and F
 3. F and C
 4. C and A
 Solution: F
 C
 E
 D
 B
 A. Answer is 2.
- 10. If a clock shows 12 minutes past 5, then the angle between its two hands is 1. 86° 2. 84° 3. 80° 4. 78° Solution: In a clock, the angle between the hours hand and minutes hand is $\theta = 30h$ -

$$\frac{11m}{2}$$
 degrees

The angle between the hands of a clock when the clock shows 12 minutes past 5

= 30 x 5 -
$$\frac{11}{2}$$
 x 12 = 150 - 66 = 84°. Answer is 2.

ICET-2012 Date, Time and Arrangement Problems

1. B is to the South-West of A; C is to the East of B and is also South-East of A while D is to the North of C in line with B and A. The direction of A relative to D is_{NW} Ν NE 1. North 2. East D 3. South-West 4. North-East Ē **Solution:** If we represent them on the line they will be as shown in the figure. Answer is 4. SE 2. Five persons A, B, C, D and E are in a row such that (ii) C is an between B and E, (i) B is not at any extreme end, (iii) A is on the left of B (iv) D is on the right of E Then the persons at the extreme ends are 4. A, D 2. A, E 3. C, E 1. C, D Solution: A B C E D. Answer is 4. 3. The town P is located on the bank of a river. Another town A is to the West of P and a town T is to the East of A but West of P. K is a town which is to the East of B but to the West of T N and A. The town on farthest West is 1. T 2. P 3. K 4. B B Α Solution: If we represent them on the line W -Т they will be as shown in the figure. Answer is 4. 4. A person facing East moves 30 meters towards East and then moves a distance of 80 meters North and later moves 30 meters towards East again. How far is he from the initial point? 1. 80m 2. 90m 30mt 3. 100m 4. 110m 80mt Solution: By pythogorous theorem he is 80 $\sqrt{80^2 + 60^2} = \sqrt{6400 + 3600} = \sqrt{10000} = 1000$ Ē Х 30mt+30 distance from the initial point. S 5. After 1990, which year has the same calendar as that of 1990? 1. 1994 2. 1995 4. 1997 3. 1996 Solution: Add score to all. 6. Five years back the ratio of son's age to that of his father is 2:5. The present age of the father is 50 years. Then the present age of the son (in years) is

1. 182. 213. 234. 25Solution:Let the present age of the son be x

$$\frac{x-5}{50-5} = \frac{2}{5}$$
, $5x - 25 = 90 \Rightarrow 5x = 115 \Rightarrow x = \frac{115}{5} = 23$. Answer is 3.

7. 15th August of a year falls on Wednesday. Then what day is 2nd October of that year?
1. Wednesday 2. Tuesday 3. Monday 4. Sunday
Solution: W - 0; T - 1; F - 2; S - 3; Sun - 4; Mon - 5; Tues - 6, Aug - 16 days; September - 30 days; October - 2 days. Total = 48 days = 6 odd days. So Tues day. Answer is 2.

8. If
$$a * b = a \left(1 + \frac{1}{b} + \frac{1}{b^2} + \cdots \right)$$
 for $a, b \in N, b > 1$ then $2 * 3 = 1.1$ 2.3 3.6 4.8

Solution:
$$2 * 3 = 2\left(1 + \frac{1}{3} + \frac{1}{3^2} + \dots\right) = 2 \times \frac{1}{1 - \frac{1}{3}} = 2 \times \frac{3}{2} = 3$$
. Answer is 3.

Note:
$$\left(1+\frac{1}{3}+\frac{1}{3^2}+\dots\right)$$
 = Infinete geometric progression = $\frac{a}{1-r} = \frac{1}{1-\frac{1}{3}} = \frac{3}{2}$

9. At 15 minutes past 5, the angle between both the hands of a clock is

1.
$$72\frac{1}{2}^{0}$$
 2. $67\frac{1}{2}^{0}$ 3. 64^{0} 4. $58\frac{1}{2}^{0}$
Solution: In a clock, the angle between the hours hand and minutes hand is $\theta = 30h$.
 $\frac{11m}{2}$ degrees.
 $|30h - \frac{11m}{2}| = \left|\frac{11 \times 5}{2} - 30(8)\right| = \left|\frac{165 - 300}{2}\right| = \left|\frac{135}{2}\right| = 67\frac{1}{2}^{0}$. Answer is 2.

- 10. The denominator of a fraction is one more than twice the numerator. If one is added to both the numerator and denominator the fraction becomes
 - 1. $\frac{3}{4}$ 2. $\frac{2}{3}$ 3. $\frac{1}{2}$ 4. $\frac{4}{5}$

Solution: The fraction is $\frac{x}{2x+1}$. Adding 1 to the numeratoe and denominator the fraction becomes

$$\frac{x+1}{2x+1+1} = \frac{x+1}{2(x+1)} = \frac{1}{2}$$
. Answer is 3.

| | ICET-20 | 12 | Date, Time and Arrangement Problems | | | | | |
|---|---|----------------|-------------------------------------|------------|----------------------------------|-----------|--|-----------------|
| 1. | If the minutes hand of a clock is facing south, then the direction of the minutes hand after 21 minutes is | | | | | after 210 | | |
| | 1. North | 2. | East | 3. | West | | 4.South-West | [1] |
| 2. | A is the mother of E
1. Mother | 3 an
2. | d C. Dis the hu
Sister | sbei
3. | nd of C. Then A
Mother-in-law | A is : | related to D as [3]
4. Daughter-in-law. | |
| 3. | If the first day of M
Independence day fa | Mare
alls i | ch in a year ha
in the year is | ppe | ens to be Frida | ıy, tl | hen the day on whic | h Indian
[3] |
| | 1. Monday | 2. | Tuesday | 3. | Thursday | | 4. Saturday | |
| 4. | If a clock shows 15 t is | ninı | ites past 3'o clo | ck t | hen the angle be | etwe | een the hours and min | utes hand |
| | 1. 20° | 2. | 30° | 3. | 40 ⁰ | | 4. 7.5° | [4] |
| 5. | If $a * b = a + b - \frac{ab}{2}$ | for | all $a, b \in R$ and | l e i | s a non-zero re | al n | umber, then the valu | e of a for |
| | which $a * e = a$ is | | | | | | | [3] |
| | 1. 0 | 2. | 1 | 3. | 2 | 4. | 3 | |
| 6. | $a * b = \frac{1}{ab} + 1 \Longrightarrow \sum_{n=1}^{20} b^{n}$ |] <i>n</i> * | s(n+1) = | | | | | [2] |
| | $1.2013 - \frac{1}{2013}$ | 2.2 | $2014 - \frac{1}{2014}$ | 3. | $-\frac{1}{2014}$ | 4.2 | $2013 - \frac{1}{2014}$ | |
| 7. | 7. In a queue Anitha is the 10 th from the front while Meena is 25 th from the last and Mohan is just in the middle of the two. If there are 50 persons in the queue, the position of Mohan from the function | | | | | | | |
| | 1. 20 th | 2. | 19^{th} | 3. | 18^{th} | 4. | 17 th | [3] |
| 8. | If $a * b = a + b + ab$ | for | all $a, b \in R$, the | en t | he value of x sa | atisf | $\frac{1}{2} \frac{1}{2} x = -13$ i | is [2] |
| • • | 1. 1 23 3. 2 42 | | | | | | | |
| 9. The denominator of a fraction is one more than twice the numerator. If one is added to both the numerator and denominator the fraction becomes [3] | | | | | | | | |
| | 1. $\frac{3}{4}$ | 2. | $\frac{2}{3}$ | 3. | $\frac{1}{2}$ | 4. | $\frac{4}{5}$ | |
| 10.In a rwo of six persons, D and C are immediate neighbours of E, B is the only neighbour of A and C is the neighbour of F. The possible persons occupying the two end points of the row are | | | | | | | | |
| | [2]
1. F and B | 2. | A and F | 3. | F and C | 4. | C and A | |

1. HCF AND LCM

Factors and Multiples: If a number 'a' divides 'b' exactly, we say that 'a' is factor of 'b', In this case, 'b' is called a multiple of 'a'.

Highest Common Factor (or) Greatest Common Measure G.C.M. (or) Greatest Common Divisor G.C.D: The H.C.F of two or more numbers is the greatest number that divides each of them exactly. There are two methods of finding the H.C.F. of a given set of numbers.

Factorization Method: Express each one of the given number as the product of prime factors. The product of least powers of common prime factors gives H.C.F.

Division Method: Divide the larger number by the smaller one. Now, divide the divisor by the remainder. Repeat the process of dividing, till zero is obtained as remainder. The last divisor is the required H.C.F.

Least Common Multiple (L.C.M.): The least number which is exactly divisible by each one of the given numbers is called their L.C.M.

Co-primes: Two numbers are said to be co-primes if their H.C.F. is one.

Note: For any two positive numbers, product of two numbers = Product of their H.C.F and L.C.M.

L.C.M of fractions = $\frac{\text{L.C.M.of the numerator numbers}}{\text{H.C.F.of the denominator numbers}}$

H.C.F, of fractions = $\frac{\text{H.C.F.of the numerator numbers}}{\text{L.C.M. of the denominator numbers}}$

Provided that the given fractions are first converted into their basic form. A basic from means, there should be no common factor in the numerator and denominator of a given fraction. Thus, a

fraction say $\frac{15}{20}$, when expressed in its basic form yields $\frac{3}{4}$.

PROBLEMS

1. If HCF (1152, 1664) = 128, then LCM (1152, 1664) = 1. 1152 2. 1154 3. 14976 4. 16872 Solution: HCF x LCM = product of the numbers. product of the numbers 1152×1664

So LCM =
$$\frac{\text{product of the numbers}}{\text{HCF} \times \text{LCM}} = \frac{1152 \times 1664}{128} = 1152 \text{ x } 13 = 14976.$$

So the answer is 3.

2. The least positive integer that leaves remainders 25, 37 and 53 respectively when divided by 36, 48 and 64 is

 1. 576
 2. 574
 3. 567
 4. 565

 Solution: Divisors = 36, 48 and 64; Remainders = 25, 37 and 53; Difference = 11, 11 and 11.

Difference of divisors and remainders is same, in all the cases. So required number = (LCM of 36, 48 and 64) - (11) = 576 - 11 = 565. So the answer 4.

3. The l.c.m. and g.c.d. of two numbers are 240 and 16 respectively. If the two numbers are in the ratio 3 : 5, the numbers are,

1. 24, 40 2. 21, 35 3. 36, 60 4. 80, 48

Solution: Let the numbers be 3x, 5x.

Product of the numbers = g.c.d x 1.c.m \Rightarrow 3x.5x = 240 x 16 \Rightarrow 15x² = 240 x 16 \Rightarrow x² = 16 x 16

 $\Rightarrow x = 16$. So the numbers are 48, 80. So the answer is 4.

4. The g.c.d. and l.c.m. of two numbes are 66 and 384 respectively. If the first number is divided by 2, the resulting answer is 66. The second number is

1. 192 2. 196 3. 384 4. 576

Solution: Let first number be '*a*' and second number be '*b*'.

Given that $\frac{a}{2} = 66 \Rightarrow a = 132$. Now $132 \ b = 66 \ x \ 384 \Rightarrow b = \frac{66 \times 384}{132} = \frac{384}{2} = 192$. So the answer is 1.

- 5. The ascending order of the numbers $\frac{7}{8}, \frac{9}{11}, \frac{5}{7}$ is
 - 1. $\frac{7}{8}, \frac{9}{11}, \frac{5}{7}$ 2. $\frac{9}{11}, \frac{7}{8}, \frac{5}{7}$ 3. $\frac{5}{7}, \frac{9}{11}, \frac{7}{8}$ 4. $\frac{5}{7}, \frac{7}{8}, \frac{9}{11}$

Solution: LCM of denominators 8, 11, 7 is 616.

So the fractions can be written as $\frac{7}{8} = \frac{7 \times 77}{8 \times 77} = \frac{539}{616}$, $\frac{9}{11} = \frac{9 \times 56}{11 \times 56} = \frac{504}{616}$, $\frac{5}{7} = \frac{7 \times 88}{8 \times 88} = \frac{440}{616}$.

So ascending order = $\frac{440}{616}$, $\frac{504}{616}$, $\frac{539}{616}$. So ascending order of fractions = $\frac{5}{7}$, $\frac{9}{11}$, $\frac{7}{8}$. So the answer is 3.

The least positive integer which leaves a reminder 2, when divided by each of the numbers 4, 6, 8, 12 and 16

1. 46 2. 48 3. 50 4. 52 Solution: The LCM of 4, 6, 8, 12 and 16 = 48. So the required number = 48 + 2 = 50. So the answer is 3.

- 7. The least perfect square which is divisible by each of the numbers 12, 15, 20, 24 is 1. 3600 2. 4600 3. 6400 4. 8100 Solution: The least number which is exactly divisible by 12, 15, 20, 24 is their LCM. LCM = $2 \times 2 \times 2 \times 3 \times 5 = 120$. 120 is not a perfect square. To make this a perfect square we have to multiply with $3 \times 2 \times 5 = 30$. So the required number is $120 \times 30 = 3600$. So the answer is 1.
- 8. The least number of five digits exactly divisible by 456 is
 1. 10000
 2. 10012
 3. 10032
 4. 10056
 Solution: The least 5 digit number is 10000.
 When 10000 divided by 456, then we get remainder as 424.
 So the least 5 digit number which is divisible by 456 is 10000 + (456 424) = 10032.
 So the answer is 3.
- 9. If three natural numbers, whose LCM is 360, are in the ratio 2 : 3 : 4, then the largest of them is

1. 60 2. 90 3. 120 4. 180

Solution: Let the numbers be 2x, 3x, 4x. Their LCM = 12x.

So $12x = 360 \implies x = 30$. So the numbers are 30, 90, 120.

The largest among them is 120. So the answer is 3.

10. The greatest possible length of a scale which can be used to measure exactly the lengths 1m 20cm, 9m, 1m 5cm. and 1m 65cm. is

1. 35cm2. 25cm.3. 5cm.4. 15cm.Solution: The greatest possible length of a scale which can be used to measure exactly thelengths 1m 20cm, 9m, 1m 5cm. and 1m 65cm. is the GCD of 120, 900, 105 and 165.Their GCD = 15cm.So the answer is 4.

11. The least number which is exactly divisible by 3, 4, 5, 6 and 8 is

 1. 60
 2. 90
 3. 120
 4. 180

Solution: The least number which is exactly divisible by 3, 4, 5, 6 and 8 is their LCM. LCM is $2 \times 3 \times 4 \times 5 = 120$. **So the answer is 3.**

12. The LCM of 36, 48, 72 and 24 is

1. 120 2. 144 3. 288 4. 240 Solution: $36 = 2^2 \times 3^2$; $48 = 2^4 \times 3^1$; $72 = 2^3 \times 3^2$; $24 = 2^3 \times 3^1$. So LCM = $2^4 \times 3^2 = 16 \times 9 = 144$. So the answer is 2.

13. The GCD of 36, 48, 72 and 24 is

1. 24 2. 12 3. 8 4. 6 Solution: $36 = 2^2 \times 3^2$; $48 = 2^4 \times 3^1$; $72 = 2^3 \times 3^2$; $24 = 2^3 \times 3^1$. So GCD = $2^2 \times 3^1 = 4 \times 3 = 12$. So the answer is 2.

14. The LCM of
$$1\frac{1}{2}$$
, $2\frac{3}{4}$ and $1\frac{1}{8}$.
1. 49
2. $49\frac{1}{2}$
3. $\frac{97}{2}$
4. 48
Solution: Converting into improper fractions we get $\frac{3}{2}$, $\frac{11}{4}$ and $\frac{9}{8}$.

So L.C.M of fractions = $\frac{\text{L.C.M.of the numerator numbers}}{\text{H.C.F.of the denominator numbers}}$

$$= \frac{\text{LCM of } 3,11,9}{\text{GCD of } 2,4,8} = \frac{99}{2} = 49\frac{1}{2}$$
. So the answer is 2

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- 15. The smallest positive integer which leaves a remainder 3 when divided by 5 and leaves a remainder 5 when divided by 7, is
 - 2. 23 3. 33 1.68 4. 12 Solution: Divisors = 5, and 7; Remainders = 3 and 5; Difference = 5-3=2 and 7-5=2. Difference of divisors and remainders is same, in all the cases. So required number = (LCM of 5 and 7) - (2) = 35 - 2 = 33. Answer is 3.

16. When the following fractions are arranged in ascending order of magnitude, the

middle one is $\frac{2}{3}, \frac{5}{7}, \frac{9}{13}, \frac{9}{14}, \frac{7}{9}$ 1. $\frac{2}{3}$ 2. $\frac{5}{7}$ 3. $\frac{9}{13}$ 4. $\frac{7}{9}$ **Solution:** $\frac{2}{3} = 0.66..., \frac{5}{7} = 0.71..., \frac{9}{13} = 0.69..., \frac{9}{14} = 0.642..., \frac{7}{9} = 0.777...$ Ascending order is $\frac{2}{3}, \frac{9}{14}, \frac{9}{13}, \frac{5}{7}, \frac{7}{9}$. The middle one is $\frac{9}{13}$. Answer is 3. 17. The least value of k such that 735 x k is a perfect square is

1. 3 2. 5 3. 7 4. 15
Solution:
$$735 \times k = 3 \times 7^2 \times 5$$

So the least value $k = 3 \times 5 = 15$ Answer is 4.

So the least value $k=3 \ge 5 = 15$. Answer is 4.

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18. If $x > x^2 > x^3$, then a possible value of x among the following is

- 1. -2 2. $-\frac{1}{2}$ 3. $\frac{3}{4}$ 4. 1 Solution: $x = -2 \Rightarrow -2 > 4 > -8$ wrong; $x = -\frac{1}{2} \Rightarrow -\frac{1}{2} > \frac{1}{4} > \frac{-1}{8}$ wrong; $x = \frac{3}{4} \Rightarrow \frac{3}{4} > \frac{9}{16} > \frac{27}{64}$ Correct; $x = 1 \Rightarrow 1 > 1 > 1$ wrong. Answer is 3. 19. If the fractions $\frac{1}{2}$, $\frac{2}{9}$ and $\frac{7}{13}$ are expressed with a common denomination, then the least numerator is 1. 117
 2. 91
 3. 136
 4. 52 Solution: LCM of 2,9,13 is 234. $\frac{1}{2} = \frac{117}{234}$, $\frac{2}{9} = \frac{52}{234}$, $\frac{7}{13} = \frac{126}{234}$ The least numerator is 52.
 Answer is 4.
- 20. H C F of two numbers is 15 and their sum is 150. If both the numbers are greater than 15, then those numbers are
 1. 45,105
 2. 60,90
 3. 55,95
 4. 30,120
 Solution: The HCF of 45, 105 is 15.
 The HCF of 60, 90 is 30.
 The HCF of 55, 95 is 5.
 The HCF of 30, 120 is 30. Answer is 1.
- 21. If n = 847 x K is a perfect square then the least possible positive value of K is: 1. 3 2. 5 3. 7 4. 11 **Solution:** $847 = 11^2 \text{ x 7}$. So the least possible positive value of K is 7; **Answer is 3**.

2. NUMBERS AND DIVISIBILITY

1. If a number is divisible by another number, it must be divisible by each of the factors of that number.

Example: 36 is divisible by 6.

The factor of 6 are 2, 3 \Rightarrow 36 is divisible by 2 and 3 also (i.e.,) the factors of 6.

2. If a number is divisible by each of the two or more co-prime numbers, it must be divisible by their product.

Example: 120 is divisible by 3, 4 and 5 which are co-primes \Rightarrow 120 is divisible by 3 x 4 x 5 = 60.

- 3. If a number is a factor of each the two given numbers it must be a factor of their sum. **Example:** 6 is divisible by 3 and 15 is divisible by $3 \Rightarrow 6 + 15 = 21$ is divisible by 3.
- 4. If a number is a factor of each of the two given numbers then it must be a factor of their difference.

Example: 324 and 264 are divisible by 4 \Rightarrow 324 - 264 = 60 is also divisible by 4.

Rules for Testing Divisibility of a Number

<u>A number is Divisible by 2</u> if the last digit or units place is 0, 2, 4, 6 or 8.

<u>A number is Divisible by 3</u> if he sum of its digits is divisible by 3.

<u>A number is Divisible by 4</u> if the last two digits from a number divisible by 4 or 00.

<u>A number is Divisible by 5</u> if the last digit is either 0 or 5.

<u>A number is Divisible by 6</u> if it is divisible by both 2 and 3.

<u>A number is Divisible by 8</u> if the last three digits from a number divisible by 8 or 000.

<u>A number is Divisible by 9</u> if the sum of all digits is divisible by 9.

<u>A number is Divisible by 10</u> if the last digit is 0.

<u>A number is Divisible by 11</u> if the difference between the sum of digits at odd and even places is either 0 or in multiples of 11.

<u>A number is Divisible by 12</u> if it is divisible by both 3 and 4.

<u>A number is Divisible by 14</u> if it is divisible by both 2 and 7.

<u>A number is Divisible by 15</u> if it is divisible by both 3 and 5.

<u>A number is Divisible by 16</u> if the number formed by the last four digits is divisible by 16.

PROBLEMS

1. If the ten-digited number 116342*a*32*b* is divisible by 9 and *a* - *b* = 2 then the ordered pair (*a*, *b*) is

1. (6, 4) 2. (8, 6) 3. (5, 3) 4. (3, 1)

Solution: The number is divisible by 9 if the sum of the digits is divisibly by 9.

Here, if 116342*a*32*b* is divisible by 9

then 1 + 1 + 6 + 3 + 4 + 2 + a + 3 + 2 + b = 22 + a + b is divisible by 9. Also given that a - b = 2, then go through options. If (a, b) = (6, 4), here a - b = 2 is true, but 22 + 6 + 4 = 32 is not divisible by 9. So answer is not (1). If (a, b) = (8, 6), here a - b = 2 is true. Also 22 + 8 + 6 = 36 is divisible by 9. So the answer is 2.

- 2. If the numbers: 169, 248, 416, 974, 517, 612 and 325 are arranged in descending order based on the sum of the digits of each of these numbers, the middle number will be

 248
 517
 612
 974

 Solution: Sum of the digits of 169 = 16; Sum of the digits of 248 = 14; Sum of the digits of 416=11;
 Sum of the digits of 974=20; Sum of the digits of 517=13; Sum of the digits of 612=9; Sum of the digits of 325=10;
 Descending order based on the sum of the digits of each of these numbers is 612, 325, 416, 517, 248, 169, 974. So the middle number is 517. So the answer is 2.
- 3. The number of divisors excluding 1 and itself of the number 8625 is

1. 15 2. 14 3. 12 4. 13 **Solution:** $8625 = 5^3 \times 3^1 \times 23^1$. The number of factors = (3+1)(1+1)(1+1)=(4)(2)(2)=16. The number of divisors excluding 1 and it self = 16 - 2 = 14. So the answer is 2. 4. The number of integers between 200 and 600, that the divisible by 2, 3 and 7 is 1. 14 2. 9 3. 11 4. 10 Solution: The integer which is divisible by 2, 3 and 7 is LCM of 2, 3 and 7. LCM of 2, 3 and 7 is 42. The number of integers divisible by 2, 3 and 7 between 200 and 600 = number of integers divisibly by 2, 3 and 7 up to 600 - number of integers divisibly by 2, 3 and 7 up to $200 = \frac{600}{42} - \frac{200}{42} = 14 - 4 = 10$. So the answer is 4.

5. The number of 3 digit positive integers that leave the remainder 5 when divided by 7, is 1. 142 2. 141 3. 129 4. 128 **Solution:** The least 3 digit number = 100, the greatest 3 digit number = 999. 100 = 7(14) + 2, so the remainder is 2. 999 = 7(142) + 5, so the remainder is 5. 103 = 7(14) + 5, so the remainder is 5.

So the number of 3 digit numbers that leave remainder 5 when divided by 7 is $\frac{999-103}{7}+1=$

129 So the answer is 3.

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- 6. The number of distinct prime factors of 8! is: 1. 3 2. 4 3. 5 4. 8 Solution: $8! = 8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1$. 7, 5, 3, 2, are prime factors. Answer is 2.
- 7. The number of elements in the set $E = \{n : n \text{ integer}, 500 \le n \le 700 \text{ and } n \text{ is divisible by 11} \}$ is

1. 63 2. 45 3. 108 4. 18 Solution: 11 x 50 = 550; 11 x 60 = 660; 660 - 550 = 110; $\frac{110}{11}$ = 10; 10+4+4 = 18. Answer is 4.

3. PERCENTAGES

Percent means per 100.

To Express x% as a Fraction: $x\% = \frac{x}{100}$

Important Formulae: If the price of commodity increases by $x^{\%}$, then the reduction in consump-

tion, so as not to increase the expenditue is $\left(\frac{x}{100+x} \times 100\right)\%$

If the price of a commodity decreases by x%, then the increase in consumption, so as not to decrease the expenditure is $\left(\frac{x}{100-x} \times 100\right)$

PROBLEMS

If A gets 50% more than B, how much does B get less than A? 1.

3. 50% 2. $33\frac{1}{3}\%$ 4. $66\frac{2}{3}\%$ 1. 25% Solution: $A = B + 50\%B \Longrightarrow \frac{A}{B} = \frac{150}{100}$. So B get less than 'A'. $\frac{50}{150} \times 100 = 33\frac{1}{3}\%$. So the answer is 2. Is an examination, A got 10% marks less than B and B got 10% marks less than C. If A get 2. 810 marks, then how many marks did C get? 1. 900 2.970 3. 920 4. 1000 **Solution:** Let C = 100 part. B = 90% of 100 parts = 90 parts. A = 90% of 90 parts = 81 parts. A = 81 parts $= 810 \implies 1$ part = 10. So C = 100 parts = 100 x 10 = 1000. So the answer is 4. If 7% of 800 is equal to 20% of x, then x =3. 1. 300 2.280 3. 240 4. 200 **Solution:** 7% of 800 = 20% of $x \Rightarrow \frac{7}{100} \times 800 = \frac{20}{100} \times x \Rightarrow x = \frac{7 \times 800}{20} = 280.$ If 20% of a = 25% of b = 30% of c = 10% of d = k > 1 then the largest of 2a, 3b, 6c and 4. *d* is 1. 2*a* 2. 3b 3. 6c 4. d

Solution: 20% of a = 25% of b = 30% of c = 10% of d = k

 $\Rightarrow \frac{a}{5} = \frac{b}{4} = \frac{3c}{10} = \frac{d}{10} = k \Rightarrow a = 5k; \ b = 4k; \ c = \frac{10k}{3}; \ d = 10k$ $\Rightarrow 2a = 10k; \ 3b = 12k; \ 6c = 20k; \ d = 10k.$ So maximum among these is 6c. So the answer is 3.

- 5. A student has to secure 45% of marks to pass. If a boy getting 285 marks fails by 30 marks the maximum marks for the examination is
 - 1. 600 2. 650 3. 700 4. 750

Solution: A student has to get 45% to pass. He got 285 and fails by 30 marks. So, pass marks are $285 + 30 = 315 \implies 45\%$ of maximum marks = 315.

$$\Rightarrow 45\% \text{ of } x = 315 \Rightarrow \frac{45}{100} \times x = 315 \Rightarrow x = 700$$
. So the answer is 3.

6. If 25% of a number is added to another number then the second number increases by 10%. The ratio of the first number to the second is

1. 1:2
2. 2:1
3. 5:2
4. 2:5

Solution: Let the two numbers be *x* and *y*.

25% of
$$x + y = 110\%$$
 of $y \Rightarrow \frac{x}{4} = \frac{110y}{100} - y \Rightarrow \frac{x}{4} = \frac{y}{10} \Rightarrow \frac{x}{y} = \frac{4}{10} = \frac{2}{5}$. So the answer is 4.

7. After successive discounts of x% and y% an article worth Rs.250 is available for Rs.170. If y = 15 then x =

1. 25 2. 20 3. 15 4. 10 Solution:(100 - x)% of (100 - 15)% of $250 = 170 \Rightarrow \frac{100 - x}{100} \times \frac{85}{100} \times 250 = 170$ $\Rightarrow 100 - x = 80 \Rightarrow x = 20$. So the answer is 2.

8. A has a share of 75% in a property and sold two-third of his share for Rs.3 lakhs. The value of the entire property (in lakhs of rupees) is

1. 7 lakhs2. 6 lakhs3. 5 lakhs4. 4 lakhsSolution: Let the entire property is x rupees, then from the given problem,

$$\frac{2}{3}(75\%(x)) = 3,00,000 \Longrightarrow \frac{2}{3} \ge \frac{3}{4} \ge x = 3,00,000 \Longrightarrow x = 6,00,000 = 6 \text{ lakhs.}$$

So the answer is 2.

9. If the income tax is reduced from 15% to $12\frac{1}{2}$ %, what difference does it make to a person

whose texable income is Rs.9,800?

3. 205 1. 245 2.250 4. 650 Solution: The difference = 15% of 9,800 - $12\frac{1}{2}$ % of 9,800 = $2\frac{1}{2}$ % of 9,800 $=\frac{5}{200} \ge 9,800 = \text{Rs.} 245$. So the answer is 1. 10. Two numbers are respectively 20% and 25% more than a third number. What percent is the first number of the second? 1. 86 2.90 3. 92 4.96 **Solution:** First number = 20% more than third number. Second number = 25% more than third number. Let third number = 100; First number = 120; Second number = 125. The first number as the percentage of the seconds = $\frac{120}{125}$ x 100 = 96%. So the answer is 4. 11. If the salary of A is 20% more than the salary of B, then the salary of B is less than that of A bv 1. $16\frac{2}{3}\%$ 2. 20% 3. 18% 4. 15% Solution: Let B's salary 100, then A's salary is 120. B's salary is less than A = $\frac{120 - 100}{120} \times 100 = \frac{100}{6} = \frac{50}{3} = 16\frac{2}{3}\%$. So the answer is 1. **ICET-2011** 12. If 7% of 900 is equal to x% of 200, then x =

1. 14 2.
$$31\frac{1}{2}$$
 3. $32\frac{1}{2}$ 4. $21\frac{1}{2}$

Solution: $\frac{7}{100} \ge 900 = \frac{x}{100} \ge 200 \Longrightarrow \frac{63}{2} = 31\frac{1}{2}$. Answeris 2.

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13. If
$$\frac{3}{4}$$
 of 15% of an amount is Rs.72, then that amount (in rupees) is
1. 1400 2. 540 3. 360 4. 640
Solution: $\frac{3}{4} \times \frac{15}{100} \times x = 72 \Longrightarrow x = 32 \ge 20 = 640$. Answer is 4.

4. PROFIT AND LOSS

The shopkeepers buy the goods directly from a factory or from a wholesale merchant. The amount paid by the shopkeeper to buy goods from the wholesale dealer or the manufacturer is called the Cost Price (C.P.). The amount at which the shopkeeper sells the goods to his customer is called the Selling Price (S.P.)

Cost Price: The price at which an article is purchased is called its cost price abbreviated as C.P. **Selling Price:** The price at which an article is sold is called its selling price abbreviated as S.P. **Profit or Gain:** If S.P. > C.P. the seller is said to have a profit or gain. <u>**Profit = S.P. - C.P.**</u> **Loss:** If S.P. < C.P., the seller is said to have incurred a loss. <u>**Loss = C.P. - S.P.**</u>

1. Gain% =
$$\frac{\text{Gain}}{\text{C.P}} \times 100$$
 2. Loss% = $\frac{\text{Loss}}{\text{C.P}} \times 100$

3. S.P. =
$$\frac{100 + \text{Gain}\%}{100} \times \text{C.P.}$$
 4. S.P. = $\frac{100 - \text{Loss}\%}{100} \times \text{C.P}$

4.
$$C.P = \frac{100}{100 + Gain\%} \times S.P$$
 6. $C.P = \frac{100}{100 - Loss\%} \times S.P$

7. If a trader sells his goods at cost price, but uses false weights, then,

$$Gain\% = \left[\frac{\text{true weight - false weight}}{\text{false weight}} \times 100\right]\%$$

8. When a person sells two similar items, one at a gain of x% and the other at a loss of x%, then

the seller always incurs a loss given by $\left[\frac{\text{Common loss and gain\%}}{10}\right]^2 = \left(\frac{x}{10}\right)^2$

Note: a) If a article is solid at a gain of 10% then S.P. =110% of C.P b) If an article is solid at a loss of 10% then S.P. = 90% of C.P.

9. When there are two successive proffits of x % and y % then the resultant

Profit % =
$$\left[x + y + \frac{xy}{100}\right]$$

10. When there is a profit of x% and loss of y% in a transaction then the resultant profit % (or)

Loss% =
$$\left[x - y - \frac{xy}{100}\right]$$
 according to the sign.

11. If cost price of x articles is equal to the selling price of y articles then the profit $=\frac{x-y}{y}$ 100%.

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12. If a trader marks his goods at x% above his cost price and allows purchasers a discount of

y% for cash then there is $\left[x - y - \frac{xy}{100}\right]$ % profit or loss according to the sign.

PROBLEMS

- 1. An article is sold at a profit of 20%. Had it beed sold at a profit of 25%, it would have fetched Rs. 35 more. The cost price of the article (in rupees) is 1. 650 2. 700 3. 750 4. 800 **Solution:** Let cost price be x. For 20% profit = $\frac{x}{100}(100 + 20) = \frac{120x}{100} = \frac{6x}{5}$. For 25% profit = $\frac{x}{100}(100 + 25) = \frac{125x}{100} = \frac{5x}{4}$. So $\frac{5x}{4} - \frac{6x}{5} = 35 \Rightarrow \frac{25x - 24x}{20} = 35 \Rightarrow x = 35(20) = 700$. So the answer is 2.
- 2. A trader allows a discount of 15% on the marked price of an article. How much percent above the cost price is to be marked to make a profit of 19%?

 1. 40%
 2. 39%
 3. 33%
 4. 29%

 Solution:LET CP = 100 parts; SP = 119 parts; Discount = 15%

SP = MP x
$$\left(\frac{100-15}{100}\right)$$
 = 119P; MP = 119P x $\frac{100}{85}$ = 140P; CP = 100P; MP 40P.

Percentage above the cost price = $\frac{40P}{100P} \times 100 = 40\%$. So the answer is 1.

- 3. By selling an article for Rs.990 a trader makes a profit of $12\frac{1}{2}$. The cost price of the article in
 - rupees is 1. 920 2. 900 3. 800 4. 880 **Solution:** Let cp = 100p; $profit = 12\frac{1}{2}$ %; $sp = 112\frac{1}{2}$ %; $\frac{225}{2}p = 990$.
 - $p = \frac{990}{225} \ge 2$; $cp = 100p = 100 \ge \frac{990}{225} \ge 2 = 880p$. So the answer is 4.
- 4. A man cells 320 mangoes at the cost price of 400 mangoes. Then the percentage of his gain is
 1. 10
 2. 15
 3. 20
 4. 25
 Solution: Cost price of 400 Mangoes = Selling price of 320 Mangoes

 \Rightarrow The sellers gain percentage = $\frac{400-320}{320}$ x 100 = 25%.

So the answer is 4.

- 5. A trader marks his good at 20% above the cost price and allows a discount of 10%. Then the percentage of his again is

 8
 10
 12
 15

 Solution: Let CP = 100 Rs, marks up is 20%, marked price = 100 + 20 = 120
 Discount = 10%, selling price = 120 x ⁹⁹/₁₀₀ = 108 Rs.
 Gain percentage 8%. So the answer is 1.
- 6. An article sold for Rs. y yields x% profit. Then the cost price of the article (in Rupees) is

1. $\frac{100+x}{100y}$ 2. $\frac{100y}{100+x}$ 3. $\frac{100x}{100+y}$ 4. $\frac{100+y}{100x}$

Solution: (100 + x)% of cost price = $y \Rightarrow \text{cost price} = \frac{100y}{100 + x}$. So the answer is 2.

7. A and B invest in a business in the ratio 3 : 2. If 10% of the total profit goes for donations and if A's share is Rs.810, then the total profit (in Rupees) is
1. 1550
2. 1500
3. 1460
4. 1400
Solution: The ratio of the investment of A, B = 3 : 2. Let the total profit = x.

Donated amount = $\frac{x}{100}$. The remaining distribution amount = $\frac{9x}{10}$.

The share of A = $\frac{9x}{10} \ge \frac{3}{5} = 810 \Longrightarrow x = 1500$. So the answer is 2.

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8. A merchant prepares the market price of the article at a profit of 40% and sells them giving a discount of 10%. If an article is sold for Rs.630, then its cost price (in rupees) is

1. 6002. 5003. 4504. 400Solution:Let C.P.= 100;M.P. = 100 + 40 = 140;S.P. = 140 - 14 = 126If C.P.=100 then S.P.=126.

If an article is sold for Rs.630, then its cost price is = $\frac{630}{126} \times 100 = 500$. Answer is 2.

9. An item costing Rs.200 is being sold out at 10% loss. If the price is further reduced by 5%, the selling price will be

1. Rs.170 2. Rs.171 3. Rs.175 4. Rs.179 Solution: C.P. = 200; S.P. = 200 - 20 = 180; loss $10\% \implies loss = Rs.20$ Further reduce by 5% i.e 5% of $180 \implies Rs.9$. Therefore S.P. = 180-9 = Rs. 171. Answer is 2.

- 10. A man sold an article for Rs. 187 and gained 10%. The article was bought for
 1. Rs.150
 2. Rs.160
 3. Rs.170
 4. Rs.180
 Solution: C.P=170;
 Gain %= 10%; So profit = 17; S.P. = 170 + 17 = 187. Answer is 3.
- 11. By selling 15 mangoes, a fruit seller recovers the cost price of 20 mangoes. What is the profit percentage?

1. 25% 2.
$$\frac{200}{3}\%$$
 3. $\frac{100}{3}\%$ 4. 50%

Solution: S.P. of 15 = C.P. of 20.

Profit = 5 Mangoes.

profit % =Gain% =
$$\frac{\text{Gain}}{\text{C.P}} \times 100 = \frac{5}{15} \times 100 = \frac{100}{3}$$
%. Answer is 3.

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12. A person buys an article with 15% discount on its marked price. He makes a profit of 15% by selling it at Rs.3910. Then the marked price of the article (in rupees) is

1. 3,500 2. 4,500 3. 4,000 4. 4,200 Solution: M.P. = $\frac{100}{85} \times 3910 \times \frac{100}{115} = 4000$. Answer is 3.

13. If the cost price of 20 books is equal to the selling price of 16 books, then the percentage of profit is

1. 162. 203. 254. 32Solution: 20 C.P. = 16 S.P.; Profit = 4;

profit %=Gain% = $\frac{\text{Gain}}{\text{C.P}} \times 100 = \frac{4}{16} \times 100 = 25\%$. Answeris 3.

5. RATIO AND PROPORTION

Introduction: The ratio between two quantities is the quotient obtained by dividing the first quantity by the second. The colon : is used between the quantities to indicate the ratio. The units of measurement of the quantities being compared should always be the same. While proporation is the equality of ratio, which can be obtained by multiplying the terms of the ratio by the same number. A detailed discusion is given below.

Ratio: The ratio of two quantities of the same kind and in the same unit is a comparison by division of the measures of two quantities. Thus the ratio of a to b is the fraction a/b and is generally expressed as a : b. For the ratio a : b, the quantities a and b are called the terms of the ratio.

Antecedent: The term is called the first term or antecedent.

Consequent: The term *b* is called the second term or consequent.

Comparison of Ratios: Let a : b and c : d be two ratios, then

i) a: b > c: d if, ab > bc (ii) a: b < c: d, and ab < bc

Compounded Ratio: Ratios are compounded by taking the product of the antecedents for a new antecedent and the product of the consequents for a new consequent. For example, the compounded ratio of a : b, c : d, e : f is *ace* : *bdf*.

Componendo and Dividendo Rule: If $\frac{a}{b} = \frac{c}{d}$ then $\frac{a+b}{a-b} = \frac{c+d}{c-d}$

This rules is called Componendo and Dividendo rule.

Duplicate Ratio: It is the compounded ratio of two equal ratios. Duplicate ratio of a : b is $a^2 : b^2$. **Triplicate Ratio:** It is teh compounded ratio of three equal ratios. Triplicate ratio of a : b is $a^3 : b^3$.

Sub-duplicate Ratio: The sub-duplicate ratio of a : b is $\sqrt{a} : \sqrt{b}$

Sub-triplicate Ratio: The sub-triplicate ratio of a : b is $\sqrt[3]{a} : \sqrt[3]{b}$

Inverse Ratio: If $a \neq 0$, $b \neq 0$, then the reciprocal ratio of a : b is $\frac{1}{a} : \frac{1}{b}$. Clearly $\frac{1}{a} : \frac{1}{b} = b : a$.

Proportion: Four quantities *a*, *b*, *c*, *d* are said to be in proportion if, $\frac{a}{b} = \frac{c}{d}$. Symbolically it is written as a : b :: c : d. The terms *a* and *b* are known as extremes and *b*, *c* are known as means. The term *d* is called the fourth proportion to *a*, *b* and *c*.

Thirs Proportional: If a : b = b : c. Then *c* is called the third proportional to *a* and *b*.

Mean Proportional: Mean proportional between *a* and *b* is \sqrt{ab} .

Variation: If 'a' is directly proportional to 'b', we say a = kb for some constant k, and we write, $a\alpha b$. If 'a' is inversely proportional to 'b', we say ab = k for some constant k, and we

PROBLEMS

In a class of 70 students consisting of boys and girls, a sum of Rs. 2,350 is distributed. If each 1. boy gets Rs.30 and each girl gets Rs.35, then the number of boys in the class is 1. 40 2.30 3. 25 4. 20 **Solution:** Let the boys x. So girls = 70 - x. Each boy get Rs. 30 and each girls get 35. So 30x + (70 - x)35 = 2350. \Rightarrow 30x + 2450 - 35x = 2350 \Rightarrow 2450 - 5x = 2350 \Rightarrow 2450 - 2350 = 5x \Rightarrow 100 = 5x \Rightarrow 20 = x. So the number of boys in the class = 20. So the answer is 4. 2. If $\frac{3q}{5p} = \frac{7}{10}$, then p : q 1. 6:7 2. 7:6 3. 5:9 4. 9:5 Solution: $\frac{3q}{5p} = \frac{7}{10} \Rightarrow \frac{q}{p} = \frac{7 \times 5}{10 \times 3} = \frac{7 \times 1}{2 \times 3} = \frac{7}{6}$ $\Rightarrow \frac{p}{q} = \frac{6}{7} \Rightarrow p: q = 6:7$. So the answer is 1. 3. The incomes of A and B are in the ratio 6:7. Their savings are in the ratio 8:7. Then what is the ratio of their expenditure if B save one-third of his income? 4. 3:4 1. 4:5 2. 5:7 3. 5:6 Solution: Given income ratio of A and B are 6I: 7I. Given savings ratio of A and B are 8S: 7S. B's saving: $\frac{1}{2}$ of B's income; B's x 75 = $\frac{1}{3}$ of 7S; $\frac{S}{I} = \frac{1}{3}$. Savings ratio is 6I - 8S : 7I - 7S. So 6(3) - 8(1) : 7(3) - 7(1) = 10 : 14 = 5 : 7. So the answer is 2. 4. If a:b is 1:2, b:c is 3:5, c:d is 5:4 and e:d is 5:6, then a:b:c:d:e=1. 3:6:10:8:7 2. 15:30:50:40:48 3. 1:2:3:4:5 4. 9:18:30:24:20 **Solution:** a: b = 1:2; b: c = 3:5; c: d = 5:4; e: d = 5:6; d: e = 6:5. So $a:b:c:d:e \Rightarrow 1 \ge 3 \ge 5 \le 6:2 \ge 3 \ge 5 \ge 6:2 \ge 5 \ge 5 \ge 6:2 \ge 5 \ge 4 \ge 6$ $\Rightarrow 90: 180: 300: 240: 200 \Rightarrow 9: 18: 30: 24: 20.$ So the answer is 4. 5. If $\frac{2y}{3x} = \frac{5}{6}$, then x : y =1. 5:3 2. 3:5 3. 5:4 4. 4:5

Solution: $\frac{2y}{3x} = \frac{5}{6} \Rightarrow \frac{x}{y} = \frac{12}{15} = \frac{4}{5}$. So x : y = 4 : 5. So the answer is 4.

- 6. If x: y=2: 3 and x + y = 10, then what is the value of y x? 1. 4 2. 7 3. 5 4. 2 Solution: x: y=2: 3. So x = 2p and y = 3p. So $x + y = 10 \Rightarrow 2p + 3p = 10 \Rightarrow p = ?$ So y - x = 3p - 2p = 1p = 2. So the answer is 4.
- 7. If a, b, c are positive integers such that $a^2+b^2+c^2=1197$, a:b=3:2 and b:c=3:2 then b=

 1. 9
 2. 18
 3. 27
 4. 36

 Solution: Given that a, b, c are positive integers.

 Also a: b = 3: 2 and b: c = 3: 2, then a: b: c = 9: 6: 4 ------(1)

Also given that $a^2 + b^2 + c^2 = 1197$, according to (1), take a = 9k, b = 6k, c = 4kSo, $(9k)^2 + (6k)^2 + (4k)^2 = 1197 \Rightarrow 81k^2 + 36k^2 + 16k^2 = 1197 \Rightarrow 133k^2 = 1197$ $\Rightarrow k^2 = 9 \Rightarrow k = 3$. And since b = 6k, b = 18. So the answer is 2.

8. If
$$x = \frac{4y}{5}$$
 then $\frac{2y}{3x} =$
1. $\frac{15}{8}$ 2. $\frac{6}{5}$ 3. $\frac{3}{4}$ 4. $\frac{5}{6}$
Solution: Given that $x = \frac{4y}{5}$, then $= \frac{2y}{3x} = \frac{2y}{3\left(\frac{4y}{5}\right)} = \frac{2y}{12y} = \frac{10y}{12y} = \frac{10}{12} = \frac{5}{6}$. Answer is 4.

9. If the ratio of speeds of three trains is 3:4:5, then the ratio of the times taken by them to travel the same distance is
1. 5:4:3
2. 12:15:20
3. 3:4:5
4. 20:15:12

Solution: The ratio of speeds is 3:4:5, then the ratio of the times is $(4 \times 5):(3 \times 5):(3 \times 4)=20:15:12$. So the answer is 4.

10. The numerator and denominator of a rational number are in the ratio 7 : 8. If 10 is substracted from numerator and denominator the resulting rational number is 2/3. The numerator of the original number is

1. 12 2. 14 3. 16 4. 18 **Solution:** Numerator: Denominator = 7:8.

$$\frac{7p-10}{8p-10} = \frac{2}{3}; \ 21p - 30 = 16p - 20; \ 5p = 10 \Longrightarrow p = 2$$

Numerator = $7 \times 2 = 14$. So the answer is 2.

11. 2 tables and 3 chairs cost Rs.3,500 while 3 tables and 2 chairs cost Rs.4,000. The cost of a table (in rupees) is

1. 5002. 10003. 12004. 1500Solution: 2tables + 3 chairs = 3, $500 \Rightarrow 2(2tables + 3 chairs) = 7,000 -----(1)$ 3 tables + 2 chairs = $4,000 \Rightarrow 3(3 tables + 2 chairs) = 12,000 -----(2)$ (2) - (1) 5 tables = 5000. So table = 1000. So the answer is 2.

12. The incomes of A and B are in the ratio 3 : 4 and their expenditure are in the ratio 4 : 5. If B saves one third of his income, then the ratio of their savings is,

 1. 13:21
 2. 13:20
 3. 14:23
 4. 12:19

Solution: Income ratio of A and B are 3 : 4. So 3I : 4I

Expenditures ratio of A and B are 4:5. So 4E:5E.

A's saving = 3I - 4E; B's saving = 4I : 5E.

Given that 4I - 5E : 4I \Rightarrow 12I : 15E = 4I \Rightarrow 8I = 15E $\Rightarrow \frac{1}{E} = \frac{15}{8}$.

A and B's saving ratio 3 x(15) - 4 x(8) : 4 x (15) - 5 x(8)

= 45 - 32 : 60 - 40 = 13 : 20. So the answer is 2.

13. Two numbers are *m* the ratio 4 : 7. If 14 is added to each, they are in the ratio 5 : 7, then the numbers are

1. 20 and 352. 15 and 183. 12 and 214. 16 and 28Solution:Numbers ratio = 4 : 7, two numbers are 4x and 7x.

$$\frac{4x+14}{7x+14} = \frac{15}{21} = \frac{5}{7} \Longrightarrow 7(4x+14) = 5(7x+14) \Longrightarrow 7x = 2 \ge 142 \Longrightarrow x = 4$$

The numbers are 16 and 28. So the answer is 4.

- 14. Fifteen years ago the ages of mother and her daughter were in the ratio 6:1. If the present age of the daughter is 20 years, then the mother's age, in years, after 5 years from now, is 1. 40 2. 45 3. 50 4. 55 **Solution:** Let the present age of mother be *m* and present age of daughter = 20 = d (let) Now $m - 15: d - 15 = 6: 1 \Rightarrow m - 15 = 6(20 - 15) \Rightarrow m - 15 = 6(5) \Rightarrow m = 30 + 15 = 45$. So the mother's present age is 45. So the mother's age after 5 years from now = 45 + 5 = 50**So the answer is 3.**
- 15. The ages of son and his father were in the ratio 2:5 seventeen year ago. If the present age of the son is 35, then the present age of the father in years, is
 1. 66
 2. 65
 3. 64
 4. 62
 Solution: Let the ages of son and father are 2x and 5x '17' years ago present son's age
$\Rightarrow 2x + 17 = 35 \Rightarrow x = \frac{18}{2} = 9$. Father present age = 5x + 17 = 5(9) + 17 = 45 + 17 = 62. So the answer is 2. 16. B is twice as old as A, but twice younger than F, C is half the age of A but is twice older than D. Who are the oldest and youngest 1. F, C 3. F, D 4. F, A 2. B, D Solution: As per the given direction B = 2A; F = 2B; A = 2C; and $C = 2D \Longrightarrow F = 2B$ 4A = 8C = 16D. The oldest among them = F. The youngest among them = D. So the answer is 3. 17. In a village $\frac{1}{4}$ th of the youth are educated and $\frac{1}{5}$ th of the youth are employed. If the number unemployed youth is 128, how many educated youth are there in that village? 1. 50 2.55 3.65 4. 40 **Solution:** Let the total number of youth = x. The number of unemployed youth = $x - \frac{x}{5} = 128 \implies x = 160$. The number of educated youth = $\frac{160}{4}$ = 40. So the answer is 4. 18. Twenty years back, the ratio of the ages of a father and his son was 11:3. If the ration on their pre ages is 2:1, then the age of the son is 1. 30 2.35 4. 32 3. 34 **Solution:** Let the present ages of a father and his son = 2x, x. 20 years ago the ratio = $\frac{2x-20}{x-20} = \frac{11}{3} \Rightarrow 6x - 60 = 11x - 220$ $5x = 160 \Rightarrow x = 32$ years. So the answer is 4. 19. The ratio of the present ages of a father and his son is 2 : 1. If the ratio 10 years ago is 5 : 2, then the present age of the son is 3. 32 1. 30 2.25 3. 24 **Solution:** Let the present ages of a father and his son = 2x. $\frac{2x-10}{x-10} = \frac{5}{2} \Rightarrow x = 30.$ So the answer is 1. **ICET-2011** 20. If a : b = 4 : 5 and b : c = 7 : 9, then a : b : c = 71. 4:5:9 2.4:7:9 3. 4:5:7 4. 28:35:45 **Solution:** a: b = 4:5; b: c = 7:9; $\Rightarrow a: b = 28:35; b: c = 35:45.$ Therefore a: b: c = 28:35:45. Answer is 4.

21. If
$$\frac{x+y}{4x+y} = \frac{7}{10}$$
, then $x: y =$
1. 7:10 2. 6:1 3. 1:6 4. 10:7

Solution: $10x + 10y = 28x + 7y \Longrightarrow 18x = 3y \Longrightarrow \frac{x}{y} = \frac{3}{18} = \frac{1}{6} \Longrightarrow x : y = 1 : 6$. Answer is 3.

22. The monthly incomes of two persons P and Q are in the ratio 4 : 3 and their monthly expenditures are in the ratio 3 : 2. If each of then save Rs.750 per month, then Q's monthly income is 1. Rs.3,000 2. Rs.1,500 3. Rs.2,250 4. Rs.3,750 **Solution:** Income 4 : 3; Expenditure 3 : 2; So Savings $3x - 2x = \text{Rs.750} \Rightarrow x = \text{Rs.750}$ So income of Q = 3 x 750 = 2250. **Answer is 3.**

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23. If the angles of a triangle are in the ratio 3:4:5, then the least angle is 1. 36° 2. 45° 3. 60° 4. 72° Solution: Sum of the ratios = 3+4+5=12. The least angle = $\frac{3}{12} \times 180 = 45^{\circ}$. Answer is 2.

24. If
$$16x^2 - 24xy + 9y^2 = 0$$
, then $x : y = 1$. $3:4$
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CEDM

6. PIPES AND CISTERNS

Suppose a pipe can fill a cistern in 'n' hrs then in one hour the pipe will fill $\frac{1}{n}$ th of the cistern.

If a pipe can empty a cistern in 'm' hrs then in one hour the pipe will empty $\frac{1}{m}$ th of the cistern. If a pipe can fill a cistern in 'n' hours and another can empty the full cistern in 'm' hours, then the net per filled in hour = $\frac{1}{n} - \frac{1}{m}$.

PROBLEMS

If a pump takes 6 hours to fill $\frac{3}{7}$ th of a cistern, the total time required to completely fill the 1. cistern (in hours) is 1.14 2. 13 3. 12 4. 11 **Solution:** to fill $\frac{3}{7}$ th ----- time 6 hours; to fill 1----- *x* hours. $x = \frac{1}{\frac{3}{7}} x 6 = \frac{7}{3} x 6 = 14$.

So the answer is 1.

A tank can be filled by one tap in 20 minutes and by another in 25 minutes. If both the taps 2. are opened for 5 minutes and then the second tap is turned off, in how many more minutes the tank is completely filled?

4. 6

1.12 Solution: $T_1 = 20$ minute $\Rightarrow 1$ minute $\Rightarrow \frac{1}{20}$; $T_2 - 25$ minute $\Rightarrow 1$ minute $\Rightarrow \frac{1}{25}$.

3.9

 $T_1 + T_2$ in 1 minute $= \frac{1}{20} + \frac{1}{25} = \frac{5+4}{100} = \frac{9}{100}$. $T_1 + T_2$ in 5 minutes $= \frac{9 \times 5}{100} = \frac{9}{20}$. Remaining $= 1 - \frac{9}{20} = \frac{11}{20}$.

2. 11

So time required to fill the remaining by $T_1 = \frac{\frac{1}{20}}{\frac{1}{20}} = 11$. So the answer is 2.

Two taps A and B can fill a tank in 12 and 18 minutes each respectively. Both are kept open 3. for 2 minutes and then the tap A is closed. In how many more minutes will the tank be filled? 1.15 2. 13 3. 18 4. 16

Solution: Two taps A + B complete work in '2' minutes = $\frac{2}{12} + \frac{2}{18} = \frac{1}{6} + \frac{1}{9}$

Remaining work
$$1 - \frac{5}{18} = \frac{13}{18}$$
.

So time taken to fill tank remaining part by $B = \frac{13}{18} \times 18 = 13$ min. So the answer is 2.

4. Pipe A full a tank in 3 hours while pipe B empties it in 5 hours. If both the taps are opned portion of the tank filled in 80 minutes is

1.
$$\frac{8}{45}$$
 2. $\frac{17}{45}$ 3. $\frac{16}{45}$ 4. $\frac{13}{45}$

Solution: Pipe 'A' takes 3 hours to fill the tank. Pipe 'B' takes 5 hours to fill the tank. The portion of the tank that can be filled by pipe 'A' in hour is $\frac{1}{3}$. Similarly in 10 minutes is $\frac{1}{18}$.

The portion of the tank that can be emptied by pipe 'B' in 1 hour is $\frac{1}{5}$.

Similarly in 10 minutes is $\frac{1}{30}$. If both the taps are opened the portion of the tank filled in 10

minutes is $\frac{1}{8} - \frac{1}{30} = \frac{5-3}{90} = \frac{2}{90} = \frac{1}{45}$ and in 80 minutes, 8 x $\frac{1}{45} = \frac{8}{45}$. So the answer is 1.

5. Two taps A and B can fill a tank in 10 and 15 minutes respectively while C can empty it in 20 minutes. If all the three are opened for 1 minutes. If all the three are opened for 1 minutes and then the tap C is closed, the extra time (in minutes) required to fill the tank is

1.
$$8\frac{3}{10}$$
 2. $6\frac{3}{10}$ 3. $5\frac{3}{10}$ 4. 5

Solution: Part of tank filled in the first minute $=\frac{1}{10} + \frac{1}{15} - \frac{1}{20} = \frac{6+4-3}{60} = \frac{7}{60}$.

So remaining part to be filled = $\frac{53}{60}$

Part of the tank filled by A and B in one minute = $\frac{1}{10} + \frac{1}{15} = \frac{5}{30} = \frac{1}{6}$.

So time taken = $\frac{\frac{53}{60}}{\frac{1}{6}} = \frac{53}{10}$ i.e., $5\frac{3}{10}$ minutes. So the answer is 3.

6. Two pipes A and B can fill a tank in 6 hrs and 8 hrs respectively. If they are opened in alternate hours starting in A the number of hours needed to fill the tank is

1.
$$3\frac{3}{7}$$
 2. 6 3. $6\frac{1}{2}$ 4. $6\frac{3}{4}$

Solution: Pipe A can fill in 6 hrs. Pipe B can fill in 8 hrs.

In 1 hour A's working part $\frac{1}{6}$, In 1 hour B's working part $\frac{1}{8}$. (A+B)'s 1 hour = $\frac{1}{6} + \frac{1}{8} = \frac{7}{24}$. So (A+B) can complete in $3\frac{3}{7}$. So the answer is 1.

7. A tank is normally filled in 8 hrs, but takes 2 hrs longer to fill because of leakage. If the tank is full, the time taken by the leak to empty it is

1. 36 hrs2. 38 hrs3. 40 hrs4. 44 hrsSolution: Filling pipe can fill in 8 hrs. In 1 hour it fills $\frac{1}{8}$ th ps.

Fill pipe and leakage pipe in 10 hr. In 1 hour both together fills $\frac{1}{10}$.

So leakage can empty in 1 hr = $\frac{1}{8} - \frac{1}{10} = \frac{5-4}{40} = \frac{1}{40}$.

So leakage can empty the tank in 40 hours. So the answer is 3.

8. Two taps can fill a tub in 5 minutes and 7 minutes respectively. Another pipe can empty it in 3 minutes. If all the three are kept open simultaneously, then the time (in minutes) to fill the tub is

Solution: Work done part of first and second filling taps in 1 minute = $\frac{1}{5} + \frac{1}{7} = \frac{12}{35}$

Workdone part of third empty tap =
$$\frac{1}{3}$$

So total work done by three taps in 1 minute = $\frac{12}{35} - \frac{1}{3} = \frac{36 - 35}{105} = \frac{1}{105}$

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- 10. If $\left(\frac{4}{5}\right)^{th}$ of a bucket is filled in one minute, the rest of it will be filled in
 - 1. 9/4 minutes 2. 1 minute 3. 1/4 minute 4. $1\frac{1}{2}$ minutes Solution: In 1 Minute $\left(\frac{4}{5}\right)^{th}$ of a bucket is filled. Rest = $1 - \frac{4}{5} = \frac{1}{5}$ So $\frac{1}{5}$ part of the bucket in $\frac{1}{5} \times \frac{5}{4}$ minute = $\frac{1}{4}$ minute. Answer is 3.
- 11. Taps A and B can fill a tank in 10 hours and 15 hours respectively. The time taken (in hours) for both the taps together to fill the tank is
 - 1. $12\frac{1}{2}$ 2. 5 3. 6 4. 10

Solution: Tap A fill in 10 hours. So Tap A fill in 1 hour = $\frac{1}{10}$;

Tap Bfill in 15 hours. So Tap B fill in 1 hour = $\frac{1}{15}$,

Taps A + B fill in 1 hour = $\frac{1}{10} + \frac{1}{15} = \frac{3+2}{30} = \frac{5}{30} = \frac{1}{6}$

- \therefore A+B can fill the tank in 6 hours. Answer is 3.
- 12. Two taps A and B can fill a tank in 12 and 18 minutes respectively. Both are kept open for 2 minutes and then the tap A is closed. In how many minutes will the tank be filled?

1. 18 2. 16 3. 15 4. 13 **Solution:** Taps A and B fill in 1 Minute = $\frac{1}{12} + \frac{1}{18} = \frac{3+2}{36} = \frac{5}{36}$. Taps A and B fill in 2 Minutes = $\frac{10}{36} = \frac{5}{18}$;

If Tap A is closed after 2 minutes , then Tap B fill the rest in

$$\frac{1 - \frac{10}{36}}{\frac{1}{18}} = \frac{36 - 10}{36} \times \frac{18}{1} = \frac{26}{2} = 13 \text{ minutes. Answer is 4.}$$

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13. Two pipes A and B can fill an empty tank in 6 hours and 8 hours respectively. After opening both of them for t hours the pipe B is closed and the pipe A filled the rest of the tank in 4 hours. Then t =

1.
$$\frac{8}{7}$$
 2. $\frac{8}{3}$ 3. $\frac{4}{3}$ 4. $\frac{2}{3}$
Solution: Pipe A fill in 6 hours. So A fill in 1 hour is $\frac{1}{6}$.
Pipe B fill in 8 hours. So B fill in 1 hour is $\frac{1}{8}$.
Pipes A and B fill in 1 hour is $\frac{1}{6} + \frac{1}{8} = \frac{7}{24}$. So Pipes A and B fill in t hour $= \frac{7t}{24}$;
A fill in 4 hour $= \frac{4}{6}$; From the given data $1 - \frac{7}{24}t = \frac{4}{6}$
Therefore $\frac{7t}{24} + \frac{4}{6} = 1$; $7t + 16 = 24$; $7t = 8$; $t = \frac{8}{7}$. Answer is 1.
14. Two pipes can fill an empty tank in 36 minutes and 45 minutes respectively. If both pipes are opened simultaneously, the how much time is needed in minutes to fill the tank?
1. 10 2. 15 3. 20 4. 25
Solution: Pipes A and B fill in 1 hour is $\frac{1}{36} + \frac{1}{45} = \frac{45 + 36}{36 \times 45} = \frac{81}{36 \times 45} = \frac{1}{20}$.

There fore 20 minutes. Answer is 3.

7. PARTNERSHIP

Introduction: Partnership is a business when two or more partners invest a certain amount (capital) for a specified period to carry out business. At the end of the period the business may generate profit or loss. This profit or loss needs to be distributed between the partners. The proportion in which the profit (or loss) would be distributed among the partners is given by the ratio of the joint product of the capital invested and the period of investment for each partner.

Working and Sleeping Partners: A partner who manages the business is known as a working partner and the one who simply invests the money is a sleeping partner.

Ratio of Division of Gains:

1. When investments of all the partners are for the same time, the gain or loss is distributed among the partners in the ratio of their investments.

Suppose A and B invests Rs. x and y respectively thene at the end of the year A's profit: B's profit = x : y.

2. When investments are of different time periods, then equivalent capitals are calculated for a unit of time by taking capital x number of units of time. Suppose A invests Rs. x for p months and B invests Rs. y for q months, then

A's share of profit: B's share of profit = xp : yq

Note:

- 1. If a partner retires during one year period, then in such cases, only the period for which his capital was utilised is taken into consideration.
- 2. If a partner joins during one year period, then in such case, only the period for which his capital was utilised is taken into consideration.

PROBLEMS

1. The details of investment of three persons X, Y, Z in a common business are given below. Out of a profit of Rs.900, the share of X in rupees is

Х Y Ζ amount in Rs. 6,000 7,000 6.400 time in months 2 4 5 1. 110 2. 150 3. 350 4. 400 **Solution:** 6000(2) : 7000(4) : $6400(5) \Rightarrow 60(2)$: 70(4) : 64(5) \Rightarrow 6(2):7(4):32 \Rightarrow 3:7:8 $3x + 7x + 8x = 900; 18x = 900 \Longrightarrow x = 50.$ The share of x is 3(50) = 150. So the answer is 2.

2. In a partnership A invested $\frac{1}{6}$ of the capital for $\frac{1}{6}$ of the time; B invested $\frac{1}{3}$ of the capital for

 $\frac{1}{3}$ of the time and C invested the rest of the capital for the whole time. If the total profit of the business is Rs.46,000/- then the share of B in it (in rupees) is 1. 2000 2. 6000 3. 8000 4. 36000 Solution: The part investment of $c = 1 - \frac{1}{6} - \frac{1}{3} = \frac{1}{2}$. The ratio of their shares $= \frac{1}{6} \times \frac{1}{6} : \frac{1}{3} \times \frac{1}{3} : \frac{1}{2} \times 1 = 1 : 4 : 18$.

The share of B in the profit Rs. 46,000.

46000 x $\frac{4}{23}$ = Rs.8000/- So the answer is 3

3. In a business, A invested 3 times as much of B invested and B invested 2/3 of what C invested. If the annual profit is Rs.55,000. The share of B in thousands of rupees is

1. 12
2. 10
3. 15
4. 30

Solution: A : B = 3 : 1 and B : C = 2 : 3
The ratio between investment of A, B, C = 6 : 2 : 3

The share of B in the total profit Rs.55, $000 = 55000 \text{ x} \frac{2}{11} = 10,000.$

So the answer is 2.

4. Four transport companies A, B, C, D rented a parking place. A kept 18 cars for 4 months; B kept 24 cars for 2 months; C kept 28 cars for 6 months and D kept 28 cars for 3 months in the parking place. If A's share of rent is Rs.3,600, the total rent of the parking place in rupees is
1. 18,000
2. 18,600
3. 21,000
4. 24,000
Solution: The ratio between the shares of A, B, C, D = 18 x 4 : 24 x 2 : 28 x 6 : 28 x 3 6 : 4 : 14 : 7

The share of A in the total rent = Rs.3,600. The total rent = $3600 \times \frac{31}{6} = 18,600$.

So the answer is 2.

5. A, B and C center into a partnership with a capital in which A's contribution is Rs.10,000. Out of total profit of Rs.1,000, if A gets Rs.500 and B gets Rs.300, then C's capital (in Rupees) is
1. 9000
2. 6000
3. 4000
4. 3500
Solution: The capital of A = Rs.10,000/The ratio between the shared of A, B, C = 500 : 300 : 200 = 5 : 3 : 2

The capital of C =
$$\frac{2}{5}$$
 x 10000 = 4000/- So the answer is 3.

7. A and B started a business investing Rs. 10,00,000 and Rs.15,00,000 respectively and C joined them after 6 months with an investment of Rs. 20,00,000. The ratio of the share of their profits at the end of the year is

1. 3:2:3 2. 2:3:2 3. 1:3:1 4. 2:3:4

Solution: The ratio of the share of their profits at the end of the year is

12x10,00,000: 12x15,00,000: 6x20,00,000

120:180:120=2:3:2. Answer is 2.

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8. A, B and C started a business investing a sum of money in the ratio of 8:9:10. After three months B contributed another 1/3rd of his capital towards business while C withdrew 1/5th of his capital after 6 months. If they get an annual profit of Rs.2,37,000 then C's share of profit in rupees is.

1. 94,200 Solution: $8 \ge 12 + (9 \ge 12 + 3 \ge 9) + (10 \ge 12 - 2 \ge 6)$ = 96 + (108 + 27) + (120 - 12) = 96 + 135 + 108 = 339.

C's share = 2, 37,000 x $\frac{108}{339}$ = 75,600. Answer is 3.

- 9. A, B and C started a business with some invesment. At the end of the year, in the profit, the share of B is Rs.5000 more than that of A and C's share is Rs.2000 more than B. If the total profit is Rs.1,11,000, then the share of C, in the profit in rupees is 1. 39,000 2. 37,000 3. 38,000 4. 40,000 Solution: Let A's share = x; B's share= x + 5,000; C's share = x + 7000Sum of shares=3x + 12,000 = 1,11,000 (given) $\Rightarrow 3x = 99,000 \Rightarrow x = 33,000$ C's share = 33,000 + 7,000 = 40,000. Answr is 4.
- 10. A and B started business together. B's capital is Rs.700 more than that of A. But B invested his capital for 9 months and A invested for 10 months. If A and B share the profit in the ratio 8:9, then the capital of B (in rupees) is

1. 3,500 2. 4,200 3. 4,000 4. 2,100 **Solution:** Let A's capital = x. So B's capital = x + 700;

We have $10x:9(x+700)=8:9 \Rightarrow \frac{10x}{9x+6300} = \frac{8}{9} \Rightarrow 90x=72x+8x6300 \Rightarrow 18x = 8x6300$

 $\Rightarrow x = 2800.$ Hence B capital = 2800 + 700 = 3500. Answer is 1.

11. A started a business with a capital of Rs.6400. Later B joined the business with a capital of Rs.8000. At the end of the year shared the profit in the ratio 6 : 5. After how many months B has joined the business?

1. 8 2. 6 3. 4 4. 3 Solution: $\frac{6400 \times 12}{8000(12 - x)} = \frac{6}{5} \Rightarrow 8 = 12 - x \Rightarrow x = 12 - 8 = 4.$

After 4 months B has joined the business. Answer is 3.

8. AVERAGE

Introduction: We might have come across terms such as average height, average speed, average weight, average marks, etc. What do we mean by the word average? Average is a number indicating the representative or central value of a group of observations or data. Averages are of different types. In this chapte, we shall learn about the simplest type of average, commonly known as the arithmetic mean or simply the mean.

Important Formulae

- $Average = \frac{sum of observations}{Total number of observations}$
- 1.
- Sum of all items = Average x Total no. of items. 2.

Note: The quantities whose average is to be determined, should be in the same unit.

PROBLEMS

1. The average age of 3 females is 15 years and their ages are in the ratio 1:2:6. Then what is the age of the eldest female in years?

2. 20 3. 25 4. 40 1. 30 **Solution:** Let the ages be *x*, 2*x* and 6*x*. So average = $\frac{x+2x+6x}{3} = 15$.

 $\frac{9x}{3} = 15 \Rightarrow 9x = 45 \Rightarrow x = 5$. So eldest female age = 6(5) = 30. So the answer is 1.

- 2. A sum of Rs.410 is distributed among 50 students in a class. If each boy gets Rs.9 and each girl gets Rs.6.50, then the number of boys in the class is 1.17 2. 34 3. 16 4. 25 **Solution:** Number of boys = x, so girls = 15 - x. So 9(x) + 6.50(50 - x) = 410 $\Rightarrow 2.5x = 410 - 325 \Rightarrow 2.5x = 85 \Rightarrow x = \frac{85}{2.5} = 34$. So the answer is 2.
- 3. A purse contains some two-rupee coins, one-rupee coins and 50 paise coins in the ratio of their denomination (that is, $2:1:\frac{1}{2}$). If the total money in the purse is Rs.210 then the number

4. 40

of one-rupee coins in the purse is 1. 100 2. 60 3. 50

Solution: The ratio of two rupees, one rupees and 50 pise coins = 2 : 1 : $\frac{1}{2}$ = 4 : 2 : 1

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Let the number of coins is 4x, 2x, x respective.

Sum of their values = $4x.2 + 2x.1 + x.\frac{1}{2} = \frac{21}{2}x = 210 \implies x = 20$. So the answer is 4.

- 4. The average age of 5 children is 8 years. If the age of the father of the children is included the average becomes 13, then the age of the father (in years) is

 30
 34
 37
 38

 Solution: The sum of the age of 5 childrens = 5 x 8 = 40 years.
 The sum of the ages of 5 childrens and his father = 6 x 13 = 78 years.
 The age of father = 38 years. So the answer is 4.
- 5. Three years ago, the average age of A and B was 20 years. Now C has joined them and their average age became 25 years. What is the present age of C in years?

1. 302. 313. 294. 32Solution: At present, the average age of A and B = 23 years.The average age of A, B and C = 25 years.The age of C = $3 \times 25 - 2 \times 23 = 75 - 46 = 29$. So the answer is 3.

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6. The average of all the prime numbers less than 20 is

1. 9 2. 9.15 3. 9.55 4. 9.625 Solution: $\frac{2+3+5+7+11+13+17+19}{8} = \frac{77}{8} = 9.625$. Answer is 4.

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9. SIMPLE INTEREST AND COMPOUND INTEREST

Introduction: When a person is need of money, he borrows it from a bank, a financial institution or from another person. He has to pay a charge on the sum of money he borrows. This charge is called the Interest. The sum that is borrowed is the principal. In this chapter, we shall discuss the concepts of Simple Interest and Compound Interest and the methods of calculating them.

Notations used

- P Principal
- A Amount
- N No. of years
- R Rate of interest
- SI Simple interest
- CI Compound interest

Important Formulae

1.
$$SI = \frac{PNR}{100}$$
 2. $P = \frac{100 \times SI}{N \times R}$ 3. $N = \frac{100 \times SI}{P \times R}$ 4. $R = \frac{100 \times SI}{P \times N}$
5. $A = P + SI$ 6. $CI = P\left(1 + \frac{R}{100}\right)^{N} - P$

Where $P\left(1+\frac{R}{100}\right)^N$ is the amount on CI, where interest is compounded annually.

Note:

a) When interest is compounded half yearly Amount = $P\left(1 + \frac{(R/2)}{100}\right)^{2n}$

b) When interest is compounded quarterly Amount =
$$P\left(1 + \frac{(R/4)}{100}\right)^{4n}$$

PROBLEMS

1. A certain amount of money deposited for compount interest becomes 4 times in 4 years. In how many years will that amount be 64 times the deposited amount if it is given for the same rate of interest?

 \Rightarrow 32x becomes 64x in 4 years. So x becomes 64x in 16 years. So the answer is 2.

2. An amount given for compound interest becomes 3 times itself in 3 years. In how many years will that amount be 9 times itself?

1. 92. 63. 54. 8Solution: x becomes 3x in 3 years, 3x becomes 9x in 3 years.So x becomes 9x in total 6 years. So the answer is 2.

3. A invests two equal amounts earning 10% and 12% of interest annually. If the interest on them earned is Rs.1650 in an year then the sum invested in each (in rupees) is

1. 17000
2. 15000
3. 8500
4. 7500

Solution: Let the each investment of A=x.

10% of x + 12% of x = 1650/-

$$\Rightarrow x \ge \frac{22}{100} = 1650 \Rightarrow x = \text{Rs.7,500/- So the answer is 4.}$$

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4. The difference between compount interest and simple interest on a sum for 2 years at the same 6% interest per annual is Rs.36. Then that sum (in rupees) is

1. 10,000 2. 20,000 3. 15,000 4. 18,000
Solution: sum = P, T=2; R=6%, simple interest =
$$I = \frac{PTR}{100} = \frac{P2.6}{100} = \frac{2PR}{25}$$

compount interest I = $P\left(1 + \frac{R}{100}\right)^2 - P = \frac{2PR}{100} + \frac{PR^2}{10,000} \Rightarrow$

Difference between compount interest and simple interest $\frac{2PR}{100} + \frac{PR^2}{10,000} - \frac{2PR}{25} = 36$

$$\Rightarrow \frac{PR^2}{10,000} = 36 \Rightarrow P = \frac{36 \times 10,000}{6 \times 6} = 10,000.$$
 Answer is 1.

10. TIME AND WORK

Introduction: In most work problems, a complete job is broken into several parts, each representing a fraction part of the entire job. For each fractional part, which represents the portion completed by one man, one machine, one pipe and so on, the numerator should represent the time actually spent on working. While the denominator should represent the total needed to do the entire job alone. The sum of all the individual fractions should be one. In this chapter, we shall use some basic concepts to solve some practical problems involving time and work.

Basic Concepts:

- 1. If A can do a piece of work in x days, then A's 1 day work = $\frac{1}{x}$.
- 2. If A's 1 daywork = $\frac{1}{x} \rightarrow A$ can finish the work in x days.
- 3. If A is x times faster than B, then the ratio fo work done by A and B is x : 1 and ratio of time taken by A and B = 1 : x.

Variation: When two quantities are compared, the increase or decrease in one of the quantities results in a corresponding change in the other quantity, then we say there is a variation between the two quantities. The two types of variation are discussed below.

Direct Variation (\uparrow): When one quantity increases, the other also increases or when one quantity decreases the other also decreases. Then the variation is said to be direct and is denoted by upper arrow head \uparrow .

Indirect Variation (\downarrow): The increase or decrease in one quantity results in a corresponding decrease or increase in other quantity is called indirect variation and is denoted by down arrow head \downarrow .

Note:

- 1. These two variations are called simple variations since it involves the variation between two quantities only.
- 2. When three or mroe quantities are compared, then the variation in any two results in a change in the third quantity, the three quantities are said to be in compound variation.

PROBLEMS

A and B can do a work in 12 days; B and C in 15 days; C and A days. The number of days required for all the three together to complete the work is

 30
 20
 16
 4.10

Solution: A + B's one day work = $\frac{1}{12}$; B + C's one day work = $\frac{1}{15}$; C + A's one day work = $\frac{1}{20}$ Adding these (A + B + C)'s two day's work = $\frac{1}{12} + \frac{1}{15} + \frac{1}{20} = \frac{5+4+3}{60} = \frac{12}{60} = \frac{1}{5}$. So A + B + C's are day work = $\frac{1}{5 \times 2} = \frac{1}{10}$. So they can together complete to the work in 10 days. So the answer is 4.

man and one woman complete the same job? 1. 4 2. 6 3. 9 4. 8 Solution: 1 man = 2 woman can complete in 12 days. Man's one day work = $\frac{1}{12}$; Woman's one day work $\frac{2}{12} = \frac{1}{6}$; One man + one woman one day work = $\frac{1}{12} + \frac{1}{6} = \frac{1+2}{12} = \frac{3}{12} = \frac{1}{4}$.

So one man and one woman can complete in 4 days. So the answer is 1.

- 3. A works 3 times as fast as B. If B completes a work in 60 days, then in how many days can A and B together complete the same work ?
 1. 12 2. 15 3. 18 4. 20
 Solution:
- 4. A and B can do a piece of work in 8 days respectively. A started the work and after 3 days B joined him to finish the work. The number of days B worked is

1. 1
2.
$$1\frac{1}{2}$$

3. 2
4. 3
Solution: A's 1 day work = $\frac{1}{8}$ th of total work, B's 1 day work = $\frac{1}{12}$ th of the total work.
A-(x + 3) days work + B - x days work = $1 \Rightarrow \frac{x+3}{8} + \frac{x}{12} = 1 \Rightarrow \frac{5x}{24} = \frac{5}{8} \Rightarrow x = 3.$
So the answer is 4.

5. A can complete a piece of work in 18 days. B is 20% more efficient than A. The number of days B takes to complete the same piece of work is

Solution: The number of days taked by A finish the work = 18. B is 20% more efficient than A. The number of days taken by B to finish the tank = $\frac{100}{120}$ x18 = 15 days. So the answer is 1. 6. One man or two women or 3 part-timers can complete a piece work in 48 days. How many days will it take for 2 men, 3 women and 3 part-timers to complete the same piece of work? 1. 12 2. 18 3. 20 4. None **Solution:** 1 man one day work = $\frac{1}{48}$; 2 man one day work = $\frac{1}{48}$; 3 part timers one day work = $\frac{1}{48}$; 2 man, 2 women, 3 part timers 1 day work $=\frac{2}{48}+\frac{1}{48}+\frac{1}{48}=\frac{1}{12}.$ 2 man, 2 women, 2 part timers finish the work in 12 days. So the answer is 1. 7. A can do $x\frac{1}{5}$ th of the work in 2 days and B can do $\frac{1}{3}$ rd of it in 5 days. Then the number of days that both A and B can do the work is 3. 6 4. 4 1. 10 2. 8 **Solution:** A 1 day work = $\frac{1}{10}$; B 1 day work = $\frac{1}{15}$. A and B together 1 day work = $\frac{1}{10} + \frac{1}{15} = \frac{1}{6}$. A and B together can finish the work in 6 days. So the answer is 3. 8. A, B and C can do a piece of work in 4, 5 and 7 days respectively. If they get Rs.415 for working together to complete the job, then A's share is (in rupees) 1. 170 2. 185 3. 175 4. 180 **Solution:** The ratio between the efficiences of A, B and C = $\frac{1}{4} : \frac{1}{5} : \frac{1}{7} = 35 : 28 : 20$ The share of A in Rs 415 = 415 x $\frac{35}{83}$ = 175. So the answer is 3. **ICET-2011** 4 men and 6 women finish a job in 8 days, while 3 men and 7 women finish it in 10 days. 10 9. women working alone will finish it in

3. 10

4. 9

2. 12

1. 15

 1. 24 days
 2. 32 days
 3. 36 days
 4. 40 days

Solution: $(4\text{men} + 6\text{women})8 = 1 \text{ job} \Rightarrow 4\text{men} + 6\text{women} = \frac{1}{8} \Rightarrow 12\text{men} + 18\text{ women} = \frac{3}{8}$ And $(3\text{men} + 7\text{women})10 = 1 \text{ job} \Rightarrow 3\text{men} + 7\text{women} = \frac{1}{10} \Rightarrow 12\text{men} + 28\text{ women} = \frac{4}{10}$ Subtracting the above two relations we get, $10 \text{ women} = \frac{4}{10} - \frac{3}{8} = \frac{16 - 15}{40} = \frac{1}{40}$. 10 women alone will finish it is 40 days. Answer is 4.

10. Two persons A and B together can do a work in 30 days. After A and B worked for 5 days, C joined them and they together finished the work in another 20 days. Then the number of days in which C alone can complete the total work is

1. 60 2. 75 3. 90 4. 120
Solution: A + B one day =
$$\frac{1}{30}$$
; (A + B) five day = $\frac{5}{30} = \frac{1}{6}$. Remaining work = $1 - \frac{1}{6} = \frac{5}{6}$

A + B + C one day =
$$\frac{1}{20}$$
; $\frac{5}{6}$ work of (A+B+C) in 20 days.

A+B+C work of one day = $\frac{5}{120}$; (A+B) one day work = $\frac{1}{30}$

: C one day work =
$$\frac{5}{120} - \frac{1}{30} = \frac{5-4}{120} = \frac{1}{120}$$

- \therefore C alone can finish the work is 120 days. Answer is 4.
- 11. Three persons A, B and C can do a work individually in 10 days, 12 days and 15 days respectively. If all the three persons work together, the number of days needed to complete the same work is

1. 8 2. 6 3. 4 4. 5
Solution:
$$\frac{1}{10} + \frac{1}{12} + \frac{1}{15} = \frac{6+5+4}{60} = \frac{15}{60} = \frac{1}{4}$$
.

4 days is required. Answer is 3.

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12. Three persons can complete a work individually in 6 days, 8 days and 12 days respectively. If all the three persons work together the number of days required to complete the same work is

1. 3
2.
$$\frac{10}{3}$$

3. $\frac{8}{3}$
4. $4\frac{1}{3}$
Solution: $\frac{1}{6} + \frac{1}{8} + \frac{1}{12} = \frac{4+3+2}{24} = \frac{9}{24} = \frac{3}{8}$.
Three persons work together require $\frac{8}{3}$ days to complete the same work. Answer is 3.
13. A, B and C can do a work individually in 20 days, 15 days and 25 days respectively. To
complete the work fast, which of the two are to be assigned the work?
1. A, B
2. B, C
3. C, B
4. B alone
Solution: A and B one day work = $\frac{1}{20} + \frac{1}{15} = \frac{3+4}{60} = \frac{7}{20}$. So A and B can complete in $\frac{20}{7}$
days.
B and C one day work = $\frac{1}{25} + \frac{1}{15} = \frac{3+5}{75} = \frac{8}{75}$. So B and C can complete in $\frac{75}{8}$ days.

To complete the work fast, A and B are to be assigned. Answer is 3.

<u>11. TIME AND DISTANCE</u>

Introduction: A particle is said to be in motion if it changes its position with respect to its surroundings. If the particle does not change its position, then it is said to be at rest.

Speed: The speed of a moving body is the distance travelled by it in unit time.

Speed = $\frac{\text{Distance travelled}}{\text{Time taken}}$

Distance = Speed x Time

Conversion of kmph to metre per second

km/hr =
$$\frac{5}{18}$$
/sec; m/sec = $\frac{18}{5}$ km/hr

Relative Speed: If two bodies move in the same direction, the relative speed of one with respect to the other is the difference of their speeds.

If two bodies move in opposite direction, relative speed of one with respect to the other body is the sum of their speeds.

Important Formulae

1. If the ratio fo the speeds of A and B is a: b, then the ratio of time taken by them to cover the $1 \quad 1$

same distance is $\frac{1}{a} : \frac{1}{b} = b : a$

2. Suppose a man covers a certain distanct at x km/hr and an equal distance at y km/hr. Then

the average speed during the whole journey is $\left(\frac{2xy}{x+y}\right)$ km/hr.

Stoppage time per hour for a train: For the same distance of travel, if a train runs at an average speed V1km/hr without stopping and an average speed of V2 km/hr with stoppage then stoppage

time per hour =
$$\frac{V_1 - V_2}{V_1}$$
 hour = $\frac{\text{Difference in speed}}{\text{Faster speed}}$ (hour)

Time and distance between two moving bodies:

Let there by be two persons A and B

Speed of A = V1 km/hr

Speed of B = V2 km/hr

If they walk in the same direction, A and B will be $(V_1 - V_2)$ km apart in 1 hour. Similarly, if they walk in opposite direction, A and B will be $(V_1 + V_2)$ km apart in 1 hour.

12. TRAINS AND MOVING OBJECTS

Introduction: A train is said to have crossed an object (stationary or moving) only when the last coach (end) of the train, crossed the said object completely. It implies that the total length of the train had crossed the total length of the object.

Basic Formulas

For Non moving objects

The time taken by the train to cross a stationary object (examples) is (lamp post, pole, 1. standing man) which is of negligible length is given by

 $t = \frac{\text{Length of the train}}{\text{Speed of the train}}$

Note: If the object is of some length (example, bridge, a tunnel, platform, another train) then,

 $t = \frac{\text{Length of (Train + Object)}}{\text{Speed of the train}}$

For moving objects

2. If the object is moving and is of negligible length (example, a train crosses a running man) is given by

 $t = \frac{\text{Length of the train}}{\text{Speed of (Train - Object)}}$

If the object is moving and has some length then, 3.

 $t = \frac{\text{Length of (Train + Object)}}{\text{Speed of (Train - Object)}}$

Note: If the object is moving in opposite direction put -ve sign before v.

Two trains crossing each other in both directions, 4.

length of 1st train = L₁

length of 2nd train = L_2

They are crossing each other in opposite directions, in t1 seconds.

They are crossing each other in same direction in t2 seconds then,

Speed of faster train =
$$\frac{L_1 + L_2}{2} \left(\frac{1}{t_1} + \frac{1}{t_2} \right)$$

Speed of slower train = $\left(\frac{L_1 + L_2}{2}\right) \left(\frac{1}{t_1} - \frac{1}{t_2}\right)$

If two trains start at the same time from points A and B towards each other and after crossing 5.

they take a and b seconds in reaching B and A respectively, then

A's speed : B's speed = \sqrt{b} : \sqrt{a} .

PROBLEMS

A train running at a speed of 90 kmph takes 20 seconds to cross a bridge of length 150m. The length of the train in metres is
 350
 100
 50
 4.45

Solution: Let the length of train = x metres.

Speed = 90kmph = 90 x $\frac{5}{18}$ m/sec = 25m/sec.; time = 20sec.

Speed = $\frac{\text{distance}}{\text{time}} \Rightarrow 25 = \frac{x+150}{20} \Rightarrow 25(20) = x + 150 \Rightarrow 500 - 150 = x \Rightarrow 350 = x$. So the length of the train = 350 metres. So the answer is 1.

- 2. A train takes 8 secs to pass a person standing on the platform. If the speed of the train is 36 kmph, its length in meters is
 1. 80
 2. 90
 3. 110
 4. 115
 Solution:gsr, 100, 4, 2007
- 3. A car starts at 8 A.M. With a speed of 65 kmph. Another car follows it at 9 A.M. with a speed of 70 kmph. The two cars will meet in the evening at time.
 1. 4
 2. 6
 3. 8
 4. 10

Solution: The time taken the second car meet the first = $\frac{65}{70-65}$ = 13 hours.

The two cars meet at 9 + 13 hr = 10PM. So the answer is 4.

4. A car covers a certain distance going at a speed of 60 kmph and returns to the starting point at a speed of 40 kmph. Then the average speed of the car (in kmph) for the whole journey is
1. 56
2. 60
3. 48
4. 52

Solution: The average speed of the total journery = $\frac{2xy}{x+y} = \frac{2 \times 40 \times 60}{100} = 48$ krph.

So the answer is 3.

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5. If the speed of a train is 92.4 kmph, how many metres would it cover in 20 minutes?1. 30,8002. 3,0803. 4,0284. 4,280

Solution: speed = 92.4 kmph = 92.4 x $\frac{5}{18}$ x20 meter per second

1 hour = 92.4 km; 20 minutes = $\frac{92.4}{60}$ x 20 = 30.8 km = 30.8 x 1000 = 30,800 metres. Ans.

is 1.

6. A train runs from station A to station B in 1 hr.20 min. If the train is running at a speed of 18 kmph, then the distance between A and B is

Solution: Time = t = 1 hour 20 minutes = $1\frac{1}{3} = \frac{4}{3}$ hours.

Speed = s = 18 km;

Distance = speed x time =
$$18 \times \frac{4}{3} = 24$$
 kms. Answer is 1.

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- 107. Three trains A, B and C moving at speeds s_1, s_2 and s_3 respectively take times t_1, t_2 and t_3 respectively to cover a distance of x kms. If $t_1: t_2: t_3 = 20: 15: 12$, then $s_1: s_2: s_3 = (1) 2:3:4 (2) 3:4:5 (3) 4:5:6 (4) 5:6:7$
- 108. The time (in seconds) taken by a train of 240 metres long travelling at 70 kmph to cross another train of length 110 metres standing on a parallel track is (1) 20 (2) 18 (3) 17 (4) 16

13. STREAMS AND BOATS

Introduction: In solving problems based on stream and boats, change the word problems into the form of quadratic equations according to the given conditions and solve the quadratic equations. The basic definitions used in problem solving are discussed below,

Still water: The speed of water in the river is zero.

Stream water: The water in the river is flowing or moving.

Speed of boat and stream: Assume the man's rate of rowing in still water = x km/hr.

Speed of stream = y km/hr

a) Down stream rate = (x + y) km/hr

(i.e.) direction of rowing and direction of flow is same.

b) Up stream rate = (x - y) km/hr

(i.e.) direction of rowing and direction of stream are opposite.

Speed of still water and stream: Assume, speed downstream = a km/hr Speed upstream = b km/hr

Then, speed in still water = $\frac{1}{2}(a+b)$ km/hr

Rate of stream = $\frac{1}{2}(a - b)$ km/hr

<u>14. MENSURATION</u> - <u>AREAS AND PERIMETERS</u>

Introduction: The term 'area' refers to the space occupied by the figure in two dimensions. The area is expressed in square units. The measurement of the length of the lines enclosing the space is called its perimeter.

| Figure | Area | Perimeter |
|------------------------------------|--|------------------|
| Rentangle
B
L | LxB | 2(L+B) |
| Square | Side ² | 4 x Side |
| Parallelogram | Base x Altitude | Sum of the sides |
| Triangle
1)Equilateral triangle | | |
| $B \xrightarrow{c} a C$ | a) $\frac{\sqrt{3}}{4}$ x Side ² (or)
b) $\frac{1}{2}$ x Base x Altitude | 3 x sides |
| 2) Other triangles | | Sum of sides |
| B a C | a) $\frac{1}{2}$ x Base x Altitude
b) $\sqrt{s(s-a)(s-b_{-})(s-c)}$ | |
| Circle | πr^2 | 2 π <i>r</i> |
| CEDM | 164 | ICE |

PROBLEMS

1. If the sides of a rectangle are in the ratio 2 : 1 and if its area is same as that of a square of side 8 cm., then the perimeter of the rectangle in cm. is

1. $24\sqrt{2}$ 2. $12\sqrt{2}$ 3. $8\sqrt{2}$ 4. $4\sqrt{2}$ Solution: Length l = 2x; breadth b = x. Side of a square = 8cm. \Rightarrow Area = $8^2 = 64$ cm. So $l \ge b = 8\sqrt{2}$, $b = 4\sqrt{2}$. Perimeter of the rectangle = $2(l+b) = 2(8\sqrt{2} + 4\sqrt{2}) = 2(12\sqrt{2}) = 24\sqrt{2}$. So the answer is 1.

2. If the perimeter of a regular hexagon is 24 cm. then its area in sq. cm. is

1. $12\sqrt{6}$ 2. 18 3. $18\sqrt{3}$ 4. $24\sqrt{3}$ Solution: A simple closed figure bounded by six sides and all its angles and sides are equal is called a regular hexagon. Let '*a*' be the side of it. So perimeter = 6a. So 6a = 24 cm. $\Rightarrow a = 4$ cm.

Area of a regular hexagon =
$$\frac{3\sqrt{3}}{2} \ge a^2 = \frac{3\sqrt{3}}{2} \ge 4^2 = \frac{3\sqrt{3}}{2} \ge 16 = 3\sqrt{3}(8) = 24\sqrt{3}$$
 sq.cm.
So the answer is 4.

3. The perimeter of a rhombus is 100cm and one of its diagonals is 40cm. The area of the rhombus in sq.cm. is
1. 400
2. 500
3. 600
4. 800

Solution: Perimeter =
$$45 = 100$$
 cm $\Rightarrow s = 25$ cm.; $d_1 = 40$ cm $\Rightarrow \frac{d_1}{2} = 20$ cm.

Now
$$\left(\frac{d_2}{2}\right)^2 = 25^2 - 20^2 \Rightarrow \frac{d_2}{4} = 625 - 400 = 225 \Rightarrow \frac{d_2}{2} = 15 \Rightarrow d_2 = 30$$

Area *d* of Rhombus = $\frac{1}{2}$ x product of its diagonals = $\frac{1}{2}$ x 30 x 40 = 600. So the answer is 3.

- 4. The height of a cone is 84cm and the area of its base is 3850 sq. cm. The area of the curved surface of the cone in sq.cm. is (taking the value of π as $\frac{22}{7}$)
 - 1. 1010 2. 10001 3. 10010 4. 11010 **Solution:** h = 84 cm, $\pi r^2 = 3850 \Rightarrow r^2 = \frac{3850}{\pi} = 3850 \ge \frac{7}{22}$

CEDM

 $\Rightarrow r^2 = 175 \text{ x } 7 = 25 \text{ x } 7 \text{ x } 7 \Rightarrow r = 5 \text{ x } 7 = 35 \text{ cm}.$

Curved surface area = $\pi r l$. Where *l* is slant height = $\pi r \sqrt{h^2 + r^2}$.

$$\Rightarrow \frac{22}{7} \times 35 \sqrt{(84)^2 + (35)^2} = 110\sqrt{7056 + 1225} = 110\sqrt{8281} = 110(91) = 10010.$$

So the answer is 3.

- 5. A rectangular plot is of 50 m x 30 m dimensions. Roads of width 2 m are laid joining the mid points of opposite sides and also a path of same width running inside and along the length and the breadth of it. What is the total area of the roads and the path in sq. metres?

 444
 448
 928
 1056

 Solution: *l*=50, *b* = 30. Roads + paths = 50(6) + 6(24) = 300 + 144 = 444.
 So the answer is 1.
- 6. The lengths of parallel sides of a trapezium are 20 m and 35 m and the distance between them is 8 m. The area of the trapezium in sq.m. is 1. 110 2. 220 3. 330 4. 440 Solution: h = 8mt, a = 20, b = 35. Area of trapezium = $\frac{1}{2}$ height (sum of paralel sides) $= \frac{1}{2}h(a + b) = \frac{1}{2}8(20 + 35) = 4(55) = 220$. So the answer is 2.
- 7. The area of a right isosceles triangle is 4.5sq.m. Its perimeter in metres is

1.
$$6+3\sqrt{2}$$

2. $3+3\sqrt{2}$
3. $1+3\sqrt{2}$
4. $3+\sqrt{2}$
Solution: Area = $\frac{1}{2}$ base x height = 4.5.
 $\Rightarrow \frac{1}{2}a \ge a = 4.5 \Rightarrow \frac{a^2}{a} = 4.5 \Rightarrow a^2 = 9 \Rightarrow a = 3.$
Perimiter = $a + a + a \sqrt{2} = 3 + 3 + 3\sqrt{2} = 6 + 3\sqrt{2}$. So the answer

Perimiter = $a + a + a\sqrt{2} = 3 + 3 + 3\sqrt{2} = 6 + 3\sqrt{2}$. So the answer is 1. (Note: A right angled isosceles triangle is a triangle in which two sides are equal)

8. A circular road runs around a circular ground. If the difference between the circumferences of the outer circle and inner circle is 66 m, the width of the road in metres is (taking the value of

$$\pi \operatorname{as} \frac{22}{7}$$
)
1. 10 2. 10.5 3. 9.5 4. 9

Solution: $2\pi r - 2\pi r = 66 \Rightarrow 2\pi (R - r) = 66 \Rightarrow R - r = \frac{66}{2\pi} = \frac{66 \times 7}{2 \times 22} = \frac{21}{2} = 10.5$ cm. So width of the road = 10.5 cm. **So the answer is 2.**

9. If C and S respectively denote the areas of a circle and a square having the same perimeter, then

1. C = S 2. C < S 3. C > S 4. $C = \pi S$

Solution: Area of circle = $C = \pi r^2$; S = Area of square = s^2 where s is the side. Given perimeter of circle = $2\pi r = 4s$ = perimeter of square.

So
$$s = \frac{\pi r}{2}$$
. Now $S = s^2 = \left(\frac{\pi r}{2}\right)^2 = \frac{\pi}{4} \cdot \pi r^2 = \frac{\pi}{4}C$. So $S > C$ (because $\frac{\pi}{4} < 1$).

So the answer is 2.

10. The length of the diagonal of a square, whose area is equal to the area of a rectangle of length 81m and breadth 50m, is

1. 45 m 2. 90 m 3. $40\sqrt{2}$ m 4. $45\sqrt{2}$ m Solution: Area of a square = s^2 = Areq of rectangle $\Rightarrow s^2 = 81(50) \Rightarrow s = 9\sqrt{50} = 9(5\sqrt{2}) = 45\sqrt{2}$. Diagonal of a square = $\sqrt{2s} = \sqrt{2}(45\sqrt{2}) = 45(2) = 90$ m. So the answer is 2.

11. Two cubes each of the edges 20cm are joined to form a single cuboid. Then the surface area of the new cuboid so formed is
1. 4000 sq.cm
2. 6000 sq.cm.
3. 5400 sq.cm.
4. 6400 sq.cm.

Solution: Length of cuboid = 20 + 20 = 40, breadth of cuboid = 20, height of cuboid = 20. So surface area of cuboid = 2(lb + bh + lh) = 2[(40) (20) + (20) (20) + (40) (20)]= 2[800 + 400 + 800] = 2[2000] = 4000. So the answer is 1.

12. For a cylinder of height and base radius r, the curved surface area is thrice the area of the base. Then h: r =

 1. 3:2
 2. 3:5
 3. 2:3
 4. 5:3

Solution: Curved surface area of a cylinder = $2\pi rh$

Base area of cylinder = πr^2 ; given that curved surface area = 3 times base area.

$$\Rightarrow 2\pi r h = 3\pi r^2 \Rightarrow 2h = 3r \Rightarrow \frac{h}{r} = \frac{3}{2} = 3 : 2.$$
 So the answer is 1.

13. The area (in square feet) of a triangle whose sides are 5ft, 12ft and 13ft is
1. 17
2. 18
3. 25
4. 30
Solution: The sides of a Triangular field = 5 ft, 12ft, 13ft.

It forms a right angled Triangle.

Area of the field = $\frac{1}{2}$ 5 x 12 sq.ft = 30 sq.ft. So the answer is 4.

14. A rope can make 140 rounds on the circumference of a cylinder whose base radius is 14cm. The number of rounds the rope make around the cylinder with base radius 20 cms is 1. 200 2. 100 3. 98 4.17 **Solution:** Radii of the given Cylinder $r_1 = 14$ cms, $r_2 = 20$ cms. The number of make by a rope on, the circumferance of the first cylinder $= h_1 = 140$.

$$2\pi r_1 h_1 = 2\pi r_2 h_2 \Longrightarrow 14 \ge 140 = 20 \ge h_2 \Longrightarrow h_2 = 98.$$

So the answer is 3.

15. A rectangular carpet has an area of 120 sq.m. and a perimetre 47 metres. The length of its diagonal (in metres) is

1. 20 2. 17 3. 15 4. 13 **Solution:** Let the length and breadth of a rectangular Carpet = *l*, *b*. It area *lb* = 120 and perimeter 2(l + b) = 46. l + b = 23, *lb* = 120. Length of its diagenel $d = \sqrt{l^2 + h^2} = \sqrt{(l + b)^2 - 2lb} = \sqrt{(23)^2 - 240} = \sqrt{289} = 17$. **So the answer is 2.**

- 16. An aluminium wire of length 8m 96cms and a copper wire of length 5m 12cms are cut into pieces of equal length/cms. The maximum possible value of 1 is
 1. 16
 2. 32
 3. 64
 4. 128
 Solution: The H.C.F of 896cms and 512cms.
 The maximum possible length = 128cms. So the answer is 4.
- 17. A rectangular lawn of dimensions 65m x 35m has two roads each of 5 metres wide running in the middle of it, one parallel to the length and the other parallel to the breadth. The cost of repairing the road at the rate of Rs.3 per square metre (in rupees) is

 1500
 1475
 1450
 1425

 Solution: The dimensions of a rectangular Lawn = 65m x 35m. The width the roads parallel to the length and breadth = 5mts. The area of Road = (l + b w)w sq.mts. The total cost of repairing the roads at the rate of Rs.3/- per sq.mts = 475 x 3 = 1425/- So the answer is 2.
- 18. The curved surface area of a cylinder is thrice the area of its base. If *r* is the radius of the base and *h* is the height, then r: h =1. 3:2 2. 3:5 3. 2:3 4. 2:5

Solution: Curved surface area of cylinder = 3,

(Area of its base) $\Rightarrow 2\pi rh^{2} \Rightarrow r: h = 2:3$. So the answer is 3.

19. The ratio of the sides of a rectangle is 4 : 9 and the are is equal to 144 sq.m. The perimeter in meter is

1. 52 2. 26 3. 18 4. 30 Solution: Let the sides of a rectangle = 4x, 9x. It's area $36x^2 = 144$ sq.mts x = 2. Perimeter of rectangle = 2(l + b) = 2(8 + 18) = 2(26) = 52mts. So the answer is 1.

- 20. The area (in square cms) of a trapezium, for which the lengths of parallel sides are 20 cms and 23 cms while the distance between the parallel sides is 12 cms, is 1. 238 2. 248 3. 258 4. 264 Solution: Area of the Trapizium = $\frac{1}{2}(a+b)h \Rightarrow \frac{1}{2}(20+23)12 = \frac{1}{2}(43)12 = 258$ sq.mts. So the answer is 3.
- 21. The area (in sq.cms.) of the regular hexagon whose perimeter is 12cms, is

1. $18\sqrt{3}$ 2. $15\sqrt{3}$ 3. $12\sqrt{3}$ 4. $6\sqrt{3}$ Solution: The side of given hexagon = 2cms.

Its area = $\frac{3\sqrt{3}}{2}a^2 = \frac{3\sqrt{3}}{2}2^2 = 6\sqrt{3}$. So the answer is 4.

22. If the ratio of the circumferences of two circles is 2 : 3 then the ratio of their areas is 1. 4:9
2. 3:5
3. 5:6
4. 3:2
Solution: The ratio between the circle circumferance of two circles = 2:3 The ratio between their areas = $2^2: 3^2 = 4:9$ (or) 2:3. So the answer is 1.

23. Six spherical balls radius *r* are melted and cast into a cylindrical rod of the same radius. The height of the rod is

1. 4r 2. 6r 3. 8r 4. 12rSolution: Let the height of the rod = h.

$$6\frac{4}{3}\pi r^3 = \pi r^2 h \Longrightarrow h = 8r$$
. So the answer is 3.

24. A circle and a square of same perimeter have areas c and s respectively. Then 1. s = c 2. s > c 3. c > s 4. $c = \pi s$ Solution: Let the perimeter = x.

Area of the circle $c = \frac{x^2}{4\pi}$; Area of the square $s = \frac{x^2}{16} \Rightarrow c > s$. So the answer is 3.

25. A cube, made of a metal, with edge 3cms weights 12gms. The weight (in grams) of the cube of edge 12cm, made of the same metal, is

1. 48 2. 64 3. 758 4. 768 **Solution:** The weight of a cub with edge 3 cms = 12 gms. (i.e) $27 \text{ cm}^3 = 12 \text{ gms}$.

Weight of the cube with edge $12 \text{ cms} = \frac{12^3}{27} \text{ x } 12 = 768 \text{ gms}$. So the answer is 3.

26. An isosceles triangle of area 12 sq.cm. has one of its equal sides as 5cm. The lengths of the base of the triangle (in cms) is

 1. 6
 2. 7
 3. 8
 4. 9

 Solution: (1) or (3). Let the third side = x.

Area of the triangle = $\frac{x}{4}\sqrt{10^2 - x^2} = 12 \Rightarrow x = 6$ or 8. So the answer is 1 and 3.

27. The radius of the circle (in feet) that can circumscribe a rectangle of length 12 feet and breadth 5 feet, is

1. 6 2. 6.5 3. 7 4. 8.5 **Solution:** The measurements of a rectangle = 12 ft x 5 ft

The diameter of circle circum scribe the rectangle = $\sqrt{12^2 + 5^2} = 13$. The radius of circum circle = 6.5 ft. So the answer is 2.

28. The inner and outer radius of a circular track are respectively 21m and 28m. The cost of livelling the track at Rs. 5 per square meter is (in rupees)
1. 1078
2. 2156
3. 4312
4. 5390

Solution: The area of the circular track = $\pi(r_1^2 - r_2^2) = \pi(28^2 - 212^2) = 1078$ sq.mts. The cost of leveling the track = 1078 x 5 = 5390. So the answer is 4.

29. The curved surface area of a cylinder is thrice the area of its base. Then the ratio of its base radius and height is

1. 4:3 2. 3:5 3. 2:3 4. 3:2 Solution: $2\pi rh = 3\pi r^2 \Rightarrow r:h=2:3$. So the answer is 3.

30. A rectangular tank has 2.6 cubic metres of water. If the area of the base of the tank is 6500sq.cms. then the depth of water (in metres) is

1. 3.5 2. 4 3. 5 4. 8 Solution: The volume of the water in the tank = 2.6cu.mts. The base area of the tank = 6500 sq.cms. Then $6500 \ge h = 2.6 \ge 100 \ge h = 4$ mts. So the answer is 2.

31. A cylinder is of height 8 metres and has base radius 8 meters. The maximum length (in meters) of the rod that can be placed in it is

1. $8\sqrt{5}$ 2. $8\sqrt{2}$ 3. $8\sqrt{3}$ 4. $8(2\pi+1)$

Solution: Base radius of the cylinder r = 8mts \Rightarrow diameter = 16mts. Height of the cylinder h = 8mts.

The maximum length of the that can be place in it = $\sqrt{4r^2 + h^2} = 8\sqrt{5}$ mts.

So the answer is 1.

- 32. If two circles of diameter 10cm and 6cm touch externally, then the distance between their centres is
 - 1. 16cm 2. 2cm 3. 4cm 4. 8cm diameter

Solution: Radius = $\frac{\text{diameter}}{2}$. So radius = 5cm and another radius = 3cm.

So distance between centres = sum of the radius = 5 + 3 = 8. So the answer is 4.

33. Two circles C_1 and C_2 are such that a square S is inscribed in C_1 and C_2 is inscribed in S. Then the ratio of the areas of C_1 and C_2 is

1.
$$\sqrt{2}:1$$
 2. 2:1 3. 2: $\sqrt{2}$ 4. 3:2

Solution: The ratio between the radius of two circles C_1 and C_2 is $r_1 : r_2 = \sqrt{2} : 1$

The ratio between their areas = $(\sqrt{2})^2$: $1^2 = 2$: 1. So the answer is 2.

34. A square sheet of paper is cut along the diagonal into two equal triangles. What is the minimum number of pieces into which one of the two triangles shall have to be cut so that these pieces together with other triangle could be arranged a rectangle?

1. 2 2. 3 3. 4 4. 5

Solution: Part A is cut into two parts 1 and 2, and adding it to

B as shown in figure, we get a rectangle.

So the answer is 1.

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35. If the area of a triangle with base x is equal to the area of a square with side x, then the altitude of the triangle is

1.
$$\frac{x}{2}$$
 2. x 3. 2x 4. 3x

Solution: Area of triangle = Area of square $\Rightarrow \frac{1}{2}xh = x^2 \Rightarrow h = 2x$. Answer is 3.

36. The area of a trapezium is 220 sq.cm. and its height is 8cm. If the sum of the non-parallel sides is 20cm., its perimeter (in cm) is

Solution: Area of trapezium = $\frac{1}{2}h(a + b)$ where *a*, *b* are parallel sides and *h* is the \perp



distance between them. $220 = \frac{1}{2} \cdot 8(a+b) \Rightarrow a+b=55 = \text{sum of parallel sides.}$

Perimeter = 55 + 20 = 75. Answer is 1.

37. If the diagonals of a rhombus are 12cm and 18cm, then its area (in sq.cm.) is
1. 216
2. 108
3. 54
4. 180

Solution: Area of rhombus = $\frac{1}{2} d_1 d_2$ where d_1 and d_2 are two diagonals.

Area =
$$\frac{1}{2}$$
 x12 x 18 = 6 x 18 = 108. Answer is 2.

38. A rectangle of length 12cm and breadth 5cm is inscribed in a circle of radius r cm. Then r (in cm) is

Solution:
$$(2r)^2 = 5^2 + 12^2 = 169 = 13^2$$
 (by using pythogorous theorem)

$$\Rightarrow 2r^2 = 13 \Rightarrow r = 6.5$$
. Answer is 3.

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39. The lengths of the sides of a right angled triangle are in the ratio 3 : 4. The area of the triangle is 726 square units. Then the length of the hypotenuse (in proper units) is
1. 33
2. 44
3. 55
4. 66

Solution:
$$\frac{1}{2} \ge 3x = 726 \Rightarrow x^2 = \frac{726}{6} = 121 = 11^2 \Rightarrow x = 11.$$

By Pythogorous Theorem Hypotenuse = $11\sqrt{4^2 + 3^2} = 11(5) = 55$. Answer is 3.

40. The length and breadth of a rectangle are changed by +20% and -10% respectively. Then the percentage change in the area of the rectangle is

1. 15 2. 10 3. 8 4. 5 Solution: Initial area = $A_1 = lb$;

Increased area = $A_2 = \left(l + \frac{l}{5}\right) \left(b - \frac{b}{10}\right) = (1.2 \ l) \ (0.9)b = (1.08) \ lb$ Change = 1.08 - 1 = 0.8

% change = $0.08 \times 100 = 8\%$. Answer is 3.

ICET-2013

- 110. A window is in the shape of a rectangle surmounted by a semicircle. If the length of the rectangle is 6 feet and the radius of the semicircle is 2 feet, then the area of the window, in square feet, is
 - (1) $18+4\pi$ (2) $24+4\pi$ (3) $24+2\pi$ (4) $18+2\pi$

15. VOLUME AND SURFACE AREA

Introduction: The term 'Volume' refers to the space occupied by the figure in 'three dimensions'. Example, cub, cuboid, cone, cylinder, sphere etc.

Volume of a Combination of Solids: The volume of the solid formed by joining two basic solids will actually be the sum of the volumes of the constituents.

Total Surface Atea (TSA): The total surface area of a solis is the sum of the curved surface area + the sum of the area of the smooth surface.

| Figure | Volume | Surface Area | Others |
|-------------------------------|---|---|---|
| Room or a
Rectangula solid | lxbxh | 2(lb+lh+bh) a) | Area of 4 walls
$2(l + b) \ge h$
b) Diagonal
= |
| Cube | Side ³ | 6 x side ² | a) Diagonal
= $\sqrt{3}$ x sides
b) Sum of edges
= 12 x side |
| Right Circular
Cylinder | $\pi r^2 h$ | a) of sides
= $2\pi rh$
b) To surface
= $2\pi r (r + h)$ | |
| Sphere | $\left(\frac{4}{3}\right) \times \pi r^2$ | $4\pi r^2$ | |
| Cone | $\frac{\left(\frac{1}{3}\right)^{\chi} \pi r^{2} h}{173}$ | a) Of sides = $2 \pi r l$
b) To surface
= $\pi r^{2} + \pi r l$ | $h^2 + r^2 = l^2$ ICET |

PROBLEMS

1. A cylinder and a cone have the same height and the radius of the base. The ratio between the volumes of the cylinder and the cone is

1. 2:1 2. 3:1 3. 2:3 4. 3:2 **Solution:** Volume of a cylinder = $\pi r^2 h$. Volume of cone = $\frac{1}{3}\pi r^2 h$.

So $\pi r^2 h: \frac{1}{3}\pi r^2 h \Longrightarrow 3:1$. So the answer is 2.

- 2. The side of a cube is 5 cm. Its total surface are in sq. cm. is 1. 30 2. 90 3. 150 4. 200 Solution: Total surface area of a cube = $6a^2$, where *a* is the side = $6(5)^2 = 150$. So the answer is 3.
- 3. The ratio of the weights of three solid spheres is 8:27:64. The ratio of their diameters is1. 1:2:32. 1:3:43. 2:4:64. 4:6:8

Solution: Volume of a sphere = $\frac{4}{3}\pi r^3 = \frac{\pi}{6}d^3$

Where *r* is the radius and *d* is the diameter. So $r_1^3 : r_2^3 : r_3^3 = 8 : 27 : 64 \Longrightarrow r_1 : r_2 : r_3 = 2 : 3 : 4$. The ratio of the diameters $= 2r_1 : 2r_2 : 2r_3 = 4 : 6 : 8$. So the answer is 4.

- 4. If the ratio of the radii of two spheres is 2:3, then the ratio of their volumes is 1. 8:9
 2. 4:9
 3. 8:27
 4. 2:3
 Solution: Ratio of their volumes is $\frac{4}{3}\pi r_1^3: \frac{4}{3}\pi r_2^3 \Rightarrow r_1^3: r_2^3 \Rightarrow (2p)^3: (3p)^3 \Rightarrow 8:27$. So the answer is 3.
- 5. The maximum number of boxes, each length 2m, breadth 4m and height 5m that can be placed in a box of length 20m, breadth 10m and height 5m, is

 30
 40
 20
 40
 20

 Solution: No. of small boxes = volume of big box volume of each small box = 20×10×5/2×4×5 = 25.

 So the answer is 4.
- 6. The radius 'r' of a circular cylinder is the same as that of a sphre. If their volumes are equal then the height of the cylinder is

1.
$$\frac{2r}{3}$$
 2. $\frac{4r}{3}$ 3. $2r$ 4. r

Solution: Area of the cylinder = Area of asphere

$$\frac{1}{3} \ge \pi \ge r^2 \ge h = \pi \ge r^3 \Longrightarrow h = \frac{4\pi}{3}.$$
 So the answer is 2.

7. To prepare an aluminium sheet of 10000 square metres the volume of the aluminium required is one cubic metre. The thickness of the sheet (in cms) is
1. 10
2. 0.1
3. 0.01
4. 0.001

1. 10 2. 0.1 3. 0.01 4. Solution: Volume of aluminium = bare area x thinkners 1 cubic meter = 10,000 sq.meter x thickners 1 meter = 100 cms; 1 sq.m. = 100 x 100 1 cubic m = 100 x 100 x 100 100 x 100 x 100 = 10,000 x 100 x 100 x thickness thickness = $\frac{1}{100}$ = 0.01 cm. So the answer is 3.

8. If the base radius of two cylinders are in the ratio 2 : 3 and their heights are in the ratio 9 : 5,

then the ratio of their volumes is 1. 11:8 2. 4:5 3. 1:4

Solution: Volume of cyliner = $\pi r^2 h$; ratio of base radii of two cylinders = 2 : 3 ratio of heights of two cylinders = 9 : 5; $\pi \ge (2)^2 \ge 9 : \pi (3)^2 \ge 36 \pi : 45 \pi = 4 : 5$. **So the answer is 2.**

4. 5:4

ICET-2011

9. If the diagonal of a cube is $5\sqrt{3}$ m, its volume (in cubic metres) is

1. 150 2. 145 3. 125 4. 120

Solution: Formula: Let the edge (side) of a cube be 'a' units then Volume = a^3 ,

Total surface area = $6a^2$, Diagonal of a cube = $(\sqrt{3}a)$ units.

Given $\sqrt{3} a = 5\sqrt{3} \Rightarrow a = \text{side} = 5 \text{ mt.}$ \therefore Volume = $a^3 = 5^3 = 125$. Answer is 3.

ICET-2012

10. A cube has a volume of 128cm³. It is divided into 8 equal cubes. Then the ratio of an edge of a smaller cube to an edge of the original cube is

1. 1:8 2. 1:16 3. 1:2 4. 2:1 **Solution:** Volume of a cube = a^3 .

- 128 : $\frac{128}{8}$ (because it is divided into 8 equal cubes)
- \Rightarrow 2:1. So ratio of edge of smaller cube : edge of original cube = 1:2. Answer is 3.
11. The volume of a cube (in cubic centimerters), whose total surface area is 384 square centimeters is,

1. 64 2. 512 3. 128 4. 256 **Solution:** Total surface area is $6a^2 = 384 \Rightarrow a^2 = 64 \Rightarrow a = 8$. Volume of a cube = $a^3 = 8 \ge 8 \ge 8 \ge 512$. **Answer is 2.**

12. The volume (in proper units) of the cone with *r* as the radius of the circular base and having height *h* is

1.
$$\frac{1}{3}\pi r^2 h$$
 2. $\frac{2}{3}\pi r^2 h$ 3. $\pi r^2 h$ 4. $\frac{4}{3}\pi r^2 h$

Solution: Volume of cone = $\frac{1}{3}\pi r^2 h$. Answer is 1.

- 13. If *n* is the maximum number of solid cubes with an edge of length 0.2 cm that can be put in a box whise dimensions are 1 cm x 4 cm then n =
 - 1. 2502. 1503. 5004. 350

Solution: Number of cubes of edge 0.2 cm that can be put in the box = $\frac{1 \times 1 \times 4}{0.2 \times 0.2 \times 0.2}$

$$=\frac{4000}{8}=500.$$
 Answer is 3.

14. The ratio of the radii of two circular cylinders A and B is 2 : 3 and that of their height is 5 : 3. If the volume of the cylinder B is $27 m^3$, then the volume of the cylinder A in cubic meters is 1. 22 2. 30 3. 40 4. 20

Solution: $r_1: r_2 = 2: 3 \Rightarrow \frac{r_1}{r_2} = \frac{2}{3} \Rightarrow 3r_1 = 2r_2;$

$$h_1: h_2 = 5: 3 \Longrightarrow \frac{h_1}{h_2} = \frac{5}{3} \Longrightarrow 3h_1 = 5h_2.$$

Volume =
$$27m^3 \Rightarrow \pi r_2^2 h_2 = 27 \Rightarrow \pi \cdot \frac{9}{4}r_1^2 \cdot \frac{3}{5}h_1 = 27 \Rightarrow \pi r_1^2 h_1 = \frac{27 \times 5 \times 4}{9 \times 3} = 20$$
. Answer is 4.

ICET-2013

- 109. The radius of a cone is 3 times the radius of a cylinder and their heights are same. Then the ratio of their volumes in that order is
- (1) 9:1 (2) 1:3 (3) 3:1 (4) 1:9 106. 11 cubic metres of steel is cast into cylindrical bars of diameter 10 cms and length 1.4
 - metres. Then the number of such bars that can be cast with the given metal is (Take $\pi = \frac{22}{7}$)

ICET

16. THEORY OF INDICIES

Let 'a' be a real number and 'n' be a natural number then the product of a's up to n terms by a^n i.e.,

 $a^n = a \ge a \ge a \ge a \ge \dots n$ terms.

In a^n , a is called base and n is called index or exponent.

Laws of Indices:

- 1. $a^{m} \ge a^{n} = a^{m+n}$ 2. $a^{m} \div a^{n} = a^{m-n}$ 3. $(a^{m})^{n} = a^{mn}$ 4. $(ab)^{m} = a^{m}b^{m}$ 5. $\left(\frac{a}{b}\right)^{m} = \frac{a^{m}}{b^{m}}$ 6. $\sqrt[n]{a} = \frac{1}{a^{n}}$ 7. $\sqrt[n]{a^{m}} = \frac{m}{a^{n}}$ 8. $\sqrt[n]{\sqrt[n]{a}} = \frac{m\sqrt[n]{a}}{a^{m}} = \frac{1}{a^{mn}}$ 9. $a^{-m} = \frac{1}{a^{m}}$ 10. $\left(\frac{a}{b}\right)^{-m} = \left(\frac{b}{a}\right)^{m}$ 11. $a^{0} = 1$ 12. $\sum(b-c) = 0$
- 13. $\sum a(b-c) = 0$ 14. $\sum \frac{a-b}{ab} = 0$ 15. $\sum \frac{1}{(a-b)(a-c)} = 0$

PROBLEMS

1. If
$$\frac{8^{\frac{3}{4}} \times 9^{\frac{4}{3}}}{27^{\frac{3}{2}} \times 16^{\frac{3}{3}}} = 2^{a} \cdot 3^{b}$$
, then $a - b =$
1. $\frac{6}{11}$ 2. $\frac{11}{6}$ 3. $\frac{17}{12}$ 4. $\frac{12}{17}$
Solution: $\frac{8^{\frac{3}{4}} \times 9^{\frac{4}{3}}}{27^{\frac{3}{2}} \times 16^{\frac{3}{2}}} = 2^{a} \cdot 3^{b} \Rightarrow \frac{(2^{3})^{\frac{3}{3}} \times (3^{2})^{\frac{4}{3}}}{(3^{3})^{\frac{3}{2}} \times (2^{4})^{\frac{2}{3}}} = \frac{2^{\frac{9}{4}} \times 3^{\frac{8}{3}}}{3^{\frac{9}{2}} \times 2^{\frac{8}{3}}} = 2^{\frac{9}{4} \cdot \frac{8}{3}} \times 3^{\frac{9}{3} \cdot \frac{9}{2}}$
 $= 2^{\frac{27-32}{12}} \times 3^{\frac{16-27}{6}} = 2^{\frac{-5}{12}} \times 3^{\frac{-11}{6}}$. So $a = \frac{-5}{12}$, $b = \frac{-11}{6}$.
So $a - b = \frac{-5}{12} + \frac{-11}{6} = \frac{-5+22}{12} = \frac{17}{12}$. So the answer is 3.
2. $16^{\frac{3}{4}} - 8^{\frac{1}{3}} + 49^{\frac{1}{2}} =$
1. 17 2. 13 3. 3 4. -1

Solution: $16^{\frac{3}{4}} - 8^{\frac{1}{3}} + 49^{\frac{1}{2}} = (2^4)^{\frac{3}{4}} - (2^3)^{\frac{1}{3}} + (7^2)^{\frac{1}{2}} = 2^3 - 2^1 + 7^1 = 8 - 2 + 7 = 13.$ So the answer is 2. 3. $\frac{\left(a^{\frac{1}{3}}b^{\frac{1}{6}}\right)^{2} - \left(a^{\frac{1}{6}}b^{\frac{1}{3}}\right)^{2}}{1} = \frac{1}{1}$ 1. $\sqrt{a} + \sqrt{b}$ 2. $\frac{1}{a^3} + \frac{1}{b^3}$ 3. \sqrt{ab} 4. $(ab)^{\frac{1}{3}}$ Solution: $\frac{\left(a^{\frac{1}{3}}b^{\frac{1}{6}}\right)^{5} - \left(a^{\frac{1}{6}}b^{\frac{1}{3}}\right)^{5}}{\frac{1}{2}} = \frac{a^{\frac{1}{2}}a^{\frac{1}{2}}b}{\frac{1}{2}a^{\frac{1}{2}}b^{\frac{1}{2}}} = \frac{a^{\frac{1}{2}}b^{\frac{1}{2}}(a^{\frac{1}{2}}-b^{\frac{1}{2}})}{\frac{1}{2}a^{\frac{1}{2}}b^{\frac{1}{2}}}$ $=\frac{1}{a^2}\frac{1}{b^2}=\sqrt{a}\sqrt{b}=\sqrt{ab}$. So the answer is 3. 4. If $(81)^x = \frac{1}{(243)^y}$, then 4x + 5y =1. 5 2.3 3. 2 4.0 **Solution:** $(81)^x = \frac{1}{(243)^y} \Rightarrow (3^4)^x = (3^5)^{-y} \Rightarrow 3^{4x} = 3^{-5y}$ $\Rightarrow 4x = -5y \Rightarrow 4x + 5y = 0$. So the answer is 4. 5. $8^{\frac{2}{3}} - 16^{\frac{1}{4}} + 9^{\frac{1}{2}} =$ 3. $\sqrt{2}$ 4. $\sqrt{2} + \sqrt{3}$ 1.3 2.5 Solution: $8^{\frac{2}{3}} - 16^{\frac{1}{4}} + 9^{\frac{1}{2}} = (2^3)^{\frac{2}{3}} - (2^4)^{\frac{1}{4}} + (3^2)^{\frac{1}{2}} = 4 - 2 + 3 = 5.$ So the answer is 2. 6. If x, y and z are three integers such that x + y = 16, y + z = 20 and z + x = 22, then x y z 3.900 1. 880 2.981 4.819 **Solution:** x + y = 16 -----(1); y + z = 20 -----(2); z + x = 22 -----(3) $(1) + (2) + (3) \Longrightarrow 2x + 2y + 2z = 58; x + y + z = 29.$ z = 13, x = 9, y = 7; $xyz = 9 \ge 7 \ge 13 = 819$. So the answer is 4.

7. If $\left(\sqrt{2}^{\sqrt{2}}\right)^{\sqrt{2}} = 2^x$, then x =1. 4 2.2 3.1 4. $\sqrt{2}$ **Solution:** $(\sqrt{2}^{\sqrt{2}})^{\sqrt{2}} = 2^x (\text{note:} (x^m)^n = x^{mn})^{-1}$ $(\sqrt{2})^2 = 2^x \Longrightarrow 2^1 = 2^x \Longrightarrow x = 1$. So the answer is 3. 8. If $9^{2x+1} = 27^{x+2}$ then x =1. 2 3.8 4.16 **Solution:** $9^{2x+1} = 27^{x+2}$ then x; $3^{4x-2} = 3^{3x+6}$; $4x - 2 = 3x + 6 \Longrightarrow x = 8$. So the answer is 3. 9. If a + b + c = 0, then the value of $x^{\left(\frac{a^5}{3a^3bc}\right)} \cdot x^{\left(\frac{b^5}{3ab^3c}\right)} \cdot x^{\left(\frac{c^5}{3abc^3}\right)}$ is 1. x^{3} 4.1 Solution: $x^{\left(\frac{a^5}{3a^3bc}\right)}$. $x^{\left(\frac{b^5}{3ab^3c}\right)}$. $x^{\left(\frac{c^5}{3abc^3}\right)} = \frac{a^2}{r^{3bc}} \cdot \frac{b^2}{r^{3ac}} \cdot \frac{c^2}{r^{3ab}}$ $= \frac{a^3 + b^3 + c^3}{3abc} \text{ (If } a + bc + c = 0; \ a^3 + b^3 + c^3 = 3abc)$ $= \frac{3abc}{x^{3}abc} = x^1 = x.$ So the answer is 3. 10. If $a^x = b^y = c^z \neq 0$ and $a^2 = bc$ then xy + yz + zx =2.3xv1. 2*xy* 3. 2vz4. 3*yz* **Solution:** $a^x = b^y = c^z = 0$, then take $a^x = b^y = c^z = k$ So, if $a^x = k$ then $a = \frac{1}{kx}$, similarly $b = \frac{1}{ky}$, $c = \frac{1}{kky}$. Also given that $a^2 = bc \Rightarrow \frac{1}{(k^x)^2} = \frac{1}{k^y}, \ \frac{1}{k^z} \Rightarrow \frac{1}{k^z} = \frac{1}{k^y} + \frac{1}{z} \Rightarrow \frac{2}{k^z} = \frac{1}{k^y} + \frac{1}{z}$ $\Rightarrow xz + xy = 2yz$. Adding yz both sides, we get xy + yz + zx = 3yz. So the answer is 4. 11. For any $\alpha \neq 0$, $\frac{1}{1+\alpha^2+\alpha^4} + \frac{1}{1+\alpha^2+\alpha^{-2}} + \frac{1}{1+\alpha^{-2}+\alpha^{-4}} = \frac{1}{1+\alpha^{-2}+\alpha^{-4}} = \frac{1}{1+\alpha^{-2}+\alpha^{-4}} = \frac{1}{1+\alpha^2+\alpha^{-4}} = \frac$ 1. $1 + \alpha^2 + \alpha^4$ 3.1 2. α^7 4.0

Solution:
$$\frac{1}{1+\alpha^{2}+\alpha^{4}} + \frac{1}{1+\alpha^{2}+\alpha^{-2}} + \frac{1}{1+\alpha^{-2}+\alpha^{-4}}$$

$$\Rightarrow \frac{1}{1+\alpha^{2}+\alpha^{4}} + \frac{1}{1+\alpha^{2}+\frac{1}{\alpha^{2}}} + \frac{1}{1+\frac{1}{\alpha^{2}}+\frac{1}{\alpha^{4}}} = \frac{1}{1+\alpha^{2}+\alpha^{4}} + \frac{\alpha^{2}}{1+\alpha^{2}+\alpha^{4}} + \frac{\alpha^{4}}{1+\alpha^{2}+\alpha^{4}}$$

$$= \frac{1+\alpha^{4}+\alpha^{2}}{1+\alpha^{2}+\alpha^{4}} = 1. \text{ So the answer is 1.}$$
12. If $a = k^{13} - \frac{1}{k^{1/3}}$, where $k \neq 0$, then $a^{3} + 3a =$
1. $\frac{k}{k^{2}-1}$ 2. $\frac{k-1}{k^{2}}$ 3. $\frac{k^{2}-1}{k}$ 4. $\frac{k-1}{k^{2}+1}$
Solution: Given that $a = k^{\frac{1}{3}} - \frac{1}{k^{\frac{1}{3}}}, k \neq 0$, then $a^{2} = \left(k^{\frac{1}{3}} - \frac{1}{k^{\frac{1}{3}}}\right)^{3}$

$$\Rightarrow a^{3} = \left(k^{\frac{1}{3}}\right)^{3} - \left(\frac{1}{k^{\frac{1}{3}}}\right)^{3} - 3. \frac{1}{k^{\frac{1}{3}}}, \frac{1}{k^{\frac{1}{3}}}\left(k^{\frac{1}{3}} - \frac{1}{k^{\frac{1}{3}}}\right)$$

$$[(a - b)^{3} = a^{3} - b^{3} - 3ab(a - b)] \Rightarrow a^{3} = k - \frac{1}{k} - 3(a) \left(k^{\frac{1}{3}} - \frac{1}{k^{\frac{1}{3}}} - \frac{1}{k^{\frac{1}{3}}}\right)$$

$$\Rightarrow a^{3} + 3a = k - \frac{1}{k} \Rightarrow a^{3} + 3a = \frac{k^{2} - 1}{k}. \text{ So the answer is 3.}$$
13. A value of x such that \sqrt{x} is rational, is
1. 125 2. 1250 3. 2401 4. 5625
Solution: If \sqrt{x} to be rational, then x should be written in the form of k^{4} , k is an integer. From options, 2401 = 7^{4}. So the answer is 3.
14. The least number by which 3^{7} , 7⁴.11 has to be multiplied to make it a perfect square is
1. 16 2. 32 3. 64 4. 128
Solution: To make 3^{7} , 7⁴, 11 as a perfect square, then we should multiply with 3 x 11.

Solution: To make 3⁷, 7⁴, 11 as a perfect square, then we should multiply with Logic here is to make it perfect square, the powers should be even numbers.

So the answer is 3.

15. The reciprocal of the sum of the reciprocals of $\frac{3}{5}$ and $\frac{5}{7}$ is 4. $\frac{46}{15}$ 1. $\frac{2}{2}$ 2. $\frac{5}{12}$ 3. $\frac{15}{46}$ **Solution:** Reciprocals of $\frac{3}{5}$ and $\frac{5}{7}$ are $\frac{5}{3}$ and $\frac{7}{5}$. Sum of these numbers are $\frac{5}{3} + \frac{7}{5} = \frac{25+21}{15} = \frac{46}{15}$. Then the reciprocal of this sum is $\frac{15}{46}$. So the answer is 3. 16. $\frac{5 \times (2^{k-2}) + 10 \times (2^{k-1})}{10^{k+2}} =$ $4.\frac{1}{4\times(5^k)}$ 1. $\frac{1}{8 \times (5^k)}$ 2. $\frac{1}{16 \times (5^k)}$ 3. $\frac{1}{32 \times (5^k)}$ Solution: $\frac{5^{\frac{2}{3}}X^3\sqrt{5^8}}{\sqrt[3]{5^7}} = \frac{5 \times (2^{k+2}) + 10 \times 2^{k-1}}{10^{k-2}} = \frac{5^{\left(\frac{2^k}{4} + 2^{k-1+1}\right)}}{10^k 10^2}$ $=\frac{2^{k}+2^{k}.2^{2}}{4\times 10^{k}\times 20} \qquad |a^{k}.b^{k}=(ab)^{k}|$ $=\frac{2^{k(5)}}{4\times 2^k\times 5^k\times 20}=\frac{1}{16\times 5^k}$. So the answer is 2. 17. $\frac{5^{\frac{2}{3}} \times \sqrt[3]{5^8}}{\sqrt[3]{5^7}} =$ 1. 5 2.25 3. $\sqrt[3]{5}$ 4.1 Solution: $\frac{5^{\frac{2}{3}} \times \sqrt[3]{5^8}}{\sqrt[3]{5^7}} = \frac{5^{\frac{2}{3}} \times 5^{\frac{8}{3}}}{5^{\frac{7}{3}}} = \frac{5^{\frac{10}{3}}}{5^{\frac{7}{3}}} = \frac{5^{\frac{10}{3}}}{5^{\frac{7}{3}}} = 5^1 = 5$. So the answer is 1. [Note: $\sqrt[n]{a^m} = \frac{m}{a^n}; a^m \times a^n = a^{m+n}; \frac{a^m}{a^n} = a^{m-n}$] CEDM 181

$$18. \left[\frac{4\sqrt{ab} - \sqrt{b}}{\sqrt{a} - \frac{4}{\sqrt{ab}}}\right]^{-4} =$$

$$1. \frac{a^{2}}{b^{2}} \qquad 2. -\frac{a}{b} \qquad 3. \sqrt{\frac{a}{b}} \qquad 4. \frac{a}{b}$$
Solution: $\left[\frac{4\sqrt{ab} - \sqrt{b}}{\sqrt{a} - \frac{4}{\sqrt{ab}}}\right]^{-4} = \left[\frac{4\sqrt{b} + \frac{4\sqrt{a} - \frac{4\sqrt{b}}{\sqrt{b}}}}{\frac{4}{\sqrt{a} - \frac{4\sqrt{b}}{\sqrt{a} - \frac{4}{\sqrt{b}}}}\right]^{-4} = \frac{4\sqrt{x}\cdot\frac{4\sqrt{x}}{\sqrt{x} = \sqrt{x}}}{\frac{4\sqrt{x}\cdot\frac{4\sqrt{x}}{\sqrt{x}} = \sqrt{x}}{\sqrt{x}}$

$$= \left(\frac{\sqrt{a}}{\sqrt{b}}\right)^{\frac{4}{4}} = \sqrt{\frac{a}{b}} \cdot \text{ So the answer is 3.}$$

$$19. \frac{2^{4n+1} - 2^{2}4^{2n-1}}{16^{n}} =$$

$$1. 0 \qquad 2.4 \qquad 3. 2 \qquad 4.1$$
Solution: $\frac{2^{4n+1} - 2^{2}4^{2n-1}}{16^{n}} = \frac{2^{4n}\cdot2^{1} - 2^{2}\cdot4^{4n}\cdot2^{-2}}{2^{4n}} = 2^{4n}\frac{2^{1} - 2^{2}\cdot\frac{1}{2^{2}}}{2^{4n}} = (2 - 1) = 1.$
So the answer is 4.
$$20. \frac{(0.63)^{2} + (0.05)^{2} + (0.032)^{2}}{(0.063)^{2} + (0.05)^{2} + (0.032)^{2}} =$$

$$1. 1 \qquad 2.10 \qquad 3.100 \qquad 4.1000$$
Solution: $\frac{(0.63)^{2} + (0.05)^{2} + (0.032)^{2}}{(0.063)^{2} + (0.005)^{2} + (0.0032)^{2}} = \frac{\left(\frac{63}{100}\right)^{2} + \left(\frac{5}{1000}\right)^{2} + \left(\frac{3.2}{1000}\right)^{2}}{\left(\frac{63}{1000}\right)^{2} + \left(\frac{5}{1000}\right)^{2} + \left(\frac{3.2}{1000}\right)^{2}}$

$$= \frac{\left(\frac{1}{100}\right)^{2}}{\left(\frac{1}{1000}\right)^{2}} = \frac{1}{100} \times \frac{1}{100} \times 1000 \times 1000 = 100.$$
 So the answer is 3.

ICET-2011

21. If
$$\frac{6^{4/3} \cdot (24)^{2/5}}{9^{1/4} \cdot 12^{1/2}} = 3^a 2^b$$
 then $a + b =$
1. $\frac{34}{15}$ 2. $\frac{29}{15}$ 3. $\frac{31}{15}$ 4. $\frac{22}{15}$

Solution:
$$3^{a}2^{b} = \frac{6^{4/3} \cdot (24)^{2/5}}{9^{1/4} \cdot 12^{1/2}} = \frac{\frac{2^{\frac{4}{3}} \cdot 2^{\frac{6}{5}} \cdot 3^{\frac{4}{3}} \cdot 2^{\frac{2}{5}}}{3^{\frac{2}{4}} \cdot 2 \cdot 3^{\frac{1}{2}}} = 2^{\frac{4}{3} + \frac{6}{5} - 1} \cdot 3^{\frac{4}{3} + \frac{2}{5} - 1} = 2^{\frac{20 + 18 - 15}{15}} \cdot 3^{\frac{20 + 6 - 15}{15}}$$

Equating the powers of 3 and 2 we get $a = \frac{11}{15}$ and $b = \frac{23}{15}$.

So $a + b = \frac{11}{15} + \frac{23}{15} = \frac{34}{15}$. Answer is 1.

22. If x + y + z = 0, then for any a > 0, $a^{x^2/yz} a^{y^2/zx} a^{z^2/xy} =$ 1. 1 2. a 3. a^2 4. a^3 **Solution:** Formula $a^3 + b^3 + c^3 - 3abc = (a + b + c) (a^2 + b^2 + c^2 - ab - bc - ca)$ $a^{x^2/yz} a^{y^2/zx} a^{z^2/xy} = \frac{x^3}{a^{xyz} + \frac{y^3}{xyz} + \frac{z^3}{xyz}} = \frac{x^3 + y^3 + z^3}{a^{xyz} + \frac{y^3}{xyz}} = \frac{a^{x^3 + y^3 + z^3}}{a^{xyz} + \frac{z^3}{xyz}} = a^{0+3} = a^3.$

Answer is 4.

ICET-2012

- 23. The maximum of 33^{3^3} , $3^{3^{3^3}}$, 333^3 and 3^{333}
 - 1. 3^{333} 2. 3^{3^3} 3. 3^{3^3} 4. 33^{3^3}

Solution: Using the properties of index we get maximum among the given is 3. Answer is 3.

24. If *a*,*b*,*c* are all non-zero such that $2^a=3^b=6^c$, then c(a+b) =1. *a* 2. *b* 3. *ab* 4. *a-b* **Solution:** We have $2^a=3^b=6^c \Rightarrow 2^{ab}=6^{bc}$ and $3^{ab}=6^{ac}$ Consider $6^{c(a+b)}=6^{ac} \ge 6^{bc}=2^{ab} \ge 3^{ab}=(2\ge 3)^{ab}=(6)^{ab} \Rightarrow c(a+b)=ab$. Answer is 3.

25. If x + 2y = 19 and 2x + y = 17, then the value of x^{3y-4x} is 1. 7 2.7⁵ 3.2⁷ 4.5 **Solution:** x + 2y = 19 -----(1); 2x + y = 17 -----(2); Now (2) $\Rightarrow 4x + 2y = 34$ ----(3). Now subtracting (1) from (3) we get $3x = 15 \Rightarrow x = 5$, using this in (1) we get y = 7. So $x^{3y-4x} = 5^{21-20} = 5$. So the answer is 4.

17. PRIMARY NUMBER THEORY

- 1. The set of integral solutions of the equation $x+8 \equiv 9 \pmod{2}$ is 1. 2Z 2. 3Z 3. Z - 3Z 4. Z - 2Z Solution: $x+8 \equiv 9 \pmod{2} \Rightarrow x \equiv 1 \pmod{2} \Rightarrow x - 1 \equiv 0 \pmod{2} \Rightarrow x \in \mathbb{Z} - 2\mathbb{Z}$. So the answer is 4.
- 2. The number of divisors of 36000 is 1. 30 2. 72 3. 640 4. 720 **Solution:** The number of divisors of 36000 is $36000 = 2^5 \times 3^2 \times 5^3$. So number of divisors = (5 + 1) (2 + 1) (3 + 1) = (6) (3) (4) = 72. **So the answer is 2.**
- 3. The number of diagonals of a regular polygon with 18 sides is1. 1892. 1713. 1534. 135

Solution: Number of diagonals of a regular polygon with *n* sides is $\frac{n(n-3)}{2}$.

Hence n = 18. So $\frac{18(18-3)}{2} = \frac{18(15)}{2} = 135$. So the answer is 4.

- 4. The least 3 digit positive integer x such that $x \equiv 3 \pmod{8}$ is 1. 105 2. 107 3. 108 4. 115 Solution: $x \equiv 3 \pmod{8} \Rightarrow x - 3 \equiv 0 \pmod{8} \Rightarrow x = 8y + 3$ for some integer y $\Rightarrow x = 107$. So the answer is 2.
- 5. If *n*, *a*, *b* are natural numbers, n < 9 and $n^5 = 10 \ a + b$, then b = 1. 2 2. *n* 3. 3 4. 9 Solution: $n^5 = 10 \ a + b$, then $b = 2^5 = 32 = 10(3) + 2 \Longrightarrow b = 2$. So the answer is 2.
- 6. The least integer value of *n* such that $\frac{54}{n^3}$ is an even integer is 1. 1 2. -1 3. -3 4. 3

Solution: $\frac{54}{n^3}$ is an even integer. If n = 1, then $\frac{54}{n^3} = 54$. If n = -1,

then
$$\frac{54}{n^3} = -54$$
. If $n = -3$, then $\frac{54}{n^3} = \frac{54}{-27} = -2$ If $n = 3$, then $\frac{54}{n^3} = \frac{54}{27} = 2$.

Every time we are getting an even integer. Among the values of n, the least integer is -3. So the answer is 4.

- 7. What is the remainder when 2^{13416} is divided by 5?
 - 1. 42. 33. 24. 1Solution: 21 gives remainder 2 when divided by 5; 22 gives remainder 4 when divided by 5;22 gives remainder 4 when divided by 5;23 gives remainder 3 when divided by 5; 24 gives remainder 1 when divided by 5.So the answer is 4.
- 8. The digit in the units place of 3^{741} is 1.3 2. 9 3. 7 4. 1 **Solution:** $3^1 = 3$, $3^2 = 9$, $3^3 = 27$, $3^4 = 81$, $3^5 = 243$, $3^6 = 729$, $3^7 = 2187$, $3^8 = 6561$, $3^9 = 2187$, $3^8 = 6561$, 19683 741 = 3(247) + 0, so the digit in the unit place is 1. So the answer is 1. 9. The remainder when 5^{20} is divided by 7 is 1.4 2. 3 3. 2 4. 1 Answer is 1. 10. What is the remainder when 2^{13215} is divided by 3? 2. 2 3. 0 1.1 4. **Solution:** $2^1 \div 3$ the remainder is 2; $2^2 \div 3$ the remainder is 1; $2^3 \div 3$ the remainder is 2;
- 11. The number of divisors of 1800, other than the number itself if 1. 34 2. 35 3. 36 4. 40 **Solution:** $1800 = 2^3 \times 3^2 \times 5^2$. The total number of factors = (3 + 1)(2 + 1)(2 + 1) = 36Other than the number itself is 36 - 2 = 34. **So the answer is 1.**

 2^4 ÷ -----1. So 2^{13215} ÷ 3 the remainder is '2'. So the answer is 2.

- 12. If the square of a prime $p \ge 5$ is divided by 12, then the remainder is always 1. 3 2. 1 3. 7 4. 11 **Solution:** $5^2 = 25$, leaves remainder 1 when divided by 12. (because $25 = 2 \ge 12 + 1$) $7^2 = 49$, leaves remainder 1 when divided by 12. (because $49 = 4 \ge 12 + 1$) $11^2 = 121$, leaves remainder 1 when divided by 12. (because $121 = 10 \ge 12 + 1$) $13^2 = 169$, leaves remainder 1 when divided by 12. (because $169 = 14 \ge 12 + 1$) **So the answer is 2.**
- 13. The smallest three digit number which satisfies $x \equiv 5 \pmod{3}$ is 1. 104 2. 103 3. 102 4. 101 **Solution:** $x \equiv 5 \pmod{3}$ if x - 5 is divisible by 3. 104 - 5 = 99 is divisible by 3; 103 - 5 = 98 is not divisible by 3. 102 - 5 = 97 is not divisible by 3; 101 - 5 = 96 is divisible by 3. **So the answer is 4.**

14. If $a+5 \equiv 4 \pmod{2}$, then the value of 'a' can be the form (n is a positive integer) 2. 2n+23. 2*n* - 1 4. *n* 1. 2n **Solution:** a + 5 - 4 is divisible by $2 \Rightarrow a + 1$ is divisible by 2. So $a + 1 = 2n \Rightarrow a = 2n - 1$. So the answer is 3. 15. If $\frac{5}{6}$ th of a number is $\frac{1}{4}$, then one-third of the number is 1. $\frac{5}{8}$ 2. $\frac{1}{12}$ 3. $\frac{5}{24}$ 4. $\frac{1}{10}$ Solution: $\frac{x}{\frac{5}{6}} = \frac{1}{4} \Rightarrow \frac{6x}{5} = \frac{1}{4} \Rightarrow x = \frac{5}{24}$. So $\frac{x}{3} = \frac{5}{8}$. So the answer is 1. 16. If a regular polygon has 15 sides, then the number of diagonals that can be drawn is 3. 30 1. 60 2. 75 4. 90 Solution: Number of diagonals = $\frac{n(n-3)}{2}$. Here n = 15. So $\frac{15(15-3)}{2} = 90$. So the answer is 4. 17. The digit in the units place of the product 51.52.53......59 is 2. 2 3. 1 4. 0 1.3 Solution: The digit in the unit place is 0. (because 52.55 gives 0 in unit place) So the answer is 4. 18. If one-third of a number is $\frac{1}{10}$ then the $\frac{5}{6}$ th of that number is 2. $\frac{1}{3}$ 3. $\frac{1}{4}$ 4. $\frac{1}{5}$ 1. $\frac{1}{2}$ Solution: Let the number be x. So $\frac{x}{3} = \frac{1}{10}$. So $x = \frac{3}{10}$. So $\frac{5x}{6} = \frac{5}{6} \times \frac{3}{10} = \frac{1}{4}$. So the answer is 3. 19. If the least positive integer divisible by 2^3 .3.5, 3^2 .5.7 and 5^2 .7.11 has k distinct prime factors then k =

1. 9 2. 7 3. 5 4. 3 Solution: The lcm of given numbers $= 2^3 \times 3^2 \times 5^2 \times 7 \times 11$. So the number of distinct prime factors k = 5. So the answer is 3.

20. $|1 - 2x| > 3 - x, x > 0 \Longrightarrow x > 0$

1.
$$\frac{4}{3}$$
 2. $\frac{3}{4}$ 3. $\frac{4}{5}$ 4. 1
Solution: $|1 - 2x| > 3 - x \Rightarrow 1 - 2x < x - 3 \Rightarrow x > \frac{4}{3}$. So the answer is 1

- 21. For any integer *a*, let $a^* = 2a 5$. Then $\{x : \{x^*\}^* = x\} =$ 1. ϕ 2. $\{0\}$ 3. $\{5\}$ 4. $\{0, 5\}$ **Solution:** $0^* = 2 \ge 0 - 5 = -5$; $(0^*)^* = (-5)^* = 2(-5) - 5 = -10 - 5 = -15$. $5^* = 2 \ge 5 - 5 = 5$; $(5^*)^* = (5)^* = 2(5) - 5 = 10 - 5 = 5$. So $(5^*)^* = 5$. So the answer is 3.
- 22. We write $a \equiv b \pmod{m}$ if *m* divides (a b). Then the correct, among the following, is 1. $100 \equiv 1 \pmod{7}$ 2. $100 \equiv 2 \pmod{8}$ 3. $100 \equiv 3 \pmod{9}$ 4. $100 \equiv 4 \pmod{12}$ Solution: 100 - 1 = 99 is not divisible by 7; 100 - 2 = 98 is not divisible by 8. 100 - 3 = 97 is not divisible by 9; 100 - 4 = 96 is divisible by 12. So the answer is 4.
- 23. For any integer *a*, if $a^* = 5a 17$ then $(5^*)^* =$ 1. 23 2. 17 3. 11 4. 5 Solution: $5^* = 5(5) - 17 = 25 - 17 = 8$; $(5^*)^* = 8^* = 5(8) - 17 = 40 - 17 = 23$. So the answer is 1.
- 24. If *m* divides *a-b* we write $a \equiv b \pmod{m}$, then the incorrect statement, among the following, is 1. $80 \equiv -1 \pmod{9}$ 2. $81 \equiv 1 \pmod{10}$ 3. $82 \equiv 5 \pmod{11}$ 4. $83 \equiv -2 \pmod{12}$ Solution: 80 + 1 is divisible by 9; 81 - 1 = 80 is divisible by 10; 82 - 5 = 77 is divisible by 11; 83 + 2 = 85 is not divisible by 12. So the answer is 4.
- 25. For integers a and b, if $a \oplus b$ is denotes the remainder when a+b is divided by 9, then $(4 \oplus 6) \oplus 8 =$

1. 0 2. 1 3. 2 4. 3 Solution: So $4 \oplus 6 = 1$ (because 4 + 6 = 10, when divided by 9, gives remainder 1) $(4 \oplus 6) \oplus 8 = 1 \oplus 8 = 0$ (because 1 + 8 = 9, when divided by 9, gives remainder 0) So the answer is 1.

26. $(0.333....)^2 =$

1. $0.\overline{09}$ 2. $0.0\overline{9}$ 3. $0.\overline{1}$ 4. $0.\overline{9}$ Solution: $(0.333....)^2 = (0.3)^2 = \left(\frac{3}{9}\right)^2 = \frac{1}{9} = 0.\overline{1}$. So the answer is 3.

27. If x is a real number, then the maximum value of f(x) = 13 - |7 + x|, is 1. 6 2. 26 3. 13 4. 20 **Solution:** Maximum value of 13 - |7 + x| = 13. Since |7 - x| is non negative. **So the answer is 3.**

28. If
$$1.8x = 0.06y$$
, then the value of $\frac{y-x}{y+x}$ is

1.
$$\frac{0.026}{0.031}$$
 2. $\frac{0.27}{0.31}$ 3. $\frac{29}{31}$ 4. $\frac{2.8}{3.1}$

Solution:
$$1.8x = 0.06 \ y \Rightarrow \frac{x}{y} = \frac{6}{180} = \frac{1}{30}$$

$$\frac{y-x}{y+x} = \frac{1-\frac{x}{y}}{1+\frac{x}{y}} = \frac{1-\frac{1}{30}}{1+\frac{1}{30}} = \frac{29}{31}.$$
 So the answer is 3.

29. If
$$(n+2)! = 12n!$$
, then $n =$
1. 2 2. 4 3. 6 4. 8
Solution: $(n+2)! = 12n! \Rightarrow (n+2)(n+1)n! = 12n! \Rightarrow (n+2)(n+1) = 12$.
So $n = 2$. So the answer is 1.

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30. If
$$\left(\frac{1}{3}\right)^{rd}$$
 of a number is $\frac{1}{10}$, then $\left(\frac{4}{5}\right)^{th}$ of that number is
1. $\frac{5}{6}$ 2. $\frac{25}{6}$ 3. $\frac{6}{25}$ 4. $\frac{6}{5}$
Solution: $\frac{x}{3} = \frac{1}{10} \Rightarrow x = \frac{3}{10}$. Therefore $\frac{4}{5}x = \frac{3}{10} \times \frac{4}{5} = \frac{6}{25}$. Answer is 3.
31. The sum of the even numbers from 100 to 200 (both numbers included) is
1. 3875 2. 7650 3. 3825 4. 7750
Solution: $100 + 102 + 104 + 106 + ... + 200 \Rightarrow n =$ number of terms = 51.
This is an arithmetic progression. So sum of 51 terms of arithmetic progression is

$$s_{a} = \frac{n}{2} [2a + (n - 1)d] = \frac{51}{2} [200 + 100] = \frac{51}{2} (300) = 51(150)$$

$$= 7650 \text{ where } a = 100, d = 2 \text{ Answer is 2.}$$
32. If $n = 10838$, then the digit in the units place of n^{9} is
$$1.4 2.2 3.6 4.8$$
Solution: $n^{9} = (10838)^{9} = (10830 + 8)^{9} = \dots + 8^{9} = \dots + 8$ Answer is 4.
Because $8^{1} = 8, 8^{2} = 64, 8^{3} = 512, 8^{4} = 6$ in units place, $8^{5} = 8$ in units place, $8^{6} = 4$ in units place, $8^{7} = 2$ in units place, $8^{8} = 6$ in units place, $8^{9} = 8$ in units place, $8^{7} = 2$ in units place, $8^{9} = 8$ in units place, $8^{7} = 2$ in units place, $8^{9} = 6$ in units place, $8^{9} = 8$ in units place.
33. If $9x - 3y = 12$ and $3x - 5y = 7$, then $6x - 2y = 1$. $-5 2.4 3.2 4.8$
Solution: $9x - 3y = 12$ ----(1); $3x - 5y = 7$ -----(2);
(2) $\Rightarrow 9x - 15y = 21$ ----(3). Now subtracting (3) from (1) we get $12y = -9 \Rightarrow y = \frac{-3}{4}$, using this in (1) we get $x = \frac{13}{12}$.
So $6x - 2y = \frac{13}{2} + \frac{3}{2} = \frac{16}{2} = 8$. Answer is 4.
34. The least value of k such that 735 x k is a perfect square is 1.3 2.5 3.7 4.15
Solution: $735 = 3 x 7^{2} x 5$
The least value of $k = 3 x 5 = 15$. Answer is 4.
35. What is the remainder when 3^{10} is divided by 4?
1.3 2.2 3.1 4.0
Solution: $3^{9} \equiv 1 \pmod{4}$; $3^{1} \equiv 3 \pmod{4}$; $3^{2} \equiv 1 \pmod{4}$; $(3^{2})^{5} \equiv (1)^{5} \pmod{4}$
 $\Rightarrow 3^{10} \equiv 1 \pmod{4}$. So the remainder is 1. Answer is 3.
36. The average of all the prime numbers less than 20 is 1.9 2.9.15 3.9.55 4.9.625
Solution: $\frac{20 + 3 + 5 + 7 + 11 + 13 + 17 + 19}{8} = \frac{77}{8} = 9.625$. Answer is 4.

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- 37. If $3^{58} \equiv r \pmod{5}$ and $0 \le r \le 4$, then r =1. 1 2. 2 3. 4 4. 3 **Solution:** $3^{1} \equiv 3 \pmod{5}$; $3^{2} \equiv 4 \pmod{5} \Rightarrow 3^{4} \equiv 1 \pmod{5}$ $\Rightarrow 3^{8} \equiv 1 \pmod{5} \Rightarrow 3^{56} \equiv 1 \pmod{5} \Rightarrow 3^{58} \equiv 4 \pmod{5}$. **Answer is 3.**
- 38. The number of distinct prime factors of 8! is:1. 32. 43. 54. 8Solution: $8! = 8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1$.7, 5, 3, 2 are prime factors. So the number of distinct prime factors = 4. Answer is 2.

ICET -2013 ARITHMETICAL ABILITY ALL 35 QUESTIONS

76. If
$$(a+b): (b+c): (c+a) = 2:3:4$$
 and $a+b+c = 9$, then the value of $c = (1) \ 3 \qquad (2) \ 1 \qquad (3) 9 \qquad (4) 5$
77. A circle and a square have the same area. Then the ratio of the side of the square to the radius of the circle is
(1) $\pi:1 \qquad (2) \ 1: \pi \qquad (3) \ \sqrt{\pi}:1 \qquad (4) \ 1: \sqrt{\pi}$
78. $\sqrt{6+2\sqrt{2}+2\sqrt{3}+2\sqrt{6}} = (1)1+\sqrt{2}+\sqrt{3}$
(3) $2+\sqrt{2}+\sqrt{3} \qquad (4) \ 2+\sqrt{6}+\sqrt{3}$
79. $\left(\frac{\sqrt{5}+\sqrt{7}}{\sqrt{5}-\sqrt{7}}+\frac{\sqrt{5}-\sqrt{7}}{\sqrt{5}+\sqrt{7}}\right)^2 = (1) \ 196 \qquad (2) \ 28 \qquad (3) \ 4\sqrt{35} \qquad (4) \ 144$
80. The number that is exactly divisible by 11 among the following is
(1) \ 9999999 \quad (2) \ 88888 \quad (3) \ 1873410 \quad (4) \ 2345432
81. If $\frac{8^3 \cdot (27)^4 \cdot 6^5}{(36)^2 \cdot 9^4 \cdot (18)^2} = 2^{\alpha} \cdot 3^{\beta}$, then $\alpha + \beta = (1) \ -7 \qquad (2) \ -8 \qquad (3) \ 9 \qquad (4) \ 8$
82. The smallest number among $\sqrt[3]{4}, \sqrt[3]{7}, \sqrt[3]{5}, \sqrt{3}$ is
(1) $\sqrt[3]{4}, \qquad (2) \sqrt[3]{7} \qquad (3) \ \sqrt[4]{5} \qquad (4) \ \sqrt{3}$
83. If the l.c.m. of the positive integers a and b is 60 and $a^2 \cdot b^2 = 32400$, then the g.c.d. of a and b is
(1) $30 \qquad (2) \ 18 \qquad (3) \ 3 \qquad (4) \ 9$
84. If $|x-6|=5$ and $|3y-12|=6$, then the maximum value of $\frac{x}{y} = (22) \ 190 \ 1CET$

(1) 2
 (2) 6
 (3)
$$\frac{11}{6}$$
 (4) $\frac{11}{2}$

 85. If 3 is added to the denominator of a rational number then that number becomes $\frac{1}{3}$ and if

 4 is added to numerator of the same rational number, then it becomes $\frac{3}{4}$, then that rational number is

 (1) $\frac{4}{9}$
 (2) $\frac{3}{7}$
 (3) $\frac{5}{12}$
 (4) $\frac{7}{12}$

 86. The difference between the biggest and smallest fractions among $\frac{1}{2}, \frac{5}{6}, \frac{7}{9}, \frac{4}{5}$ is
 (1) $\frac{1}{3}$
 (2) $\frac{5}{18}$
 (3) $\frac{3}{10}$
 (4) $\frac{1}{4}$

 87. The remainder when 73 x 79 x 81 is divided by 11 is
 (1) 1
 (2) 5
 (3) 7
 (4) 9

 88. The greatest 4-digited number which is exactly divisible by each of the numbers 18, 24 and 36 is
 (1) 1008
 (2) 9999
 (3) 9972
 (4) 9936

 89. If the length and breadth of a rectangle are increased by 20% each, then the area of the rectangle increases by 2^{0} , then $x =$
 (1) 20
 (2) 120
 (3) 44
 (4) 144

 90. An article when sold at a gain of 5% yields rupees 15 more than when it is sold at a loss of 5%. Then the cost price of that article in rupees is
 (1) 75
 (2) 100
 (3) 120
 (4) $35\frac{1}{5}$

 91. By selling 15 items, a seller recovers the cost price of 20 items. Then his profit percent is
 (1) 25
 (2) $33\frac{1}{3}$
 (3) 20
 (4) $35\frac{1}{5}$
 (1) $8, 400$
 (2)11,900

| | $(3)\frac{8}{11} < \frac{11}{12} < \frac{13}{14} < \frac{15}{16} \qquad (4)\frac{13}{14} < \frac{11}{12} < \frac{15}{16} < \frac{8}{11}$ |
|--------|--|
| 94 | If $7\% \text{ of } 5\% \text{ of } 8\% \text{ of } r \text{ is } 105 \text{ then } r =$ |
| 77. | $\begin{array}{cccccccccccccccccccccccccccccccccccc$ |
| 95. | Tap A can fill an empty tank in one hour, while a drain pipe B can empty that full tank in 6 hours. If both A and B are opened at the same instant, the total time taken to fill that empty tank, in hours, is |
| | (1) $\frac{5}{6}$ (2) $\frac{3}{2}$ (3) $\frac{2}{3}$ (4) $\frac{6}{5}$ |
| 96. | A train travels a distance of 60 km in 40 minutes. If its velocity is decreased by 15 km/ |
| | hour, then the time required by that train to travel the same distance, in minutes, is |
| | (1) 45 (2) 60 (3) 54 (4) 48 |
| 97. | A person travels from A to B at a speed of 75 km/hour in a car and returns from B to A by |
| | reducing his speed by 15 km hour. If the total time taken is 3 hours, then the distance |
| | between A and B, in kilometers, is |
| | (1) 100 (2) 80 (3) 120 (4) 160 |
| 98. | A, B and C are running a business by investing the capitals in the ratio 2:4:5. If C's share |
| | in the profit is Rs. 2,200/-, then A's share in the profit, in rupees, is |
| | $(1) 400 \qquad (2) 800 \qquad (3) 840 \qquad (4) 880$ |
| 99. | Two pipes A and B can fill a tank independently in 20 and 30 minutes respectively. Both |
| | the pipes are opened simultaneously and after 6 minutes tap B is closed. Then the total |
| | time taken, in minutes, to fill the tank, is (assume that the tank is empty initially) |
| | (1) 10 (2) 15 (3) 16 (4) 12 |
| 100. I | f the length of the hypotenuse of right angled isosceles triangle is 12 cm, then the area of |
| | that triangle, in square centimeters, is |
| | (1) 72 (2) 36 (3) 144 (4) 24 |
| 101. | If the lengths of the diagonals of a rhombus are 18 cm and 24 cm, then the area of the |
| | rhombus, in square centimeters, is |
| | (1) 108 (2) 225 (3) 432 (4) 216 |
| 102. | A cylindrical bar of height 1 metre and base radius 0.75 metres is melted and cast as a |
| | sphere. Then the diameter of that sphere in metres is |
| | (1) 2 (2) 1.5 (3) 0.75 (4) 0.50 |
| 103. | Two boxes have square bases. The sides of these bases are in the ratio 2:1. If the heights |
| | of the boxes are in the ratio 1:2 respectively, then the ratio of the volumes of the boxes in |
| | that order is |
| | (1) $1:1$ (2) $1:2$ (3) $3:1$ (4) $2:1$ |
| 104. | Two persons A, B can together complete a piece of work in 12 days, B and C together |
| | complete the same work in 8 days. If A, B, C work together, then that work can be |
| | finished in 6 days. Then the number of days B alone can finish the same work is |
| | (1) 16 (2) 18 (3) 24 (4) 30 |
| 105. | A, B, C can individually complete a work in 20 days. 15 days, 12 days respectively. B and |
| | , , |

C start the work and they worked for 3 days and left. Then the number of days required by A to finish the remaining work is

(1) 11 (2) 14 (3) 12 (4) 9

- 106. 11 cubic metres of steel is cast into cylindrical bars of diameter 10 cms and length 1.4 metres. Then the number of such bars that can be cast with the given metal is (Take π =
 - $\frac{22}{7}$)

(1) 10 2) 100 (3) 1000 (4) 10000

- 107. The difference between the largest 3 digit natural number x satisfying $x \equiv 5 \pmod{8}$ and the smallest 3 digit natural number y satisfying $y \equiv 2 \pmod{5}$ is (1) 985 (2) 0 (3) 1 (4) 995
- 108. If $3^{48} \equiv x \pmod{10}$ and if $0 \le x \le 9$, then x =(1) 1 (2) 3 (3) 5 (4) 9
- 109. The radius of a cone is 3 times the radius of a cylinder and their heights are same. Then the ratio of their volumes in that order is
 - (1) 9:1 (2) 1:3 (3) 3:1 (4) 1:9
- 110. A window is in the shape of a rectangle surmounted by a semicircle. If the length of the rectangle is 6 feet and the radius of the semicircle is 2 feet, then the area of the window, in square feet, is
 - (1) $18+4\pi$ (2) $24+4\pi$ (3) $24+2\pi$ (4) $18+2\pi$

ICET-2014 ARITHMETICAL ABILITY ALL 35 QUESTIONS

 $\left(a^{\frac{1}{z-x}}\right)^{\frac{1}{z-y}} \left(a^{\frac{1}{x-y}}\right)^{\frac{1}{x-z}} \left(a^{\frac{1}{y-z}}\right)^{\frac{1}{y-x}} =$ 76. Answer: [4] (2) 0 (1)a(3) *xyz* (4)1If $\left(\sqrt{\frac{3}{5}}\right)^{a} = \left(\sqrt{\frac{625}{81}}\right)^{\frac{a+3}{2}}$, then a =77. Answer: [4] (1)2(2) 1 (3) -1 (4) - 278. In a mixture of 35 litres the ratio of milk and water is 4:1. If one litre of water is added to the mixture the ratio of milk and water in the new mixture is (1) 2:7 (2)7:2(3) 4:3 (4) 2:1 Answer: [2] 79. The salaries of two persons are in the ratio 4:7. Both spend 80% of their salaries and save the rest. The ratio of their savings is (1) 8:2 (2) 7:5 (3) 5:3 (4) 2:1 Answer: [4] If $\left(\sqrt{2}\right)^{x+5} = \left(\sqrt[4]{2}\right)^{2x^2-2}$, then the value of (x^2-1) is 80. Answer: [4] (1)2(2) 4 (3) 6 (4) 8

| 81. | $\left \sqrt{10 + 2\sqrt{6} + 2\sqrt{10} + 2\sqrt{15}}\right + \left \sqrt{10 - 2\sqrt{6} - 2\sqrt{10} + 2\sqrt{15}}\right =$ | Answer: [1] |
|--------|--|--|
| | $(1)_2(\sqrt{3}+\sqrt{5})$ (2) $2\sqrt{3}$ (3) $2\sqrt{5}$ | (4) $2\sqrt{10}$ |
| 82. | The least value of k such that 315 x k is a perfect square is | Answer: [1] |
| | (1) 35 (2) 31 (3) 21 (4) 15 | |
| 83. | Which among the following numbers leaves remainders 1, 2 and 2 | 2 respectively when |
| | divided by 2, 3 and 7? | Answer: [3] |
| 84. | (1) 130 (2) 68 (3) 65 (4) 57
The L.C.M. of two integers is 144 and their G.C.D is 12. If one of the | e integers is 36, then |
| | the other integer is | Answer: [3] |
| 05 51 | $\begin{array}{cccccccccccccccccccccccccccccccccccc$ | • • • • |
| 85. Th | le least number that is to be subtracted from 2580 so that it leaves a divided by 0, 11 and 12 is | remainder 4 when |
| | (1) 1 (2) 2 (3) 3 (4) 4 | Answer: [2] |
| 86. | Three numbers are in the ratio 1:2:3 and the sum of their squares is 50 numbers is | Answer: [3] |
| | $\begin{array}{cccccccccccccccccccccccccccccccccccc$ | |
| 87. | The ascending order of the fractions : $\frac{5}{7}$, $\frac{6}{8}$, $\frac{9}{11}$, $\frac{11}{14}$ | Answer: [4] |
| | $(1)\frac{5}{7},\frac{6}{8},\frac{9}{11},\frac{11}{14} (2)\frac{5}{7},\frac{9}{11},\frac{6}{8},\frac{11}{14} (3)\frac{5}{7},\frac{11}{14},\frac{9}{11},\frac{6}{8}$ | $(4) \ \frac{5}{7}, \frac{6}{8}, \frac{11}{14}, \frac{9}{11}$ |
| 88. | The persons A, B, C share a property in such a way that A and B ge | t $\frac{3}{7}$ th and $\frac{5}{14}$ th and |
| | C getting the rest. The person or persons who get the least property
(1) C (2) B (3) A and B (4) A | Answer: [1]
and C |
| 89. | The descending order of $\sqrt[4]{10}, \sqrt[3]{6}, \sqrt{3}$ is | Answer: [4] |
| 90. | (1) $\sqrt[4]{10}, \sqrt{3}, \sqrt[3]{6}$ (2) $\sqrt[4]{10}, \sqrt[3]{6}, \sqrt{3}$ (3) $\sqrt{3}, \sqrt[3]{6}, \sqrt[4]{10}$
In a face to face election the winner got 65% of votes and won by votes. The total votes polled (in lakks) is | (4) $\sqrt[3]{6}, \sqrt[4]{10}, \sqrt{3}$
a margin of 12000 |
| | Answer: [2] | |
| | (1) 4 	(2) 0.4 	(3) 0.04 	(4) 0.00 |)4 |
| 91. | In a library 23% of the books are in Arts, 30% in Commerce, 35% in are in Telugu language. If there are 1440 books in Telugu language, t in Arts is | Science and the rest
he number of books |
| | (1) 2760 (2) 3000 (3)3600 (4) 4200 | Answer: [1] |
| 92. | A person bought a pen and sold it for a loss of 10%. If he had bough
sold it for Rs. 44 more than earlier sale price he would have made a
cost price of the pen is (in Rs.) | t it for 20% less and
profit of 40%. The
Answer: [1] |

| | (1) 200 | (2) 2 | 25 | (3) | 250 | | (4) 2 | 80 | |
|--|---|-----------------------------------|----------------------|------------------|---------------|-------------|---------------------|--------------|--|
| 93. | If an article is | s sold at a prot | fit of 15% | instead | lofa | profit of | f9% the pe | rson ge | ets Rs. 60 more. |
| | The cost price | ce of the articl | e (in rupe | es) is | - | - | - | A | Answer: [3] |
| | (1) 1200 | (2) | 050 | ,
(| (3) 1 | 000 | | (4) 80 | 0 |
| 94. | A and B star | ted a busines | s investin | g Rs.1 | 0
lakl | hs and F | Rs.15 lakh | srespe | ctively. After 6 |
| | months C jo | ined them by | investing | Rs.20 | lakhs | s. If the r | profit at the | e end o | f the vear is Rs. |
| | 5.6 lakhs, the | en the share o | fA in the | profit (| in lak | ths of ru | pees) is | A | Answer: [1] |
| | (1) 1.6 | (2) 2 | 4 | (3) | 3.2 | | (4) 4. | 8 | |
| 95 | In a joint bu | siness A \mathbf{B} a | nd C inv | ested c | anita | l in the | ratio $5 \cdot 6$ | • 8 At | the end of the |
| <i>.</i> | business they | v shared profit | s in the rat | tio 4.3. | 12 Tł | ne ratio | of the numl | er of n | onths in which |
| | A Band Ck | ent their can | ital ic | 10 4.5. | 12, 11 | | | | Answer [3] |
| | $(1)^2 \cdot 1 \cdot 3$ | (2) | $5 \cdot 3 \cdot 12$ | , | ſ | 3) 8 · 5 | · 15 | 1 | $(A) 25 \cdot 18 \cdot 16$ |
| 96 | $\begin{array}{c} (1)2 \cdot 1 \cdot 3 \\ \text{Dipe } \Lambda \text{ fills} \end{array}$ | (2) | J.J.12 | -
nino B |)
omn | ties the | . 15
full tonk i | 10ho | (-7) 25 .10 .10 |
| 90. | nipos A and l | a talik ili o ilu
Doro opopoda | uis winte | oucly t | ha tin | no tokon | (in hours) | t_0 fill t | ha tank is |
| | A narrow [3 | B are opened s | siniunane | cousiy u | | | (III IIours) | 10 1111 | ine tank is |
| | Answer: [3 | | | | | | | | |
| | (1) $33\frac{1}{2}$ | (2) | $36\frac{1}{2}$ | | (2) | 40 | (| 4) 42 | |
| | (1) | (2) | 2 | | (3) | 40 | (| 4) 42 | |
| 97. | Two pipes A | and B can fill | a tank in | 10 hour | s and | 15 hour | rs respectiv | vely. If t | they are opened |
| | alternately fo | or one hour ea | ch and if A | A is ope | ned fi | irst, the | time (in ho | urs) rec | quired to fill the |
| | tank is | | | 1 | | , | × × | , | 1 |
| | (1) 10 | (2) 11 | | (3) | 12 | | (4) 13 | A | Answer: [3] |
| 98. | If a man star | ts at A and wa | lks at 5 ki | mph he | will | reach B | late by 7 m | inutes. | But if walks at |
| | 6 kmph he w | vill reach B ea | rlvbv 5 n | ninutes | . The | distance | e between | A and I | 3 (in km) is |
| | Answer: [3 |] | | | | | | | |
| | (1)9 | (2) 12 | | (3) 1 | 4 | | (4) 16 | | |
| 99 | A train of 27 | 0 metres lon | o crosses | a nlatfe | orm c | of 390 m | netres leno | th in 3' | 3 seconds. The |
| <i>,</i> ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, | speed of the | train (in kmpl |) is | a piaci | |)1 5 / 0 H | | | Answer: [3] |
| | (1) 66 | (2) 68 | 1) 15 | (3) | 72 | | (4) 75 | 1 | |
| 100 | Three person | (2) 00 | ether can | comple | 12
ete a i | work in | (ד)
4 w wh | ore as A | alone requires |
| 100. | 24 days to co | mnlete the se | me work | The m | umbor | rofdav | required f | r R ar | d C together to |
| | 24 days to co | same work | | . The m | innoci | 1 01 days | sicquircu i | | Answor: [3] |
| | (1) 18 | (2) 14 | 5 | (2) | 12 | | (4) 10 | ľ | |
| | (1) 10 | (2) 10 |) | (3) | 12 | | (4) 10 | | |
| 101 | 1 man aamm | $\frac{4}{1000}$ | ouvorlyin | 1 - da | . T | hanumi | or of hour | roqui | rad to commista |
| 101. | A man comp | 5 5 5 | e work in | 12^{ua} | .ys. 11 | | ber of nour | srequi | led to complete |
| | the remainin | ng work by hir | n is | | | | | A | Answer: [2] |
| | (1) 6 | $(2)^{9}$ | | (3) 7 | | (| (4) 8 | | |
| 102. | A circle is in | scribed in an | equilatera | al trians | zle. If | the area | of the circ | le is 46 | $52 \mathrm{cm}^2$, then the |
| | perimeter (in | cm) of the tri | angle is | , c | | | | A | Answer: [4] |
| | (1) 72 | (2) 84 | 1 | (3) | 96 | | (4) 126 | 5 | ······································ |
| 103. | The area of: | a rectangular | metal she | eet is 6 |) sa.n | n. The s | um of its 1 | ength | and diagonal is |
| | equal to 5 tin | nes its breadth | . Then the | e differ | ence (| (in metro | es) betwee | n lengtl | h and breadth is |

| (1) 4 | (2) 5 | (3) 6 | (4) 7 | |
|---|---|---|--|---|
| A cone of heig | ht 24 cm and r | adius of its ba | ise 6 cm is made up | of clay. If that clay is |
| reshaped in the | form of a spher | re, then the dia | meter of that sphere | (in cms) is |
| Answer: [3] | | | | |
| (1) 6 | (2) 8 | (3) 12 | (4) 14 | |
| The surface are | a of a sphere is | same as the cu | rved surface area of a | a right circular cylinder |
| whose height a | nd diameter are | 12 cm each. T | Then the radius of the | e sphere (in cm) is |
| Answer: [4] | | | | |
| (1) 3 | (2) 4 | (3) 5 | (4) 6 | |
| Let 's' be the su | urface area of a | cube of edge | cm. This cube is cu | t into smaller cubes of |
| edge 3 cm each | . If 'S' is the su | m of the surfac | e areas of all the sm | aller cubes, then $s: S =$ |
| (1) 3 :1 | (2) 1 : 3 | (3) 3 | :2 (4) | 2:3 Answer: [2] |
| The number of | revolutions ma | de by a wheel o | of 42 cm diameter in | travelling a distance of |
| 1320 metres is | | | | Answer: [4] |
| (1) 300 | (2) 400 | (3) | 500 (4 | l) 1000 |
| The radius r of a | a right circular o | ylinder is the s | same as that of a sphe | ere. If the volume of the |
| sphere is twice | that of the cylin | der, then the h | eight of the cylinder i | s Answer: [2] |
| r | 2r | | 4 <i>r</i> (1) | |
| $(1)\frac{1}{3}$ | $(2) {3}$ | (3) | $\overline{3}$ (4) | 2r |
| Thedigitinthe | units place of th | ne number 134 | ⁰⁰ is | Answer: [4] |
| | • | | (1) 1 | |
| (1)4 | (2) 3 | (3) 2 | (4) 1 | |
| (1) 4
If a* = k denote | (2) 3 es that k is the r | (3) 2
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2 n 8a is divided by 7 | , then $100^* =$ |
| (1) 4
If $a^* = k$ denote
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en 8a is divided by 7
(4) 6 | , then 100* =
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en 8a is divided by 7,
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(3) 14
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(4) $12\sqrt{2}$
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(3) 14
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(3) 260
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ne of its diagonals is
(4) 16
s. The number of bri
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its height is 9 cms. T | , then 100* =
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FIONS
Sides 56 metres and 14
18 units then the length
cks required to build a
27000
he base radius (in cms) |
| | Answer: [3]
(1) 6
The surface are
whose height a
Answer: [4]
(1) 3
Let 's' be the su
edge 3 cm each
(1) 3 :1
The number of
1320 metres is
(1) 300
The radius r of a
sphere is twice
(1) $\frac{r}{3}$
The digit in the | Answer: [3]
(1) 6 (2) 8
The surface area of a sphere is s
whose height and diameter are
Answer: [4]
(1) 3 (2) 4
Let 's' be the surface area of a
edge 3 cm each. If 'S' is the sur
(1) 3 :1 (2) 1 : 3
The number of revolutions mand
1320 metres is
(1) 300 (2) 400
The radius r of a right circular of
sphere is twice that of the cylin
(1) $\frac{r}{3}$ (2) $\frac{2r}{3}$
The digit in the units place of the | Answer: [3]
(1) 6 (2) 8 (3) 12
The surface area of a sphere is same as the cur
whose height and diameter are 12 cm each. The
Answer: [4]
(1) 3 (2) 4 (3) 5
Let 's' be the surface area of a cube of edge 9
edge 3 cm each. If 'S' is the sum of the surface
(1) 3 :1 (2) 1 : 3 (3) 3
The number of revolutions made by a wheel of
1320 metres is
(1) 300 (2) 400 (3)
The radius r of a right circular cylinder is the set
sphere is twice that of the cylinder, then the here
(1) $\frac{r}{3}$ (2) $\frac{2r}{3}$ (3) $\frac{2}{3}$
The digit in the units place of the number 13 ⁴ | Answer: [3]
(1) 6 (2) 8 (3) 12 (4) 14
The surface area of a sphere is same as the curved surface area of a
whose height and diameter are 12 cm each. Then the radius of the
Answer: [4]
(1) 3 (2) 4 (3) 5 (4) 6
Let 's' be the surface area of a cube of edge 9 cm. This cube is cu
edge 3 cm each. If 'S' is the sum of the surface areas of all the small
(1) 3 :1 (2) 1 : 3 (3) 3 : 2 (4)
The number of revolutions made by a wheel of 42 cm diameter in
1320 metres is
(1) 300 (2) 400 (3) 500 (4)
The radius r of a right circular cylinder is the same as that of a sphere
sphere is twice that of the cylinder, then the height of the cylinder is
(1) $\frac{r}{3}$ (2) $\frac{2r}{3}$ (3) $\frac{4r}{3}$ (4)
The digit in the units place of the number 13^{400} is |

square whose side is equal to the diagonal of R, is (1) 361 sq. m (2)289 sq. m (3) 225 sq.m (4) 169 sq.m 81. A wheel makes 50 revolutions in covering a distance of 440 m. The radius (in meters) of the wheel is (1)4.2 m(2)2.8(3)1.4(4)0.782. The ratio of the curved surface area to the total surface area of a right circular cylinder is 1:2. its total surface area is 616 sq. cms., then the volume of the cylinder (in cubic cms) is (2)1080(3)1078(1)1120(4)1000If x > 0 and |1 - 3x| > 4 - x, then 83. (1) $x > \frac{5}{4}$ (2) $x > \frac{4}{5}$ (3) $x > \frac{3}{5}$ (4) $x > \frac{2}{5}$ $(1100101)_2 - (10112011)_2 =$ 84. $(2)(1100)_2$ $(3)(1001)_2$ $(1)(1010)_{2}$ $(4)(1101)_{2}$ If $m = 7^{1}.5^{2}.3^{4}.2^{8}$, then the greatest integer value of k such that 21^{k} divides m is 85. (3) 4 (2) 2(4) 8 (1)1If $a^x = b^y = c^z \neq 0$ and $b^2 = ac$, then the progression in which x, y, z are is 86. (2) a geometric progression (1) an arithmetic progression (3) a harmonic progression (4) an arithmetico-geometric progression 87. Three numbers are in the ratio 1:2:3 and the sum of the cubes of them is 36. The smallest number among them is (1)1(2) 2(4)4(3)3The earnings of A, B, C are in the ratio 7:9:12 and their expenditures are in the ratio 88. 8:9:15.If A saves 25% of his earnings, then the ratio of their savings is (1) 46:99:59 (2)56:99:69 (3) 69:56:99 (4)59:46:99If $x = \frac{\sqrt{5} + \sqrt{3}}{\sqrt{5} - \sqrt{3}}$ and xy = 1, then x + y = 189. (3) 8 (1)6(2) 7 (4) 9 If $a \neq b$ and $a^2 + b^2 \neq 0$, then $\frac{(a-b)(\sqrt{a} - \sqrt{b})}{(a+b)(\sqrt{a} + \sqrt{b})} =$ 90. $(1)1 - \frac{2\sqrt{ab}}{a+b} \qquad (2) \quad 1 + \frac{2\sqrt{ab}}{a+b} \qquad (3) \quad 1 + 2\sqrt{\frac{1}{a} + \frac{1}{b}} \qquad (4)1 - 2\sqrt{\frac{1}{a} + \frac{1}{b}}$ The least positive integer m to be added to 3096 so that their sum is divisible by 39 is 91. (1) 2(2) 12 (3) 24 (4) 32 If a number k is of the form 18 m + 7 for some integer m, then the remainder when k is 92. divided by 6 is (1)5(2) 3 (3) 2 (4) 1

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- 93. The largest number m such that the numbers 947, 639 and 1051 leave the same remainder when divided by m is
- 94. (1) 3 (2) 4 (3) 7 (4) 11 The number of pairs of positive integers a and b such that a + b = 594 and gcd(a, b) = 27is
- (1) 4 (2) 5 (3) 6 (4) 7 95. Taking $\frac{1}{6.198} = 0.16134$, the value of $\frac{1}{0.0006198}$ is (1) 0.016134(2) 0.16134 (3)16134 (4) 1613.4
- 96. The rational number r that becomes $\frac{1}{2}$ when 1 is subtracted from the numerator and

becomes
$$\frac{3}{5}$$
 when 1 is subtracted from the denominator is

(1)
$$\frac{17}{32}$$
 (2) $\frac{15}{26}$ (3) $\frac{13}{24}$ (4) $\frac{9}{16}$

97. The descending order of the fractions $\frac{8}{13}, \frac{5}{12}, \frac{9}{11}$ and $\frac{7}{15}$ is

$$(1) \frac{9}{11}, \frac{8}{13}, \frac{7}{15}, \frac{5}{12} \qquad (2) \frac{9}{11}, \frac{7}{15}, \frac{8}{13}, \frac{5}{12} \qquad (3) \frac{5}{12}, \frac{7}{15}, \frac{8}{13}, \frac{9}{11} \qquad (4) \frac{5}{12}, \frac{8}{13}, \frac{7}{15}, \frac{9}{11}$$
98. 1.57777......=

(1)
$$\frac{69}{45}$$
 (2) $\frac{71}{45}$ (3) $\frac{74}{45}$ (4) $\frac{77}{45}$

99. In a fraction if the numerator is increased by 20% and the denominator is decreaset by 20% we get new fraction $\frac{3}{7}$. The sum of the new fraction and the original fraction is

(1)
$$\frac{2}{7}$$
 (2) $\frac{4}{7}$ (3) $\frac{5}{7}$ (4) $\frac{6}{7}$

- 100.
 If 25% of a number is 25 more than 25% of 500, then the number is

 (1) 500
 (2) 550
 (3)600
 (4)
 650
- 101. By selling an item for Rs. 189, a trader gets a profit of 12.5%. The cost price (in rupees) of the item is
 - (1) 148 (2) 158 (3) 168 (4) 178
- 102. The cost price of an item is Rs. 250. Its marked price is Rs. 360. The maximum possible discount that can be given so that a profit of 20% is made is
 - (1) Rs. 30 (2) Rs. 40 (3) Rs.50 (4) Rs.60
- 103. In a partnership, A invests 1/4 of the capital for 1/4 of the time; B invests 1/5 of the capital for 1/2 of the time while C invests the rest of the capital for the whole time. The share of A

| | (in thousands of rupees) in the profit of Rs.2.28 lakhs is | | | | | | |
|------|--|--------------------------------------|------------------------------------|--|----------------------------------|--|--|
| | (1) 26 | (2) 24 | (3) 22 | (4) 20 | | | |
| 104. | In a joint busin | ness, A invests R | Rs. 20,000 for 6 | 6 months while B ir | vested certain amount for | | |
| | the whole yea | r. In the year-end | d profit of Rs. | 9,000 the share of A | is Rs. 6,000. The amount | | |
| | (in rupees) inv | vested by B is | | | | | |
| | (1) 8,000 | (2) 6,000 | (3) 5,000 | (4) 4,000 | | | |
| 105. | Pipes A, B, C | can fill a tank ir | dividually in 2 | 2 hours, 3 hours and | d 4 hours respectively. All | | |
| | the three are c | pened for 15 m | inutes and pip | e C is closed. The t | ime (in minutes) required | | |
| | further to fill t | he tank is | | | | | |
| | (1) 48 | (2) 52.5 | (3) 54 | (4) 70 | | | |
| 106. | Pipes A and E | can fill a tank | in 9 minutes a | nd 12 minutes resp | bectively. A is opened and | | |
| | after sometin | ne B is opened; | and the tank | s full in 4 minutes | The time difference (in | | |
| | minutes) betw | veen the opening | g of A and B is | | | | |
| | (1)4 | (2) 3 | (3) 2 | (4) 1.5 | | | |
| 107. | Three trains A | A, B and C movi | ng at speeds s | s_1, s_2 and s_3 respect | tively take times t_1, t_2 and | | |
| | t_3 respective | ly to cover a dist | tance of x kms | . If $t_1: t_2: t_3 = 20:$ | 15:12, then $s_1:s_2:s_3 =$ | | |
| | (1) 2:3:4 (2 | 2) 3:4:5 | (3) 4:5:6 | (4) 5:6:7 | | | |
| 108. | The time (in s
another train o | seconds) taken b
of length 110 me | by a train of 24
etres standing | 0 metres long trave
on a parallel track i | elling at 70 kmph to cross
s | | |
| | (1) 20 | (2) 18 | (3) 17 | (4) 16 | | | |
| 109. | 10 men and 1 | 5 women can c | omplete a wor | k in 6 days; and 12 | 2 men and 27 women can | | |
| | complete the | same work in 4 o | days. The num | ber of days require | d for 2 men and 12women | | |
| | to complete th | ne same work is | | | | | |
| | (1) 8 | (2) 9 | (3) 10 | (4) 12 | | | |
| 110. | A and B can d | lo a work in 8 ho | ours; B and C c | can complete the sa | me work in 6 hours while | | |
| | C and A requi | ire 12 hours to c
k is | complete that | work. The time rec | uired by C alone to com- | | |
| | (1) 16hours | (2) 9 hours 36 | 6 minutes | (3) 48 hours | (4) 10 hours 30 minutes | | |
| | | | | | | | |

ICET-2015 AP ICET ARITHMETICAL ABILITY ALL 35 QUESTIONS AP ICET-2015 Arithmetical Ability (Marks : 35) : 35)

76. The radius of the base of a right circular cylinder is r and the radius of a sphere is $\frac{r}{2}$. If the

volumes of that cylinder and the sphere are equal, then the height of the circular cylinder h in proper units is

(1)
$$\frac{r}{2}$$
 (2) $\frac{r}{4}$ (3) $\frac{r}{6}$ (4) $\frac{r}{8}$

- 77.The volume of a cube (in cubic feet) whose total surface area is 384 square feet is(1)468(2)512(3)525(4)1000
- 78. A copper sphere of 6 cm diameter is melted to prepare a long wire of diameter 0.2 cm.

Then the length of the wire (in metres) is (2) 34 (3) 32 (4) 28 (1) 36 79. If $\left|\frac{7-2x}{4}\right| = 2$, then x =(1) $\frac{15}{4}$ (2) $\frac{15}{6}$ (3) $\frac{15}{2}$ (4) $\frac{-15}{2}$ 80. For integers a, b and $m \ge 0$, write $a \equiv b \pmod{m}$ if m divides a - b. Then which one of the x = following is true? (1) $110 \equiv -1 \pmod{11}$ (2) $120 \equiv -1 \pmod{11}$ (3) $130 \equiv -1 \pmod{11}$ (4) $140 \equiv -1 \pmod{11}$ A copper rod of diameter 1 cm and length 8 cm is drawn into a wire of length 18 metres 81. of uniform diameter. Then the diameter of the wire in centimetres is (1) $\frac{1}{15}$ (3) $\frac{1}{9}$ (4) $\frac{1}{8}$ (2) $\frac{1}{12}$ 82. In a class, the number of boys and girls are in the ratio 2:1. If five boys leave the class and five girls join class, then the ratio becomes 7:5. The number of boys in that class at the beginning is (2) 30 (3) 40 (1) 20(4) 50 If A:B:C::2:3:4, then $\frac{A}{B}:\frac{B}{C}:\frac{C}{4}$ is 83. (1) 4:9:16 (2) 8:9:24 (3) 6:9:8 (4) 5:7:6 $\frac{1}{\sqrt{3} + \sqrt{2}} = x\sqrt{2} + y\sqrt{3} \Longrightarrow x - y =$ 84. (1) 0(2) 1 (3) -2 (4) 2The curved surface area of a cone is 4070 sq. cm. If the diameter of the base of that cone 85. is 70 cm, then its slant height in centimeters is (1) 22 (2) 37 (3) 44 (4) 23 86. A solution of $8x \equiv 3 \pmod{21}$ is (1) (2) 3 (3) 7 (4) 9 1 87. If 20 and 24 are factors of n, then which one of the following is a factor of n? (1) 120 (2) 240 (3) 50 (4) 25 The value of $(1-\frac{1}{5})(1-\frac{1}{6})(1-\frac{1}{7})\dots(1-\frac{1}{20}) =$ 88. (1) $\frac{5}{19}$ (2) 5 (3) $\frac{19}{5}$ (4) $\frac{1}{5}$ 89. If 12% of x = 8% of y, then the ratio x : y =(1) 2:3(2) 3:2 (3) 4:3 $(4) \quad 3:4$ ICET **CEDM** 200

90. The rate of simple interest per annum that makes some amount of money double in 12 years is

(1) 10% (2) 12% (3)
$$\frac{8}{3}\frac{1}{9}$$
% (4) 15%
91. $\frac{3^{\frac{3}{2}} \sqrt[3]{3}^{\frac{1}{22}}}{27^{5/3}} =$
(1) 1 (2) $\frac{1}{3}$ (3) $\frac{1}{9}$ (4) $\frac{1}{27}$
92. If a,b,c are real and $a+b+c=0$, then $x^{a^{b}b^{-}c^{-1}} \cdot x^{a^{-b}b^{-}c^{-1}} + x^{a^{-1}b^{-}c^{-1}} =$
(1) 1 (2) x^{2} (3) x^{3} (4) x^{2}
93. If $7^{3x+1} = 49^{x+2}$, then $x =$
(1) 1 (2) 2 (3) 3 (4) 4
94. If $9x^{2} + 16y^{2} - 24xy = 0$, then $x: y =$
(1) 4:3 (2) 2:3 (3) 3:4 (4) 3:2
95. If $\sqrt{19-4\sqrt{x}} = \sqrt{12} - \sqrt{7}$, then $x = 1=$
(1) 15 (2) 20 (3) 24 (4) 22
96. $\sqrt{15+2\sqrt{15}+2\sqrt{21}+2\sqrt{35}} + \sqrt{15-2\sqrt{15}-2\sqrt{21}+2\sqrt{35}} =$
(1) $\sqrt{5} + \sqrt{7}$ (2) $2(\sqrt{5} + \sqrt{7})$ (3) $2\sqrt{5}$ (4) $2\sqrt{7}$
97. The greatest three digit number which when divided by 6, 9 and 12 leaves the remainder 4 in each case is
(1) 976 (2) 963 (3) 939 (4) 924
98. The greatest number which divides 121, 134 and 147 leaving 4 as the remainder in each case is
(1) 17 (2) 14 (3) 13 (4) 9
99. The reciprocal of the sum of the reciprocals of $\frac{5}{8}$ and $\frac{3}{4}$ is
(1) $\frac{5}{22}$ (2) $\frac{15}{22}$ (3) $\frac{15}{44}$ (4) $\frac{25}{44}$
100. The correct order of $a = \frac{3}{4}, b = \frac{4}{7}, c = \frac{11}{13}$ and $d = \frac{13}{15}$ is
(1) $b < c < d < a$ (2) $b < a < c < d$
(3) $a < b < c < d$ (4) $a < c < b < d$

101.
$$2\frac{1}{3} + 3\frac{3}{4} + \frac{3}{4} - 2\frac{1}{3}\left(6\frac{1}{2} - 2\frac{1}{4}\right) \div 2\frac{1}{4} =$$

(1) $\frac{73}{27}$ (2) $\frac{77}{27}$ (3) $\frac{79}{27}$ (4) $\frac{83}{27}$
102. Two numbers *x* and *y* are respectively 20% and 25% more than the third number *z*. If *x* is a% of *y*, then a =
(1) 80 (2) 90 (3) 96 (4) 85
103. By selling an item for Rs.754, a trader gets 16% profit. Then the cost price of the item in rupees is
(1) 680 (2) 670 (3) 660 (4) 650
104. A pipe can fill an empty tank in 15 hours. Due to a leak at the bottom, the tank is filled in 20 hours. If the tank is full, then in how much time (in hours) will the leak take to empty the tank?
(1) 35 (2) 30 (3) 60 (4) 75
105. Two pipes A and B can fill an empty tank independently in 3 hours and 4 hours, respectively. If the pipes A and B are opened in alternate hours starting with B, then the total time taken, in hours, to fill the tank is
(1) $2\frac{1}{2}$ (2) $3\frac{1}{2}$ (3) $3\frac{2}{3}$ (4) $2\frac{3}{4}$
106. Two cars A and B start at the same time and move in opposite directions between the places *x* and *y*. The time taken by Car A and Car B to reach their destinations after they meet each other on their way is 4 hours and 9 hours respectively. Then the ratio of the speeds of cars A and B is
(1) 3:2 (2) 2:3 (3) 9:4 (4) 4:9
107. A car travels at $\frac{8}{7}$ times its usual speed and reaches the destination 15 minutes early. Then the time taken by the car in hours to reach the B can can complete that work in 12 days, then in how many days can A and B complete that work together?
(1) 3 (2) 4 (3) 5 (4) 6
109. Z men and 3 women can do a particular work in 10 days, whereas 4 men can do that work in 10 days. Then in how many days can 3 men and 3 women complete the same work?
(1) 8 (2) 6 (3) 5 (4) 4 144
110. The sides of a rectangle of perimeter 52 metres are in the ratio 4:9. Then the area in square metres of that rectangle is
(1) 100 (2) 120 (3) 132 (4) 144

SETS AND RELATIONS

Concepts and Formulae

- 1. Definition: A set is a collection of defined objects. We denote a set by capital letters A, B, C.
- 2. **Operations on Sets:** If A, B are two sets, then we define
 - $A \cup B = \{x/x \in A \text{ or } x \in B\}; A \cup B \text{ is called the union of } A \text{ and } B.$ i)
 - $A \cap B = \{x/x \in A \text{ and } x \in B\}; A \cap B \text{ is called the intersection of } A \text{ and } B.$ ii)
 - iii) $A B = \{x/x \in A \text{ and } x \notin B\}; A B \text{ is called th difference of } A \text{ with } B.$
 - iv) $A \wedge B = (A B) \cup (B A); A \wedge B$ is called the symmetric difference of A and B
- 3. **Types of sets:**
 - **Null set:** A set having no elements is called null set or empty set and it is denoted by ϕ . i)
 - ii) Subset, Super set: If A, B are two sets, we say that A is a subset of B and write $A \subset B$ if $x \in A \Longrightarrow x \in B$. In this case we also say that B is a super set of A and wirte $B \supset A$. Note that $A \subset A$ always.
 - **Disjoint sets:** If A, B are two sets such that $A \cap B = \phi$ (that is A, B have no common iii) elements), then A, B are called disjoint sets.
 - iv) **Power set:** If A is a set, then the set of all subsets of A is called the power set of A and is denoted by P(A).
 - v) **Complement of a set:** Let A be any set and $B \subseteq A$. Then the complement of B in A (denoted by \overline{B} , when A is fixed) is defined as $\overline{B} = \{x \in A | x \notin B\}$. Note that $\overline{B} = A - B$.
 - vi) Finite set, Infinite set: If the number of elements in a set A is finite (i.e., a non-negative interger), then A is called a finite set. In this case the number of elements in A is denoted by n(A). A set which is not finite is calld an infinite set.

4. **Properties:**

- I) If A, B, C are three sets, then
 - $A \cup A = A = A \cap A$ (Idempotent Laws) 1)
 - $A \cup B = B \cup A$, $A \cap B = B \cap A$ (Commutative Laws) ii)
 - $(A \cup B) \cup C = A \cup (B \cup C), (A \cap B) \cap C = A \cap (B \cap C)$ (Associative Laws) iii)
 - iv) $(A \cup B) \cap A = A$, $(A \cap B) \cup A = A$ (Absorption Law)
 - $A \cup (B \cap C) = (A \cup B) \cap (A \cup C), A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$ (Distribuv) tive)
 - vi) $A ((B \cup C) = (A B) \cap (A C), A (B \cap C) = (A B) \cup (A C).$

These laws can also be stated as,

- vii) If B, C \subseteq A then $(\overline{B \cup C}) = \overline{B} \cap \overline{C}$ and $(\overline{B \cap C}) = (\overline{B} \cup \overline{C})$ (De-morgan's Law)
- viii) $\phi \subset A$, $A \subset A$, $\overline{\phi} = A$ and $\overline{A} = \phi$
- II. If A, B are two sets, then (i) $A \subset B \Leftrightarrow A \cup B = B \Leftrightarrow A \cap B = A$ В

(11)
$$A \subset B$$
 and $B \subset A \Leftrightarrow A = J$

$$(iii) A - A = \phi$$

- iv) $A B = A (A \cap B) = (A \cup B) B$ (v) A
- vi) $(A-B) \cup (A \cap B) = A$ = $A \cup B$
- III. If B, C are subsets of a set A, then

i)
$$B - C = B \cap \overline{C}$$
 (ii) $B - \overline{C} = B \cap C$ (iii) $(\overline{\overline{B}}) = B$

- IV. If A, B, C are finite sets, then
 - i) $n(A \cup B) = n(A) + n(B) n(A \cap B)$
 - ii) If A, B are disjoint sets, then $n(A \cup B) = n(A) + n(B)$
 - iii) $n(A \cup B \cup C) = n(A) + n(B) + n(C) n(A \cap B) n(B \cap C) n(C \cap A) + n(A \cap B \cap C)$
 - iv) $n(A B) = n(A) n(A \cap B)$

5. Relations:

1. If A, B are two sets, then we define their cartesian product A x B as A x B = $\{x, y | x \in A, y \in B\}$

Then we have the following properties.

- i) In general, $A \times B \neq B \times A$
- ii) $(A \times B) \cap (C \times D) = (A \cap C) \times (B \cap D)$
- iii) $(A \times B) \cap (B \times A) = (A \cap B) \times (A \cap B)$
- iv) A x B = B x A if $A = \phi$ or $B = \phi$ or A = B
- v) $A x (B \cup C) = (A x B) \cup (A x C)$
- vi) $A x (B \cap C) = (A x B) \cap (A x C)$
- 6. i) Let A be a finite sets and n(A) = m, then $n(p(A)) = 2^{m}$.
 - ii) If A, B are finite sets and if n(A) = m, n(B) = n then $n(A \times B) = mn$.
 - iii) If A, B are finite set and if n(A) = m, n(B) = n, then the number of relations from A to B $= 2^{mn}$.
- 7. Let A be a finite set and n(A) = n, then
 - i) $n(A \times A) = n^2$.
 - ii) The number of relations on $A = 2^{n^2}$.
 - iii) The number of reflextive relations on $A = 2^{n^2-n}$
 - iv) The number of symmetric relations on $A = 2^{\frac{n^2+n}{2}}$

PROBLEMS

1. If a set A has 5 elements, then the number of subsets of A with not exceeding 4 elements is 1. 31 2. 26 3. 5 4. 16 **Solution:** $5_{c_0} + 5_{c_1} + 5_{c_2} + 5_{c_3} + 5_{c_4} = 1 + 5 + 10 + 10 + 5 = 31.$

(v) $A - (A - B) = (A \cap B)$ vii) $(A - B) \cup (B - A) \cup (A \cap B)$

So the answer is 1.

2. For any positive integer *n*, let $A_n =$ set of all positive integral divisors of *n*, then the number of elements in $A_{18} \cap A_{24}$ is

1. 4 2. 6 3. 72 4. 36 **Solution:** $A_{18} = \{1, 2, 3, 6, 9, 18\}; A_{24} = \{1, 2, 3, 4, 6, 8, 12, 24\}.$ $A_{18} \cap A_{24} = \{1, 2, 3, 6\}.$ So the number of elements in $A_{18} \cap A_{24}$ is 4. **So the answer is 4.**

- 3. If A, B, C are three sets then A $(B \cap C) =$ 1. $(A - B) \cap (A - C)$ 3. $(A - B) \cup (A - C)$ 5. $(A - B) \cup (A - C)$ 5. $(B \cap C) = A \cap (B \cap C)^c = A \cap (B^c \cup C^c) = (A \cap B^c) \cup (A \cap C^c)$ $= (A - B) \cup (A - C)$. So the answer is 3.
- 4. If a set A has 6 elements, then the number of subsets of A containing at least 3 elements is 1. 63 2. 57 3. 42 4. 40 Solution: $6_{c_0} + 6_{c_1} + 6_{c_2} + 6_{c_3} = 1 + 6 + 15 + 20 = 42$. So the answer is 3.
- 5. If A and B are any two sets then $((A^c \cup B^c) \cap B^c)^c =$ 1. A 2. $A \cup B$ 3. A^c 4. B Solution: $((A^c \cup B^c) \cap B^c)^c = ((A^c \cup B^c)^c) \cup (B^c)^c = ((A^c)^c \cap (B^c)^c) \cup B$ $= (A \cap B) \cup B = B$. So the answer is 4.
- 6.. If A and B are sets with 3 and 6 elements respectively then the minimum number of elements in $A \cup B$ is

 1. 9
 2. 8
 3. 7
 4. 6

 Solution: Minimum number of element in $A \cup B = Maximum of \{3, 6\} = 6$.

 So the answer is 4.

- 7. If $D_n = \left\{ x \in R : 0 < x < \frac{1}{n} \right\}$ for n = 1, 2, 3, ... then $\bigcap_{n=1}^{\infty} D_n =$ 1. $\{0\}$ 2. ϕ 3. $\{1\}$ 4. $\{x \in R : 0 < x < 1\}$ Solution: $\bigcap_{n=1}^{\infty} D_n = D_1 \cap D_2 \cap D_3 \cap \dots$ $= \{x \in R : 0 < x < 1\} \cap \left\{ x \in R : 0 < x < \frac{1}{2} \right\} \cap \left\{ x \in R : 0 < x < \frac{1}{3} \right\} \cap \dots = \phi.$ So the answer is 2.
- 8. The set of values of x that satisfy |5x 3| = 7, is

1.
$$\left\{\frac{4}{5}, 2\right\}$$
 2. $\left\{-\frac{4}{5}, -2\right\}$ 3. $\left\{-\frac{4}{5}, +2\right\}$ 4. $\{3, 7\}$
Solution: $|5, \frac{4}{5}, -3| = |4 - 3| = 1;$ $|5, 2 - 3| = |10 - 3| = 7;$
 $|5.(-\frac{4}{5}) - 3| = |-4 - 3| = |-7| = 7.$ So the answer is 3.
9. If $D_n = \left\{x \in R : 0 < x < \frac{1}{n}\right\}$ for $n = 1, 2, 3, \dots$ then $D_3 \cap D_7 =$
1. D_3 2. D_7 3. D_{10} 4. D_{21}
Solution: $D_3 \cap D_7 = \left\{x \in R : 0 < x < \frac{1}{3}\right\} \cap \left\{x \in R : 0 < x < \frac{1}{7}\right\} = \left\{x \in R : 0 < x < \frac{1}{7}\right\} = D_7.$
So the answer is 2.

- 10. If A_n is the set of all multiples of n for $n = 1, 2, 3, \dots$ and P is the set of all prime numbers then $\bigcup_{p \in P} A_p =$ 2. $\{1, 2, 3, ...\}$ 3. $\{2, 3, 4, 5, ...\}$ 4. $\{0, \pm 1, \pm 2, ...\}$ 1. P **Solution:** $\bigcup_{p \in P} A_p = A_2 \cup A_3 \cup A_5 \cup A_7 \cup \dots$ $= \{2, 4, 6, 8, ...\} \cup \{3, 6, 9, 12, ...\} \cup \{5, 10, 15, 20, ...\} \cup \{7, 14, 21, 28, ...\}$ = {2, 3, 4, 5, 6, 7, 8, 9, 10, 11,....}. So the answer is 3. 11. If $B_n = \{m \in N / m = \text{ is a multiple of } n\}$, where $n \in N$, then $B_6 \cap B_8 =$ 3. B₁₂ 4. B₂₄ 1. B₆ 2. B₂ **Solution:** $B_6 = \{6, 12, 18, 24, 30, 36, 42, 48, ...\}; B_8 = \{8, 16, 24, 32, 40, 48, 56, 64, ...\}$ $B_6 \cap B_8 = \{24, 48, 72, ...\} = B_{24}$. So the answer is 4. 12. If $A = \{n \in Z: 1 \le n \le 40 \text{ and } 3 \text{ divides } n\}$ and $B = \{n \in Z: 1 \le n \le 35 \text{ and } 6 \text{ divides } n\}$ then A - B = 2. A 3. B 4. $\{3, 9, 15, 21, 27, 33, 36, 39\}$ 1. ¢ **Solution:** A = {3, 6, 9, 12, 15, 18, 21, 24, 27, 30, 33, 36, 39}; $B = \{6, 12, 18, 24, 30\}$. So $A - B = \{3, 9, 15, 21, 27, 33, 36, 39\}$. So the answer is 4. 13. A, B, C respectively denote the set of letters in the words 'FOLLOW'; "FCOW" and "WOLF"
- then

1.
$$B = C$$
; $A + B$ 2. $A = B$; $B \pm C$ 3. $A = B = C$ 4. $A \neq B \neq C$

Solution: $A = \{F, O, L, W\}; B = \{F, L; O, W\}; C = \{W, O, L, F\}$

So A = B + C. So the answer is 3.

- 14. If n(S) denotes the number of elements in the set S, n(A) = 20, n(B) = 40, $n(A \cup B) = 50$, then the $n(A \cap B) =$
 - 1. 30 2. 20 3. 10 4. 8

Solution: $n(A \cup B) = n(A) + n(B) - n(A \cap B) \Longrightarrow n(A \cap B) = n(A) + n(B) - n(A \cup B)$

$$= 20 + 40 - 50 = 10$$
. So $n(A \cap B) = 10$. So the answer is 3.

- 15. If *N* is the set of positive integers, then $\{n \in N || n-2 | < 3\} =$
 - 1. $\{1, 2, 3, 4, 5\}$ 2. $\{1, 2, 3, 4\}$ 3. $\{2, 3, 4, 5\}$ 4. $\{2, 3\}$

Solution: The given set = $\{n \in N : |n-2| < 3\} = |n-2| < 3 \implies -3 < n-2 < 3 \implies -1 < n < 5$ and $n \in N \implies n \in \{1, 2, 3, 4\}$. So the answer is 2.

- 16. If *N* is the set of all positive integer, then $\{n \in N : | n-4 | \le 2\} = ?$
 - 1. $\{3, 4, 5\}$ 2. $\{2, 3, 4, 5, 6\}$
 - 3. $\{2, 3, 4, 5\}$ 4. $\{3, 4, 5, 6\}$

Solution: $|n - 4| \le 2 \Longrightarrow 2 \le n \le 6$. (i.e) The required set = $\{2, 3, 4, 5, 6\}$.

So the answer is 2.

- 17. Let Z denote the set of integers, $A = \{a \in Z : |a-1| < 3\}$, $B = \{a \in Z : |a-3| < 4\}$. Then the least element B A is
 - 1. 1 2. 2 3. 3 4. 4

Solution: A = { $a \in Z : |a-1| < 3$ } = {-1, 0, 1, 2, 3};

B = { $a \in Z : |a-3| < 4$ } = {-1, 0, 1, 2, 3, 4, 5, 6}; B - A = {4, 5, 6}

The lest element of B - A = 4. So the answer is 4.

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18. If the number of elements in the sets A, B are respectively 5, 7, then the number of relations that can be defined from A to B is

19.2⁷ 2. 2^{12} 3. 2^{35} 4. 2^{5} Solution: n(A) = 5; n(B) = 7; $n(A \times B) = n(A) \times n(B) = 5 \times 7 = 35$.

The number of relations that can be defined from A to B is 2^{35} . So the answer is 3.

20. If a set A has 8 elements, then the number of subsets of A having atmost 4 elements is
1. 256
2. 126
3. 93
4. 163
Solution: The number of subsets of A having atmost 4 elements is

$$8_{C_0} + 8_{C_1} + 8_{C_2} + 8_{C_3} + 8_{C_4} = 1 + 8 + 28 + 56 + 70 = 163$$
. So the answer is 4.

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21. If a set A has 3 elements and another set B has 5 elements, then the number of relations from A to B is

1. 15 2. 2^3 3. 2^5 4. 2^{15} Solution: n(A) = 3; n(B) = 5; $n(A \times B) = n(A) \times n(B) = 3 \times 5 = 15$.

The number of relations that can be defined from A to B is 2^{15} . So the answer is 4.

- 22. If $A = \{4, 5, 6, 7, 8, 9\}, B = \{1, 2, 3, 4, 5, 6\}$ and $C = \{2, 4, 6, 8\}$, then $A (B \cap C) =$ 1. $\{4, 6\}$ 2. $\{5, 7, 8, 9\}$ 3. $\{2, 4, 6\}$ 4. $\{7, 8, 9\}$ Solution: $B \cap C = \{2, 4, 6\}$. So $A - (B \cap C) = \{5, 7, 8, 9\}$. So the answer is 2.
- 23. If a set A has 4 elements and another set B has 2 elements, then the number of functions from A into B that are not surjections is

 1. 16
 2. 2
 3. 14
 4. 8

 Solution: If n(A) = m, n(B) = n, then the number of functions from A to B = n^m. If n(A) = m, n(B) = 2, then the number of onto functions from A to B = 2^m 2.

The number of functions from A into B that are not surjections is $= n^m - (2^m - 2) = 2^4 - 2^4 + 2 = 2$ So the answer is 2.

24. If a set A has 7 elements, then the number of subsets of A having exactly one element in each is

1. 2^6 2. 2^7 3. 7^2 4. 7

Solution: If n(A) = m, then the number of subsets of $A = 2^{m}$.

The number of subsets of A having exactly one element in each is 7. So the answer is 4.

STATEMENTS

 Definition: A sentence is called a statement (or a mathematically acceptable statement) if it is either true or false but not both.

Ex: New Delhi is the captal of India.

- 2. The truth or falsehood of a statement is called its truth value. The truth value of a true statement is 'True' and is denoted by T. The truth value of a false statement is 'False' and is denoted by F.
- 3. Negation: Let p be a statement. The statement 'It is not the case that p' is called the negation of p. The negation of p is denoted by ~p. The statement ~p is read 'not p'.
- 4. **Truth table:** The truth table displays the relationship between truth values of statements.
- 5. **Conjunction:** Let p and q be statements. The statement 'p and q', denoted by $p \land q$, is the statement that is true when both p and q are true and is false otherwise. The statement $p \land q$ is called the conjunction of p and q.

| р | $\sim p$ | р | q | $p \wedge q$ |
|---|----------|---|---|--------------|
| Т | F | Т | Т | Т |
| F | Т | Т | F | F |
| | | F | Т | F |
| | | F | F | F |

6. **Disjunction:** Let p and q be statements. The statement 'p or q' denoted by $p \lor q$, is the statement that is false when p and q are both false and true otherwise. The statement $p \lor q$ is called the disjunction of p and q. $p \lor q = p \lor q$

| ٩. | | P | 9 | P |
|----|---|---|---|---|
| | Т | Т | Т | |
| | Т | F | Т | |
| | F | Т | Т | |
| | F | F | F | |

7. **Implication:** Let p and q be statements. The implication $p \rightarrow q$ is the statement that is false when p is true and q is false and true otherwise. In this implication p is called the hypothesis (or antecedent or premise) and q is called the conclusion (or consequence).

| р | q | $p \rightarrow q$ | $q \rightarrow p$. |
|---|---|-------------------|---------------------|
| Т | Т | Т | Т |
| Т | F | F | Т |
| F | Т | Т | F |
| F | F | Т | Т |

- 8. **Converse:** The statement $q \rightarrow p$ is called the converse of $p \rightarrow q$.
- 9. Contrapositive: The statement $\sim q \rightarrow \sim p$ is called the contrapositive of $p \rightarrow q$.

10. **Biconditional:** Let p and q be statements. The biconditional $p \leftrightarrow q$ is the statement that is true when p and q have the same values and false otherwise. The truth table for $p \leftrightarrow q$ is given below.

| р | q | $p \leftrightarrow q$ |
|---|---|-----------------------|
| Т | Т | Т |
| Т | F | F |
| F | Т | F |
| F | F | Т |

- 11. **Tautology:** A compound statement that is always true, no matter what the truth values of the statements that occur in it are, is called a tautology.
- 12. Contradiction: A compound statement that is always false is called a contradiction.

| | | Tautology | Contradiction |
|---|---|-----------------|-------------------|
| р | q | $p \lor \sim p$ | $p \wedge \sim p$ |
| Т | F | Т | F |
| F | Т | Т | F |

- 13. Converse: The statement $q \rightarrow p$ is called the converse of $p \rightarrow q$.
- 14. **Inverse:** The statement $\sim p \rightarrow \sim q$ is called the iverse of $p \rightarrow q$.
- 15. Contrapositive: The statement $\sim q \rightarrow \sim p$ is called the contrapositive of $p \rightarrow q$.
- **Ex.** Show that $\sim (p \lor q)$ and $\sim p \land \sim q$ are logically equivalent.
- Sol. The truth table for the statements is displayed below. Since the truth values of the statements $\sim (p \lor q)$ and $\sim p \land \sim q$ agree for all possible combinations of the truth values of p and q, it

| р | q | $p \lor q$ | $\sim (p \lor q)$ | $\sim p$ | $\sim q$ | $\sim p \wedge \sim q$ | $(p \lor q) \rightarrow p$ |
|---|---|------------|-------------------|----------|----------|------------------------|----------------------------|
| Т | Т | Т | F | F | F | F | Т |
| Т | F | Т | F | F | Т | F | Т |
| F | Т | Т | F | Т | Т | F | F |
| F | F | F | Т | Т | Т | Т | Т |

Ex. Show that the statements $p \rightarrow q$ and $\sim p \lor q$ are equivalent.

Sol. Following is the truth table for these statements.

| р | q | $\sim p$ | $\sim p \lor q$ | $p \rightarrow q$ |
|---|---|----------|-----------------|-------------------|
| Т | Т | F | Т | Т |
| Т | F | F | F | F |
| F | Т | Т | Т | Т |

| F | F | Т | Т | Т |
|---|---|---|---|---|
| | | | | |

Since the truth values of $\sim p \lor q$ and $p \rightarrow q$ agree, these statements are equivalent.

PROBLEMS

| | 0 | | | |
|----------------------------|--------------------------------|--------------|--------------------------------------|-----------------------------|
| 1. $p \rightarrow (p - q)$ | 2. $(p \land q) \rightarrow p$ | | 3. $(p - q) \rightarrow (p \land q)$ | 4. $p \lor q \rightarrow p$ |
| Solution: p | q | $p \wedge q$ | $(p \land q) \rightarrow p$ | |
| Т | Т | Т | Т | |
| Т | F | F | Т | |
| F | Т | F | Т | |
| F | F | F | Т | |

So the answer is 2.

2. $\sim ((\sim p) \lor q)$ is equivalent to

1. Which of the following is a tautology?

1.
$$p \lor (\sim q)$$
 2. $(\sim p) \lor q$ 3. $p \land (\sim q)$ 4. $(\sim p) \land q$

Solution: $\sim ((\sim p) \lor q) \equiv \sim (\sim p) \land (\sim q) \equiv p \land (\sim q)$. So the answer is 3.

3. If p,q are two statements, then $\sim (p \rightarrow q)$ is equivalent to

1. $(\sim p) \lor q$ 2. $(\sim p) \land q$ 3. $p \lor (\sim q)$ 4. $p \land (\sim q)$

Solution: $\sim (p \rightarrow q) \equiv p \land (\sim q)$. So the answer is 4.

4. If p and q are statements then $p \lor (p \land q)$ is equivalent to

1.
$$p$$
 2. q 3. $p \land q$ 4. $p \lor q$

Solution: $p \lor (p \land q) = (p \lor p) \land (p \lor q) = p \land (p \lor q) = p$ (by absorption law). So the answer is 1.

5. If p and q are statements then $\sim (p \lor q)$ is equivalent to

$$1. \sim p \lor \sim q \qquad 2. \sim p \land \sim q \qquad 3. \sim p \land q \qquad 4. p \land \sim q$$

Solution: $\sim (p \lor q) \equiv \sim p \land \sim q$ by De morgan's law. So the answer is 2.

6. If p, q are two statements then $\sim (p \lor \sim q)$ is equivalent to

1. $p \wedge \sim Q$ 2. $\sim p \wedge \sim q$ 3. $\sim p \wedge q$ 4. $p \lor \sim q$

Solution: $\sim (p \lor \sim q) \equiv \sim p \land \sim (\sim q)$ (by De morgan's law)

$$\equiv \sim p \land q \text{ (since } \sim (\sim q) = q \text{). So the answer is 3.}$$

7. The statement ~ $(\sim p \rightarrow \sim q)$ is equivalent to

$$1. \sim p \wedge q \qquad 2. \quad p \wedge \sim q \qquad 3. \quad \sim p \vee q \qquad 4. \quad p \vee \sim q$$

Solution: $\sim (\sim p \rightarrow \sim q) \equiv \sim p \land \sim (\sim q) \equiv \sim p \land q \text{ (since } \sim (p \rightarrow q) = p \land \sim q.$ DM 211
So the answer is 2.

8. If *p* is a statement, then which of the following is a tautology?

1.
$$p \land (\sim p)$$
 2. $p \lor (\sim p)$ 3. $\sim (\sim p)$ 4. $(\sim p) \land (\sim p)$

Solution: $p \lor (\sim p)$ is a tautology. Because $p \lor (\sim p)$ is always true.

So the answer is 1.

9. If p, q are two statements, then $\sim (p \Rightarrow q)$ is equivalent to

1. $\sim p \lor q$ 2. $\sim p \land q$ 3. $p \lor (\sim q)$ 4. $p \land (\sim q)$

The answer is 3.

- 10. If p and q are statements $p \lor (p \land q)$ is equivalent to
 - 1. p 2. q 3. $p \land q$ 4. $p \lor q$

The answer is 1.

- 11. If p, q are two statements then which of the following is equivalent to $p \lor [(\sim p) \land q]$ is
 - 1. $p \land q$ 2. $p \lor q$ 3. $(\sim p) \lor q$ 4. $p \lor (\sim q)$

The answer is 1.

- 12. If p, q are two statements then the inverse of the statement $\sim p \Rightarrow q$ is
 - 1. $q \Rightarrow p$ 2. $\sim q \Rightarrow p$ 3. $(\sim p) \Rightarrow (\sim q)$ 4. $p \Rightarrow \sim q$

The answer is 4.

- 13. If p and q are two statements then the symbolic form of p and not q is
 - 1. $p \land (\sim q)$ 2. $p \lor (\sim q)$ 3. $p \land q$ 4. $(\sim p) \land q$ The answer is 1.
- 14. If p and q are any two statements then the converse of $p \Rightarrow q$ is

1. $q \Rightarrow p$ 2. $(\sim p) \Rightarrow (\sim q)$ 3. $(\sim q) \Rightarrow (\sim p)$ 4. $p \Rightarrow (\sim q)$

The answer is 1.

Note:

| р | q | $\sim q$ | $p \rightarrow q$ | $\sim\!(p\!\rightarrow\!q)$ | $p_\wedge(\sim q)$ |
|---|---|----------|-------------------|-----------------------------|--------------------|
| Т | Т | F | Т | F | F |
| Т | F | Т | F | Т | Т |
| F | Т | F | Т | F | F |
| F | F | Т | Т | F | F |

From the last two columns $\sim (p \rightarrow q) \equiv p \land (\sim q)$

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15. The statement $(p \rightarrow q) \rightarrow p$ is equivalent to 1. p 2. q 3. $q \rightarrow p$ 4. $p \rightarrow q$ Solution: $(p \rightarrow q) \rightarrow p \equiv (\neg p \lor q) \rightarrow p \equiv \neg (\neg p \lor q) \lor p$ $\equiv (p \land \neg q) \lor p \equiv p \lor \neg q \equiv \neg q \lor p \equiv q \rightarrow p$ So the answer is 3.

16. The contrapositive of the statement $p \rightarrow q$ 1. $(\sim p) \rightarrow q$ 2. $(\sim p) \rightarrow (\sim q)$ 3. $q \rightarrow p$ 4. $(\sim q) \rightarrow (\sim p)$ **Converse:** The statement $q \rightarrow p$ is called the converse of $p \rightarrow q$. **Inverse:** The statement $\sim p \rightarrow \sim q$ is called the iverse of $p \rightarrow q$. **Contrapositive:** The statement $\sim q \rightarrow \sim p$ is called the contrapositive of $p \rightarrow q$. Answer 4. 17. If the statement $\frac{1}{2}$ is rational and $\sqrt{3}$ is irrational' is denoted by *p*, then which of the following statement represent $\sim p$? 2. $\frac{1}{2}$ is irrational or $\sqrt{3}$ is rational 1. $\frac{1}{2}$ is rational or $\sqrt{3}$ is irrational. 4. $\frac{1}{2}$ is rational $\sqrt{3}$ is rational 3. $\frac{1}{2}$ is irrational or $\sqrt{3}$ is irrational Answer 2. **ICET-2011** 18. Among the following $(p \rightarrow q) \rightarrow \sim p$ is equivalent to

1. $p \wedge q$ 2. $\sim (p \wedge q)$ 3. p 4. q

Solution: $(p \rightarrow q) \rightarrow p \equiv (\neg p \lor q) \rightarrow \neg p \equiv \neg (\neg p \lor q) \lor \neg p$

$$\equiv (p \land \neg q) \lor \neg p \equiv \neg p \lor \neg q \equiv \neg (p \land q)$$
 So the answer is

19. Among the following, the converse of $p \rightarrow (q \rightarrow r)$ is equivalent to

1. $(p \lor q) \land (r \rightarrow p)$ 2. $\sim r \lor (p \land q)$ 3. $(r \rightarrow q) \rightarrow p$ 4. $(p \land q) \lor (r \rightarrow p)$

Solution: The converse of $p \rightarrow (q \rightarrow r) \equiv (q \rightarrow r) \rightarrow p \equiv (\sim q \lor r) \rightarrow p$

$$\equiv \sim (\sim q \lor r) \lor p \equiv (q \land \sim r) \lor p \equiv p \lor (q \land \sim r) \equiv (p \lor q) \land (p \lor \sim r)$$
$$\equiv (p \lor q) \land (\sim r \lor p) \equiv (p \lor q) \land (r \to p)$$
So the answer is 2. $\lor \land$

2.

FUNCTIONS

1. Functions: A relation of $f: A \rightarrow B$ is said to be a function if every element of set A have unique image in set B.

Types of functions:

- 2. Into Function: A function $f: A \rightarrow B$ is said to be an into function if at least one element of set B does not have pre-image in set A.
- 3. **One-One Function:** A function $f: A \rightarrow B$ is said to be a 1 1 function if distinct element of set A have distinct images in set B. It is also known as injection.

i) For a 1 - 1 function if f(x) = f(y) then x = y.

ii) For a 1 - 1 function $n(A) \le n(B)$.

4. **Onto Function:** A function $f: A \rightarrow B$ is said to be an onto function if all the elements of set B have pre-images in set A. It is also known as surjection.

i) For an onto function f(A) = B.

ii) For an onto function $n(A) \ge n(B)$.

iii) If A, B are two finite sets and n(B) = 2, then the number of onto functions that can be defind from A onto B is $2^{n(A)} - 2$.

- 5. **Bijection:** A function $f: A \rightarrow B$ is said to be bijection if it is 1 1 and onto. If A, B are two finite sets and $f: A \rightarrow B$ is bijection, then n(A) = n(B).
- 6. **Composite Function:** If $f: A \rightarrow B$, $g: B \rightarrow C$ are two functions then gof $: A \rightarrow C$ defined by (gof)(x) = g[f(x)] for all $x \in A$ is known as composite function.
- 7. Constant Function: A function $f: A \rightarrow B$ is said to be a constant function if all the elment of set A have same image in set B. The range of a constant function always consists of only one element.
- 8. Identity Function: A function $I: A \rightarrow A$ is said to be an identity function if the element and its image are equal,

i) For an identity function. I(x) = x

ii) Identity function is always a bijection.

- 9. Inverse Function: A function $f: A \rightarrow B$ will have its inverse function $f^1: B \rightarrow A$ if f is a bijection.
- 10. **Real Variable Function:** A function is said to be a real variable function if its domain belongs to set of real numbers.
- 11. **Real Valued Function:** A function is said to be a real valued function if its codomain belongs to set of real numbers.
- 12. **Real Function:** A function is said to be a real function if its domain and co-domain both belong to set of real numbers.
- 13. Even Function: If f(-x) = f(x) then f(x) is known as even function.
- 14. **Odd Function:** If f(-x) = -f(x) then f(x) is known as odd function.
- 15. If A, B are two finite sets, then the number of functions that can be defind from A to B are $n(B)^{n(A)}$.
- 16. If A, B are two finite sets, then the number of functions that can be defined from B to A are $n(A)^{n(B)}$.
- 17. The number of constant functions from A to B are n(B).
- 18. The number of one-one functions that can be defined from A to B is $n(B)_{P_{n(A)}}$.

- 19. The number of one-one functions that can be defined from a finite set A into a finite set B is $n(B)_{P_{n(A)}}$ if n(B) > n(A) and of in n(B) < n(A).
- 20. If A, B are two finite sets and n(A) = n(B) then the number of onto functions that can be defined from A onto B is n(A)!.
- 21. If A, B are two finite sets and n(A) = n(B) then the number of bijections that can be defined from A onto B is n(A)!.

PROBLEMS

- 1. If a set A has 5 elements, then the number of bijections from A to A is
 - 1. 2^5 2. 5^5 3. 5! 4. 1

Solution: The number of bijections from A to A = n(A)! = 5!.

So the answer is 3.

- 2. If R denotes the set of all real numbers and if a function $f: R \rightarrow R$ is defined by
 - $f(x) = x^2 \forall x \in \mathbb{R}$, then f is
 - 1. a one-one function 2. an onto function
 - 3. a function but neither one-one nor onto 4. a bijection

Solution: It is a function, but not one-one. (because f(2) = 4 and f(-2) = 4, it is not onto, because -2 has no preimage). So the answer is 3.

3. If set A has 4 elements, then the number of relations from A to A is1. 4^{16} 2. 2^4 3. 2^8 4. 4^3

Solution: The number of binary operations or relations from a set containing *n* elements to itself is $n^{(n^2)}$. So $d^{(4^2)} = 4^{16}$. So the answer is 1.

(Note The number of functions from A to A is $n(A)^{n(A)} = 4^4$)

- 4. If a set *A* has 5 elements, then the number of injections from *A* to *A* is 1. 120 2. 5^5 3. 0 4. 25 Solution: The number of one-one functions from *A* to $A = n(A)! = 5! = 5 \times 4 \times 3 \times 2 \times 1 = 120$. So the answer is 1.
- 5. If $f(x) = 2\left(x^2 + \frac{1}{x^2}\right) 3\left(x + \frac{1}{x}\right) 1$ then $\{\alpha \in R : f(\alpha) = 0\} =$ 1. $\left\{1, \frac{1}{2}\right\}$ 2. $\left\{2, \frac{1}{2}\right\}$ 3. $\left\{3, \frac{1}{3}\right\}$ 4. $\left\{-2, \frac{1}{2}\right\}$

Solution: We have to find $\alpha \in R$ such that $f(\alpha) = 0$, using the given options we have the following

$$f(1) = 2\left(1+\frac{1}{1}\right)-3\left(1+\frac{1}{1}\right)-1 = 2(2) - 3(2) - 1 = 4 - 6 - 1 = -3 \neq 0.$$

$$f(2) = 2\left(4+\frac{1}{4}\right)-3\left(2+\frac{1}{2}\right)-1 = 8 + \frac{1}{2} - 6 - \frac{3}{2} - 1 = 1 - 1 = 0.$$

So the answer is 2.

6. If $f(x) = 2x^2 + 5x + 1$ and g(x) = x - 4 then $\{\alpha \in R : g(f(\alpha)) = 0\} = 0$

1.
$$\left\{-\frac{1}{2},3\right\}$$
 2. $\left\{-\frac{1}{2},-3\right\}$ 3. $\left\{\frac{1}{2},-3\right\}$ 4. $\left\{\frac{1}{2},3\right\}$

Solution: $g(f(\alpha)) = 0 \Rightarrow g(2x^2 + 5x + 1) = 0 \Rightarrow 2x^2 + 5x + 1 - 4 = 0$ $\Rightarrow 2x^2 + 5x - 3 = 0 \Rightarrow 2x^2 + 6x - x - 3 = 0 \Rightarrow 2x(x + 3) - 1(x + 3) = 0$

$$\Rightarrow (2x - 1) (x + 3) = 0 \Rightarrow x = \frac{1}{2}, x = -3.$$
 So the answer is 3.

7. If $f(x) = a^{x}$ then $\frac{f(x+k)}{f(x-l)} =$ 1. f(k) 2. f(-l) 3. f(k-l) 4. f(k+l)Solution: $\frac{f(x+k)}{f(x-l)} = \frac{a^{x+k}}{a^{x-l}} = a^{x+k-x+l} = a^{k+l} = f(k+l)$. So the answr is 4.

8. If
$$f(x) = \log\left[\frac{1+x}{1-x}\right]$$
 and $g(x) = f\left[\frac{2x}{1+x^2}\right]$ then $\frac{g(x)}{f(x)} =$
1. 1 2. 2 3. $\frac{1}{2}$ 4. $\frac{1}{3}$

Solution:
$$g(x) = f\left[\frac{2x}{1+x^2}\right] = \log\left(\frac{1+\frac{2x}{1+x^2}}{1-\frac{2x}{1+x^2}}\right) = \log\left(\frac{(1+x)^2}{(1-x)^2}\right) = \log\left(\frac{1+x}{1-x}\right)^2 = 2\log\left(\frac{1+x}{1-x}\right)$$

$$=2f(x)$$
. So $\frac{g(x)}{f(x)}=2$. So the answer is 2.

9. If
$$f(x) = \frac{1}{x}$$
, $x \neq 0$ and $f^{n}(x) = f(f^{n-1}(x))$ then $f^{50}\left(\frac{1}{50}\right) =$
1. 1 2. 100 3. 50 4. $\frac{1}{50}$

Solution: Given that
$$f^n(x) = f(f^{n-1}(x))$$
. Put $n = 2$, then $f^2(x) = f(f(x)) = f\left(\frac{1}{x}\right) = \frac{1}{\frac{1}{x}} = x$.

So $f^{50}(x) = x$. So $f^{50}\left(\frac{1}{50}\right) = \frac{1}{50}$. So the answer is 4.

10. If $f: R \to R$ and $g: R \to R$ are defined by f(x) = x - [x] and g(x) = [x] for each $x \in R$, where [x] is the greatest integer not exceeding x, then the range of $g \circ f$ is

2. $\{0\}$ 3. Z 1. 4. R **Solution:** $(g \circ f)(x) = g(f(x)) = g(x - [x]) = [x - [x]].$ So the answer is 3. 11. The number of injections of the set $\{1, 2, 3\}$ in to the set $\{1, 2, 3, 4, 5, 6\}$ is 3. 60 2. 30 4. 120 1. 10 **Solution:** The number of one-one functions from a set A to a set B is $n(B)_{P_n(A)}$. Here n(A) = 3, n(B) = 6. So number of injections of $6_{p_3} = \frac{6!}{3!} = \frac{6 \times 5 \times 4 \times 3 \times 2 \times 1}{3 \times 2 \times 1} = 120$. So the answer is 4. 12. The number of functions that can be defined from B to A when A = $\{x_1, x_2, x_3, x_4\}$ and $B = \{5, 6, 7\}$ is 2. 64 3. 81 4. 105 1. 4 **Solution:** The number of functions defined from B to $A = n(A)^{n(B)} = 4^3 = 64$. So the answer is 2. 13. If f(x) = 3 + 4x and $g(x) = x^2 - 1$ for all real x then $[g_{\circ}(g_{\circ}f)](1) =$ 4. 2499 3. 2303 1. 48 2. 50 **Solution:** $g[(g \circ f)](1) = g[g(f(1))] = g[g(7)] = g[48] = 2303.$ So the answer is 3. 14. The function $f(x) = 2x^4 - 6x^2 + 9$ defined on **R** is 1. an even function 2. an odd function 3. neither odd nor even 4. both odd and even **Solution:** $f(-x) = 2(-x)^4 + 6(-x)^2 + 9 = 2x^4 + 6x^2 + 9 = f(x) = f(x)$ is an even function. So the answr is 1. 15. If $f(x) = \log_{0} x$ then $f^{-1}(x) =$ 3. x^9 4. 9^{-x} 2.9^{x} 1.9 **Solution:**Let $f(x) = \log_9 x = y \Longrightarrow x = 9^y \Longrightarrow f^{-1}(y) = 9^y \Longrightarrow f^{-1}(x) = 9^x$. So the answer is 2. 16. If $y = f(x) = \frac{3x+4}{2x-3}$ then f(y) =3. f(x) 4. 3x2. *x* 1. v Solution: $y = \frac{3x+4}{2x-3} \Rightarrow y(2x-3) = 3x+4 \Rightarrow (2y-3)x = 3y+4$

 $\Rightarrow x = \frac{3y+4}{2y-3} = f(y). \therefore f(y) = x.$ So the answr is 2.

BINOMIAL THEOREM

- 1. If '*n*' is a positive integet than
 - $(x+a)^n = n_{c_0} x^n + n_{c_1} x^{n-1} \cdot a + n_{c_2} x^{n-2} \cdot a^2 + \dots + n_{c_r} x^{n-r} \cdot a^r + \dots + n_{c_n} a^n \cdot a^n$
- 2. General term $T_{r+1} = n_{c_r} x^{n-r} a^r$
- 3. In an expansion of $(ax^{p} + \frac{b}{x^{q}})^{n}$, the coefficient of x^{m} is $n_{c_{r}}a^{n-r}.b^{r}$ where $r = \frac{np-m}{p+q}$.

The term independent of 'x' in the expansion of $(ax^p + \frac{b}{x^q})^n$ is T_{r+1} where $r = \frac{np}{p+a}$. 4.

- Number of terms in the expansion of $(a + b)^n = n + 1$. 5.
- Number of terms in the expansion of $(a + b + c)^n$ is (n + 1)(n + 2)/3!. 6.
- 7. Numerically greatest term in $(1 + x)^n$.

a) If
$$\frac{(n+1)|x|}{|x|+1} = P$$
 where 'p' is integer, then pth and $(P+1)$ th terms are numerically greatest terms

terms.

b) If
$$\frac{(n+1)|x|}{|x|+1} = P + f$$
 where p is integer and $0 < f < 1$ then $(P+1)$ th term is numerically

greatest term.

8.
$$C_0 + C_1 + C_2 + ... + C_n = 2^n$$
.
9. $C_0 - C_1 + C_2 - C_3 + ... + (-1)^n c_n = 0$.
10. $C_0 + C_2 + C_4 + C_6 + ... + 2^{n-1}$.
11. $C_1 + C_3 + C_5 + ... = 2^{n-1}$.
12. $1C_1 + 2C_2 + 3C_3 + ... + n$. $C_n = n2^{n-1}$.
13. $1C_1 - 2C_2 + 3C_3 + ... + (-1)^{n-1n}c_n = 0$.
14. $(1 - x)^{-1} = 1 + x + x^2 + x^3 + x^4 +$
15. $(1 + x)^{-1} = 1 - x + x^2 - x^3 + x^4 - x^5 +$

PROBLEMS

1. The coefficient of
$$\frac{1}{x^2}$$
 in the expansion of $\left(\frac{2}{x^2} - 3x\right)^4$ is
1. 36 2. -36 3. 216 4. -216

Solution: The coefficient of x^m in $\left(ax^p + \frac{b}{x^q}\right)$ is $n_{c_r}a^{n-r}b^r$ where $r = \frac{np-m}{p+q}$

Here m = -2, n = 4, a = -3, b = 2, p = 1, q = 2. So $r = \frac{(4)(1) - (-2)}{1 + 2} = \frac{4 + 2}{3} = 2.$ So $n_{c_r}a^{n-r}b^r = 4_{c_2}(-3)^{4-2}(2)^2 = (6)(9)(4) = 216$. So the answer is 3. 2. The term independent of x in the binomial expansion of $\left(x^3 - \frac{1}{x^2}\right)^9$ is 1.84 2. 56 3. 0 4 9 **Solution:** Let the independent term be $T_{r+1} = 9_{c_r} (x^3)^{9-r} \left(\frac{1}{x^2}\right)^r$ $=9_{c_r} x^{27-3r-2r} = 9_{c_r} x^{27-5r}$. So 27 - 5r = 0 \Rightarrow r = $\frac{27}{5}$. Hence it is not possible to get term independent of x. So the answer is 3. 3. The 4th term in the binomial expansion of $\left(\frac{1}{x^2} + x^2 \cdot 2^x\right)^{\circ}$ is 160. Then the value of x is 1.8 2. -8 3. -1 4. 1 Solution: $T_4 = T_{3+1} = 6_{c_3} \left(\frac{1}{r^2}\right)^{6-3} (x^2 2^x)^3 = 160 \Rightarrow \frac{6 \times 5 \times 4}{1 \times 2 \times 3} \cdot \left(\frac{1}{r^6}\right) (x^6 \cdot 2^{3x}) = 160$ $\Rightarrow 20.2^{3x} = 160 \Rightarrow 2^{3x} = 8 = 2^3 \Rightarrow 3x = 3 \Rightarrow x = 1$. So the answer is 4. 4. The coefficient of x^5 in the expansion of $(1 + 3x)^4 (1 - x)^3$ is 3. 27 4. 32 1. 18 2. 25 **Solution:** $(1 + 3x)^4 (1 - x)^3 = [1 + 4(3x) + 6(3x)^2 + 4(3x)^3 + (3x)^4] [1 - 3x + 3x^2 - x^3]$ $= [1 + 12x + 54x^{2} + 108x^{3} + 81x^{4}] [1 - 3x + 3x^{2} - x^{3}]$ So efficient of x^5 is 54(-1) + (108) (3) + 81(-3) = -54 + 324 - 243 = -297 + 324 = 27. So the answer is 3. 5. If the coefficients of the $(2k+1)^{th}$ term and of the $(4k+5)^{th}$ term in the expansion of $(1+x)^{10}$ are equal then k =1.1 2. 2 3 3 4. 0 **Solution:** Co-efficient of $T_{2k+1} = \text{coefficient of } T_{4k+5}$ $\Rightarrow 10_{c_{2k}} = 10_{c_{(4k+4)}} \Rightarrow 2k + 4k + 4 = 10 \text{ (or) } 2k = 4k + 4 \text{ (} : n_{c_r} = n_{c_s} \Rightarrow r + s = n \text{ (or) } r$ =s) $\Rightarrow 6k = 6$ (or) $2k = -4 \Rightarrow k = 1$ (or) k = -2. So k = 1. So the answer is 1.

- 6. The coefficient of term independent of x in the expansion of $\left[\frac{3}{2}x^2 \frac{1}{3x}\right]^9$ is
 - 1. $\frac{7}{18}$ 2. $-\frac{11}{2}$ 3. $\frac{21}{2}$ 4. None

Solution: The term independent of 'x' in the expansion of $(ax^p + \frac{b}{x^q})^n$ is T_{r+1} where r =

$$\frac{np}{p+q} \text{ Here } n = 9, a = \frac{3}{2}, p = 2, b = -\frac{1}{3}, q = 1. \text{ So } r = \frac{18}{3} = 6.$$

So $T_{6+1} = 9_{c_6} \left(\frac{3}{2}\right)^{9-6} \left(\frac{-1}{3}\right)^6 = \frac{9 \times 8 \times 7}{1 \times 2 \times 3} \times \frac{27}{8} \times \frac{1}{27 \times 27} = \frac{7}{18}.$ So the answer is 1.

- 7. If the 21st and 22nd terms in the expansion $(1 + a)^{44}$ are equal then a =
 - 1. $\frac{7}{8}$ 2. $\frac{8}{7}$ 3. $\frac{5}{8}$ 4. $\frac{8}{5}$ Solution: $T_{22} = T_{21} \Rightarrow 44_{c_{21}} a^{21} = 44_{c_{20}} a^{20} \Rightarrow \frac{44!}{21! \times 23!} a = \frac{44!}{20! \times 24!} \Rightarrow a = \frac{21! \times 23!}{20! \times 24!} = \frac{21}{24} = \frac{7}{8}$. So the answer is 1.
- 8. The 9th term in the expansion $\left(\frac{a}{3} \frac{b}{2}\right)^{12}$ is

1.
$$\frac{55a^4b^8}{2403}$$
 2. $\frac{55a^4b^8}{2304}$ 3. $\frac{55a^8b^4}{2304}$ 4. $\frac{56a^4b^8}{2304}$

Solution: $T_9 = T_{8+1} = 12_{c_8} \cdot \left(\frac{a}{3}\right)^{12-8} \left(-\frac{1}{2}\right)^8 b^8 = \frac{12 \times 11 \times 10 \times 9}{1 \times 2 \times 3 \times 4} \cdot \frac{a^4}{3^4} \cdot \frac{b^8}{2^8} = \frac{55a^4b^8}{2304}$. So the answer is 4.

- 9. The number of integral terms in the expansion of $\left(5^{\frac{1}{2}} + 7^{\frac{1}{8}}\right)^{1024}$ is
 - 1. 129
 2. 128
 3. 130
 4. 132

 Solution: The power of $\frac{1}{5^2}$ and $\frac{1}{7^8}$ must be multiple of LCM of 2, 8 = 8.

There are $\frac{1024}{8}$ = 128 multiples hence integral terms are 128. So the answer is 2.

10. The coefficient of x^4 in $\left(\frac{x}{2} - \frac{2}{x^2}\right)^{10}$ is

1. $\frac{45}{256}$ 2. $\frac{45}{64}$ 3. $\frac{68}{45}$ 4. $\frac{64}{256}$

In an expansion of $(ax^p + \frac{b}{x^q})^n$, the coefficient of x^m is $n_{c_r}a^{n-r}b^r$ where $r = \frac{np-m}{p+q}$.

Here $m = 4, n = 10, a = \frac{1}{2}, b = -2, p = 1, q = 2$. So $r = \frac{10-4}{1+2} = 2$.

Substituting these in $n_{c_r} a^{n-r} . b^r$ we get $10_{c_2} . \frac{1}{2^8} . (-2)^2 = \frac{10 \times 9}{1 \times 2} . \frac{1}{256} . 4 = \frac{45}{64}$. So the answer is 2.

11. If the 5th term of
$$\left[2x^2 + \frac{3}{x}\right]^5$$
 is to 10 then $x =$
1. 6 2. -6 3. 9 4. 8

Solution: $T_5 = 10 \Rightarrow T_{4+1} = 10 \Rightarrow 5_{c_4} (2x^2)^{5-4} \cdot \left(\frac{3}{x}\right)^4 = 10 \Rightarrow 5 \cdot 2x^2 \cdot \frac{81}{x^4} = 10 \Rightarrow \frac{81}{x^2} = 1.$ $\Rightarrow x^2 = 81 \Rightarrow x = 9.$ So the answer is 3.

12. If the term independent of
$$x$$
 in $\left(\sqrt{x} + \frac{k}{x^2}\right)^{10}$ is 405 then $k = 1$. ± 2 2. ± 3 3. ± 4 4. ± 5

Solution: The term independent of 'x' in the expansion of $(ax^p + \frac{b}{x^q})^n$ is T_{r+1}

where
$$r = \frac{np}{p+q}$$
. Here $a = 1, p = \frac{1}{2}, b = k, q = 2, n = 10$. So $r = \frac{5}{2.5} = 2$. So $T_3 = 405$.

$$\Rightarrow 10_{c_2} \cdot (\sqrt{x})^{10-2} \cdot \left(\frac{k}{x^2}\right)^2 = 405 \Rightarrow \frac{10 \times 9}{1 \times 2} k^2 = 405 \Rightarrow k = \pm 3.$$
 So the answer is 2.

13. If the coefficients of x^7 and x^8 in the expansion of $\left(3 + \frac{x}{2}\right)^n$ are equal then n =

1. 552. 523. 484. 44Solution: Given that coefficient of $x^7 = \text{coefficient of } x^8$

$$\Rightarrow n_{c_7} \cdot 3^{n-7} \cdot \left(\frac{x}{2}\right)^7 = n_{c_8} \cdot 3^{n-8} \cdot \left(\frac{x}{2}\right)^8 \Rightarrow \frac{n_{c_8}}{n_{c_7}} = \frac{3^{n-7} \cdot 2^8}{3^{n-8} \cdot 2^7}$$

$$\Rightarrow \frac{n-8+1}{8} = 6 \Rightarrow n = 55.$$
 So the answer is 1.
(Note: $\frac{n_{c_r}}{n_{c_{r-1}}} = \frac{n-r+1}{r}$)

ICET-2012

14. The coefficient of x in the expansion of $\left(3x^2 - \frac{1}{2x}\right)$ is

1.
$$\frac{45}{4}$$
 2. $\frac{-45}{4}$ 3. $\frac{45}{8}$ 4. $\frac{-45}{8}$

Solution: $T_{r+1} = n_{c_r} x^{n-r} y^r$, $5_{c_r} (3x^2)^{5-r} \left(\frac{-1}{2x}\right)^r = x$

Equating the power / index of x we get $10 - 3r = 1 \implies r = 3$.

So the coefficient of *x* is $5_{c_3} 3^2 \left(\frac{-1}{8}\right) = 10 \ge 9 \ge \frac{-1}{8} = \frac{-45}{4}$. Answer is 2.

15. If
$$(2 + 3x)^5 = \sum_{n=0}^{5} a_n x^n$$
, $\sum_{n=0}^{5} a_n =$
1. 32 2. 243 3. 1024 4. 3125
Solution: $(2 + 2x)^5 = \sum_{n=0}^{5} a_n x^n$ But $n = 1$ then $\sum_{n=0}^{5} a_n = (2 + 2)^5 = 5^5 = 2126$

Solution:
$$(2+3x)^5 = \sum_{n=0}^{5} a_n x^n$$
. Put $x = 1$, then $\sum_{n=0}^{5} a_n = (2+3)^5 = 5^5 = 3125$. Answer is 4.

ICET-2011

- 16.. The coefficient of x^{15} in the product $(x 1) (x 2) \dots (x 16)$ is 1. (16)! 2. 136 3. -136 4. -(16)! Solution: Coefficient of $x^{15} = -(1+2+3+4+5+6+7+8+9+10+11+12+13+14+15+16)$ $= -\frac{16(16+1)}{2} = -8 \times 17 = 136$. Answer is 3.
- 17. If the sum of all the coefficients in the expansion of $(1 + 3x 2x^2)^n$ is 128, then the greatest coefficient in the expansion of $(1 + x)^n$ is

1. 35 2. 21 3. 49 4. 14 **Solution:** Put x = 1. Then $(1+3-2)^n = 128 \Longrightarrow 2^n = 2^7 \Longrightarrow n = 7$.

So the greatest coefficient in expansion of $(1 + x)^7$ is $7_{c_3} = 35$. Answer is 1.

SURDS

- 1. Surd: If 'a' is a positive rational number, 'n' is a natural number such that $\sqrt[n]{a} = \frac{1}{a^n}$ is not a rational number then $\sqrt[n]{a}$ is called as a surd, (or) n^{th} order surd (or) a surd of n^{th} order.
- 2. Simple Surd: A surd consisting of a single term is called a simple surd.
- 3. Mixed Surd: If 'a' is a rational number and \sqrt{b} is surd, then $a \pm \sqrt{b}$ is called mixed surd.
- 4. Compound Surd: A surd which is the sum of two or more simple surds is called a compound surd.
- 5. Binomial Surd: It is an expression containing two terms of which at least one is a simple surd.
- 6. Similar Surds: If the surds are different rational multiplies of same surd, they are called similar surds.
- 7. Dissimilar Surds: Two surds which are not similar are called dissimilar surds.
- 8. Square Root of a Surd
 - i) If $a, b \sqrt{a^2 b}$ are positive rational numbers and \sqrt{b} is surd then,

$$\sqrt{a + \sqrt{b}} = \sqrt{\frac{1}{2}[a + \sqrt{a^2 - b}]} + \sqrt{\frac{1}{2}[a - \sqrt{a^2 - b}]}$$

The results holds good even if $\sqrt{a^2 - b}$ is surd.

Note: If
$$\sqrt{a + \sqrt{b}} = \sqrt{x} + \sqrt{y}$$
 and $x > y$ then $\sqrt{a - \sqrt{b}} = \sqrt{x} - \sqrt{y}$.

- ii) If $\sqrt{a + \sqrt{b} + \sqrt{c} + \sqrt{d}} = \sqrt{x} + \sqrt{y} + \sqrt{z}$ where *a*, *b*, *c*, *d* are positive rationals and
 - $\sqrt{b}, \sqrt{c}, \sqrt{d}$ are dissimilar surds then $x = \frac{1}{2}\sqrt{\frac{bd}{c}}, y = \frac{1}{2}\sqrt{\frac{bc}{d}}, z = \frac{1}{2}\sqrt{\frac{dc}{b}}$ and x + y + z = aNote: If $\sqrt{a + \sqrt{b} + \sqrt{c} + \sqrt{d}} = \sqrt{x} + \sqrt{y} + \sqrt{z}$ and $(\sqrt{x} + \sqrt{y}) > \sqrt{z}$ then $\sqrt{a + \sqrt{b} - \sqrt{c} - \sqrt{d}} = \sqrt{x} + \sqrt{y} - \sqrt{z}$
- 9. Cube Root fo Surd: If $\sqrt[3]{a+\sqrt{b}} = x+\sqrt{y}$ then $\sqrt[3]{a-\sqrt{b}} = x-\sqrt{y}$ where *a*, *x* are rationals and *b*, *y* are positive rationals \sqrt{b} , \sqrt{y} are surds. Here $x^3 + 3xy = a$ and $\sqrt[3]{a^2 - b} = x^2 - y$.
- **10.** Conjugate Surds: The sum and product of two binomial surds is a rational number then they are called conjugate surds.

Example: $a + \sqrt{b}$ and $a - \sqrt{b}$.

PROBLEMS

1.
$$\sqrt{47-4\sqrt{33}} =$$

1. $\sqrt{22}-\sqrt{6}$ 2. $\sqrt{45}-\sqrt{2}$ 3. $\sqrt{44}-\sqrt{3}$ 4. $\sqrt{35}-\sqrt{12}$
Solution: $\sqrt{47-4\sqrt{33}} = \sqrt{47-2\sqrt{132}} = \sqrt{(\sqrt{44})^2 + (\sqrt{3})^2 - 2\sqrt{44}\sqrt{3}}$
 $= \sqrt{(\sqrt{44}-\sqrt{3})^2} = \sqrt{44}-\sqrt{3}$. So the answer is 3.
2. $\left[\frac{\sqrt{7}+\sqrt{5}}{\sqrt{7}-\sqrt{5}} + \frac{\sqrt{7}-\sqrt{5}}{\sqrt{7}+\sqrt{5}}\right]^3 =$
1. 1728 2. 1827 3. $(\sqrt{14}+\sqrt{10})^3$ 4. $(12+2\sqrt{35})^3$
Solution: $\left[\frac{\sqrt{7}+\sqrt{5}}{\sqrt{7}-\sqrt{5}} + \frac{\sqrt{7}-\sqrt{5}}{\sqrt{7}+\sqrt{5}}\right]^3 = \left[\frac{(\sqrt{7}+\sqrt{5})^2 + (\sqrt{7}-\sqrt{5})^2}{(\sqrt{7})^2 - (\sqrt{5})^2}\right]^3$
 $= \left[\frac{(\sqrt{7})^2 + (\sqrt{5})^2 + 2\sqrt{7}\sqrt{5} + (\sqrt{7})^2 + (\sqrt{5})^2 - 2\sqrt{7}\sqrt{5}}{7-5}\right]^3 = \left[\frac{7+5+7+5}{2}\right]^3 = 12^3 = 1728.$
So the answer is 1.

3.
$$\frac{2}{\sqrt{5} + \sqrt{3}} + \frac{2}{\sqrt{7} + \sqrt{5}} =$$
1.
$$\sqrt{5} - \sqrt{3}$$
2.
$$\sqrt{7} - \sqrt{5}$$
3.
$$\sqrt{7} - \sqrt{3}$$
4.
$$\sqrt{7} - 2\sqrt{5} + \sqrt{3}$$
Solution:
$$\frac{2}{\sqrt{5} + \sqrt{3}} + \frac{2}{\sqrt{7} + \sqrt{5}} = \frac{2(\sqrt{5} - \sqrt{3})}{(\sqrt{5} + \sqrt{3})(\sqrt{5} - \sqrt{3})} + \frac{2(\sqrt{7} - \sqrt{5})}{(\sqrt{7} + \sqrt{5})(\sqrt{7} - \sqrt{5})}$$

$$= \frac{2(\sqrt{5} - \sqrt{3})}{(\sqrt{5})^{2} - (\sqrt{3})^{2}} + \frac{2(\sqrt{7} - \sqrt{5})}{(\sqrt{7})^{2} - (\sqrt{5})^{2}} = \frac{2(\sqrt{5} - \sqrt{3})}{5 - 3} + \frac{2(\sqrt{7} - \sqrt{5})}{7 - 5}$$

$$= \frac{2(\sqrt{5} - \sqrt{3})}{2} + \frac{2(\sqrt{7} - \sqrt{5})}{2} = \sqrt{5} - \sqrt{3} + \sqrt{7} - \sqrt{5} = \sqrt{7} - \sqrt{3}$$
. So the answer is 3.
4.
$$\left[\frac{4\sqrt{ab} - \sqrt{b}}{\sqrt{a} - \sqrt[4]{ab}}\right]^{4} =$$
1.
$$\frac{b}{a}$$
2.
$$\frac{a}{b}$$
c.
$$-\frac{b}{a}$$
4.
$$-\frac{a}{b}$$

Solution:
$$\left[\frac{\sqrt[4]{ab} - \sqrt{b}}{\sqrt{a} - \sqrt[4]{ab}}\right]^4 = \left[\frac{\sqrt[4]{a}\sqrt[4]{b} - \sqrt[4]{b}\sqrt[4]{b}}{\sqrt[4]{a}\sqrt[4]{a} - \sqrt[4]{ab}}\right]^4 = \left[\frac{\sqrt[4]{a}\sqrt[4]{a}\sqrt[4]{a}-\sqrt[4]{b}}{\sqrt[4]{a}\sqrt[4]{a}-\sqrt[4]{b}}\right]^4 = \left[\frac{\sqrt[4]{a}\sqrt[4]{a}}{\sqrt[4]{a}\sqrt[4]{a}-\sqrt[4]{a}}\right]^4 = \left[\frac{\sqrt[4]{a}\sqrt[4]{a}}{\sqrt[4]{a}\sqrt[4]{a}-\sqrt[4]{a}}\right]^4 = \left[\frac{\sqrt[4]{a}\sqrt[4]{a}\sqrt[4]{a}}{\sqrt[4]{a}\sqrt[4]{a}-\sqrt[4]{a}}\right]^4 = \left[\frac{\sqrt[4]{a}\sqrt[4]{a}\sqrt[4]{a}}{\sqrt[4]{a}\sqrt[4]{a}-\sqrt[4]{a}}\right]^4 = \left[\frac{\sqrt[4]{a}\sqrt[4]{a}\sqrt[4]{a}\sqrt[4]{a}}{\sqrt[4]{a}\sqrt[4]{a}-\sqrt[4]{a}}\right]^4 = \left[\frac{\sqrt[4]{a}\sqrt[4]{a}\sqrt[4]{a}\sqrt[4]{a}\sqrt[4]{a}-\sqrt[4]{a}}{\sqrt[4]{a}\sqrt[4]{a}-\sqrt[4]{a}}\right]^4 = \left[\frac{\sqrt[4]{a}\sqrt[4]{a}\sqrt[4]{a}\sqrt[4]{a}\sqrt[4]{a}\sqrt[4]{a}\sqrt[4]{a}-\sqrt[4]{a}}{\sqrt[4]{a}$$

So the answer is 1.

5. If $x = 5 + 2\sqrt{6}$ then $\sqrt{x} - \frac{1}{\sqrt{x}} = \frac{1}{\sqrt{x}}$ 2. $2\sqrt{6}$ 3. $2\sqrt{3}$ 4. $\sqrt{8}$ 1. 5 Solution: $\sqrt{x} = \sqrt{5 + 2\sqrt{6}} = \sqrt{3 + 2 + 2\sqrt{2}\sqrt{3}} = \sqrt{(\sqrt{3} + \sqrt{2})^2} = \sqrt{3} + \sqrt{2}$. So $\frac{1}{\sqrt{r}} = \frac{1}{\sqrt{3} + \sqrt{2}} = \frac{\sqrt{3} - \sqrt{2}}{(\sqrt{3} + \sqrt{2})(\sqrt{3} - \sqrt{2})} = \frac{\sqrt{3} - \sqrt{2}}{3 - 2} = \sqrt{3} - \sqrt{2}$. So $\sqrt{x} - \frac{1}{\sqrt{x}} = \sqrt{3} + \sqrt{2} - \sqrt{3} + \sqrt{2} = 2\sqrt{2} = \sqrt{8}$. So the answer is 4. 6. $3.\sqrt{\frac{2}{3}} - 2\sqrt{\frac{3}{2}} + \sqrt{6} + \sqrt{216} =$ 1. $4\sqrt{6}$ 2. $5\sqrt{6}$ 3. $6\sqrt{6}$ 4. $7\sqrt{6}$ Solution: 3. $\sqrt{\frac{2}{2}} - 2\sqrt{\frac{3}{2}} + \sqrt{6} + \sqrt{216} = \frac{3\sqrt{2}}{\sqrt{2}} - \frac{2\sqrt{3}}{\sqrt{2}} + \sqrt{6} + \sqrt{36(6)}$ $=\sqrt{6}-\sqrt{6}+\sqrt{6}+6\sqrt{6}=7\sqrt{6}$. So the answer is 4. 7. If $x = \frac{5 - \sqrt{21}}{2}$ then $x^2 + \frac{1}{r^2} =$ 1. $\frac{27}{2}$ 2. $\frac{25}{2}$ 3. 23 4. 25 Solution: $x^2 = \left(\frac{5-\sqrt{21}}{2}\right)^2 = \left(\frac{25+21-10\sqrt{21}}{4}\right) = \frac{46-10\sqrt{21}}{4} = \frac{23-5\sqrt{21}}{2}$ $\frac{1}{r^2} = \frac{2}{23 - 5\sqrt{21}} = \frac{2(23 + 5\sqrt{21})}{(23 - 5\sqrt{21})(23 + 5\sqrt{21})} = \frac{2(23 + 5\sqrt{21})}{23^2 - 25(21)}$ $=\frac{2(23+5\sqrt{21})}{520-525}=\frac{2(23+5\sqrt{21})}{4}=\frac{23+5\sqrt{21}}{2}$ So $x^2 + \frac{1}{x^2} = \frac{23 - 5\sqrt{21}}{2} + \frac{23 + 5\sqrt{21}}{2} = 23$. So the answer is 3.

8. If
$$x = \sqrt{\frac{7+4\sqrt{3}}{7-4\sqrt{3}}}$$
 then $x(x - 14) =$
1. 1
2. -1
3. $\frac{1}{\sqrt{3}}$
4. $-\frac{1}{\sqrt{3}}$
Solution: $x = \sqrt{\frac{7+4\sqrt{3}}{7-4\sqrt{3}}} = \sqrt{\frac{2^2+3+2.2\sqrt{3}}{2^2+3-2.2.3}} = \sqrt{\frac{(2+\sqrt{3})^2}{(2-\sqrt{3})^2}} = \frac{2+\sqrt{3}}{2-\sqrt{3}}$
 $= \frac{2+\sqrt{3}}{2-\sqrt{3}} \cdot \frac{2+\sqrt{3}}{2+\sqrt{3}} = \frac{4+3+4\sqrt{3}}{4-3} = 7+4\sqrt{3}$.
So $x(x - 14) = (7+4\sqrt{3})(7+4\sqrt{3}-14) = (4\sqrt{3}+7) \cdot (4\sqrt{3}-7) = 16(3)-49 = 48-49 = -1$.
So the answer is 2.

9.
$$\frac{\sqrt{7} + \sqrt{5}}{\sqrt{7} - \sqrt{5}} + \frac{\sqrt{7} - \sqrt{5}}{\sqrt{7} + \sqrt{5}} =$$
1.
$$2\sqrt{35}$$
2.
$$-2\sqrt{35}$$
3.
$$12$$
4.
$$-12$$
Solution:
$$\left[\frac{\sqrt{7} + \sqrt{5}}{\sqrt{7} - \sqrt{5}} + \frac{\sqrt{7} - \sqrt{5}}{\sqrt{7} + \sqrt{5}}\right] = \left[\frac{(\sqrt{7} + \sqrt{5})^2 + (\sqrt{7} - \sqrt{5})^2}{(\sqrt{7})^2 - (\sqrt{5})^2}\right]$$

$$= \left[\frac{(\sqrt{7})^2 + (\sqrt{5})^2 + 2\sqrt{7}\sqrt{5} + (\sqrt{7})^2 + (\sqrt{5})^2 - 2\sqrt{7}\sqrt{5}}{7 - 5}\right] = \left[\frac{7 + 5 + 7 + 5}{2}\right] = 12.$$

So the answer is 3.

10. Among the surds $\sqrt{2}$, $\sqrt[3]{4}$, $\sqrt[3]{2}$ and $\sqrt[4]{6}$, the largest one is 1. $\sqrt{2}$ 2. $\sqrt[3]{4}$ 3. $\sqrt[3]{2}$ 4. $\sqrt[4]{6}$ **Solution:** $\sqrt{2} = \frac{1}{2^2}$; $\sqrt[3]{4} = \frac{1}{4^3}$; $\sqrt[3]{2} = \frac{1}{2^3}$; $\sqrt[4]{6} = \frac{1}{6^4}$. The LCM of $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$ is 12. Raising the given surds to the power 12 we get $\frac{12}{2^{\frac{12}{2}}}$; $\frac{12}{4^3}$; $\frac{12}{2^{\frac{12}{3}}}$; $\frac{12}{6^{\frac{12}{4}}} \Rightarrow 2^6$; 4^4 ; 2^4 ; $6^3 \Rightarrow 64$; 256; 16; 216. So the second surd is the largest i.e. $\sqrt[3]{4}$. **So the answer is 2.**

11.
$$\frac{6}{2\sqrt{3} + \sqrt{6}} - \frac{1}{\sqrt{3} - \sqrt{2}} + \frac{4}{\sqrt{6} - \sqrt{2}} =$$

1.
$$\sqrt{3}$$
 2.
$$\sqrt{2}$$
 3.
$$\sqrt{6}$$
 4.
$$\sqrt{2} - \sqrt{3} + \sqrt{6}$$

Solution:
$$\frac{6}{2\sqrt{3} + \sqrt{6}} - \frac{1}{\sqrt{3} - \sqrt{2}} + \frac{4}{\sqrt{6} - \sqrt{2}}$$
$$= \frac{6(2\sqrt{3} - \sqrt{6})}{(2\sqrt{3} + \sqrt{6})(2\sqrt{3} - \sqrt{6})} - \frac{\sqrt{3} + \sqrt{2}}{(\sqrt{3} + \sqrt{2})(\sqrt{3} - \sqrt{2})} + \frac{4(\sqrt{6} + \sqrt{2})}{(\sqrt{6} + \sqrt{2})(\sqrt{6} - \sqrt{2})}$$
$$= 2\sqrt{3} - \sqrt{6} - \sqrt{3} - \sqrt{2} + \sqrt{6} + \sqrt{2} = \sqrt{3}$$
. So the answer is 1.

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12.
$$\sqrt{\sqrt{60} + 8} =$$

1. $2\sqrt{2} + 3$ 2. $\sqrt{3} + \sqrt{5}$ 3. $\sqrt{3} + \sqrt{15}$ 4. $\sqrt{5} + \sqrt{7}$
Solution: $(a + b)^2 = a^2 + 2ab + b^2$;
 $(2\sqrt{2} + 3)^2 = 4(2) + 2(2\sqrt{2})^3 + 9 = 8 + 12\sqrt{2} + 9 = 17 + 12\sqrt{2}$.
 $(\sqrt{3} + \sqrt{5})^2 = 3 + 2\sqrt{3}\sqrt{5} + 5 = 3 + 2\sqrt{15} + 5 = 8 + 2\sqrt{15} = 8 + \sqrt{60}$.
 $\sqrt{\sqrt{60} + 8} = \sqrt{(\sqrt{3} + \sqrt{5})^2} = \sqrt{3} + \sqrt{5}$
 $(\sqrt{3} + \sqrt{15})^2 = 3 + 2\sqrt{3}\sqrt{15} + 15 = 3 + 2\sqrt{45} + 15 = 18 + 2\sqrt{45}$.
 $(\sqrt{5} + \sqrt{7})^2 = 5 + 2\sqrt{5}\sqrt{7} + 7 = 5 + 2\sqrt{35} + 7 = 12 + 2\sqrt{35}$.
Answer 2.

ICET-2012

14. If
$$a = \sqrt{2} + \sqrt{3}$$
, then $\frac{a+1}{a-1} + \frac{1-a}{1+a} =$
1. $\sqrt{2}$ 2. $\sqrt{3}$ 3. $1 + \sqrt{2}$ 4. $1 + \sqrt{3}$
Solution: $\frac{a+1}{a-1} + \frac{1-a}{1+a} = \frac{(a+1)^2 - (a-1)^2}{a^2 - 1} = \frac{a^2 + 2a + 1 - a^2 + 2a - 1}{a^2 - 1} = \frac{4a}{a^2 - 1} =$
 $= \frac{4(\sqrt{2} + \sqrt{3})}{2 + 3 + 2\sqrt{2}\sqrt{3} - 1} = \frac{4(\sqrt{2} + \sqrt{3})}{4 + 2\sqrt{2}\sqrt{3}} = \frac{2(\sqrt{2} + \sqrt{3})}{2 + \sqrt{2}\sqrt{3}} = \frac{2(\sqrt{2} + \sqrt{3})}{\sqrt{2}(\sqrt{2} + \sqrt{3})} = \frac{2}{\sqrt{2}} = \sqrt{2}$. Answer
1.
15. If $x = 3 + \sqrt{5}$, then the value of $x^4 + 12x^3 + 36x^2$ is
1. 4 2. -4 3. -16 4. 16
Solution: no answer add score to all.
16. $\sqrt{10 + \sqrt{25 + \sqrt{108 + \sqrt{154 + \sqrt{225}}}}} =$
1. 16 2. 10 3. 5 4. 4
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Solution:
$$\sqrt{225} = 15$$
;
 $\sqrt{154 + \sqrt{225}} = \sqrt{154 + 15} = \sqrt{169} = 13$.
 $\sqrt{108 + \sqrt{154 + \sqrt{225}}} = \sqrt{108 + 13} = \sqrt{121} = 11$
 $\sqrt{25 + \sqrt{108 + \sqrt{154 + \sqrt{225}}}} = \sqrt{25 + 11} = \sqrt{36} = 6$
 $\sqrt{10 + \sqrt{25 + \sqrt{108 + \sqrt{154 + \sqrt{225}}}}} = \sqrt{10 + 6} = \sqrt{16} = 4$.
Answer 1.

GEOMETRY

Angle: An angle is a figure formed by two rays with the same initial point. The common initial point is called the vertex of the angle and the rays forming the angle are calld its arms or sides.

Types of Angle

Acute Angle: An angle which is greater than zero but less than a right angle (90°) is called an acute angle.

Right Angle: An angle whose measure is exactly equal to 90° is called an right angle.

Obtuse Angle: An angle which is greater than a right angle but less than 180^o (i.e.,) a straight angle, is called an obtuse angle.

Straight Angle: An angle whose measure is 180° is called a straight angle.

Reflex Angle: An angle which is greater than 180° but less than 360° is called a reflex angle.

Complete Angle: An angle whose measures in 360° is called a complete angle.

Types of pairs of Angle:

Let *l* and *m* be two parallel lines, *n* be a transversal for *l* and *m*.

Adjacent Angles: Two angles are said to be adjacent, if they have a common vertex and common arm (ray).

Linear Pair: Two adjacent angles are said to form a linear pair of angles, if their two non common are opposite rays. The sum of measures of angles of the linear pair is 180^o.

Vertically Opposite Angles: Two angles formed by two intersecting lines having no common arm are called vertically opposite angles.

Interior Angles: Angles which are within the parallel lines *l*, *m* are called Interior Angles.

Exterior Angles: Angles which are not within the parallel lines are called exterior angles.



Corresponding Angles: (A, E), (B, F), (D, H), (C, G) are called corresponding angles.

These pair of angles are equal.

Alternate Interior Angles: (C, E), (D, F) are alternate interior angles. These pair of alternate interior angle sare equal.

Alternate Exterior Angles: (B, H), (A, G) are alternate exterior angles. These pair of alternate exterior angles are equal.

Complementary Angles: If the sum of two angles is 90°, then the pair of angles are said to be complementary angles.

Supplementary Angles: If the sum of two angles is 180°, then the pair of angle sare said to be supplementary angles.

Triangle: Definition: A triangle is a 3-sided polygon. If two sides of a triangle are equal, it is called isosceles triangle. If all the three are equal, it is called equilateral triangle. If all of the sides have different lengths, the triangle is scalene.

Properties of Triangle: The sum of the angles of a triangle is 180[°].

The sum of the lengths of any two sides of the triangle is greater than the third side.

Pythagoras Theorem: The square of the length of the hypotenuse is equal to the sum of the squares of the lengths of the other two sides.

 $AB^2 + BC^2 = AC^2$, where AC is the hypotenuse.

Similarity: If two geometric figures are congruent, they have the same shape and same size. Geometric figures which are of the same shape but not necessarily of the size are called similar figures.

Similar Triangles: Two triangles, which have the three angles of one triangle equal to the three angles of the other triangle and all the ratios between the measures of corresponding sides equal are said to be similar. If triangle ABC is similar to A'B'C' then we write $\triangle ABC \sim \triangle A'B'C'$

Note: i) $\triangle ABC$ is equiangular to $\triangle A'B'C'$, then, $\angle A = A'$, $\angle B = \angle B'$, $\angle C = \angle C'$.

$$ii) \qquad \frac{a}{a'} = \frac{b}{b'} = \frac{c}{c'}$$

Important Results:

- 1. In a triangle, a line drawn parallel to one side to intersect the other sides in distinct points divides the two sides in the same ratio.
- 2. If a line divides any two sides of a triangle in the same ratio, then it is parallel to the third side.
- 3. The bisector of an angle of a triangle divides the opposite side in the ratio of the sides containing the angle.
- 4. In in two triangles, corresponding angles are equal (i.e.) the two triangles are equiangular, then the triangles are similar.
- 5. If corresponding sides of two triangles are proportional, then they are similar.
- 6. If in two triangles one pair of corresponding sides are proportional and the included angles are equal, then the two triangles are similar.

Quadrilateral: Definition: A figure formed by joining four points in an order is called a quadrilateral. A quadrilateral has four sides, four angles and four vertices.

Types of Quadrilateral: Different types of quadrilateral are drawn below,

Square: A quadrilateral having all sides equal and all angles $= 90^{\circ}$

Rhombus: A special type of parallelogram having opposite sides equal and all angles $= 90^{\circ}$

Rhombus: All sides are equal and sides are not perpendicular.

Parallelogram: Opposite sides are equal and parallel.

Trapezium: One pair of opposite side is parallel.

Important Points: 1. The sum of angles of quadrilateral $= 360^{\circ}$.

- 2. A square is a rectangle and also a rhombus.
- 3. A parallelogram is a trapezium but the converse is not true.
- 4. A rectangle or a rhombus is not a square.
- 5. The diagonal of a parallelogram divides it into two congruent triangles.
- 6. The idagonals of a parallelogram bisect each other.

Circle: Definition: The collection of all the points in a plane, which are at a fixed distance from a fixed point in the plane, is called a circle.

Radius: The line segment joining the centre and any point on the circle is called the radius of the circle.

Chord: The line segment joining any two points on the circle is called the chord of the circle. The diameter is the biggest chord of the circle.

Circumference: The length of the complete circle is called its circumference.

Important points:

- 1. Equal chords of a circle and equidistant from the centre.
- 2. Chords equidistant from the centre of a circle are equal in length.
- 3. If two chords of a circle are equal, then their corresponding arcs are congruent and conversely, if two arcs are congruent, then their corresponding chords are equal.
- 4. The angle subtended by an arc at the centre is double the angle subtended by it at any point on the remaining part of the circle.
- 5. Angle in a semicircle is a right angle.
- 6. If the sum of either pair of opposite angles of a quadrilateral is 180⁰, then the quadrilateral is cyclis (the converse is also true).
- 7. Angles in the same segment of a circle are equal.

Note: A quadrilateral is called cyclic, if all the four of its vertices lie on a circle.

Tangent to a circle: A tangent to a circle is a line that intersects the circle in exactly one point.

Regular Hexagon: A simple closed figure bounded by six sides and all its angles and sides are equal is called Regular Hexagon.

The angle subtended by a regular hexagon at the centre of circumscribed circle is 60° .

Area of regular hexagon = $\frac{3\sqrt{3}}{2}a^2$ or $\frac{6\sqrt{3}}{4}a^2$, where a = side of the regular hexagon.

Regular Octagon: The angle subtend by a regular octagon at the centre of circumscribed circle is 45^o.

Area of the regular octagon = $2(1 + \sqrt{2})a^2$, where a = side of the regular octagon.

Regular Polygon: Len '*n*' be the number of sides.

Then sum of interior angles of a convex polygon of n sides = (2n - 4) right angles.

Each interior angles =
$$\frac{(2n-4)}{n}$$
 right angles. Each exterior angle = $\left(\frac{360}{n}\right)^n$.

Number of sides = $\frac{360^0}{\text{Exterior Angle}}$.

PROBLEMS

- 1. If the perimeter of a circle is equal to the length of the side of a square of area $64m^2$, then the area of the circle is
 - 1. $\frac{16}{\pi^2} m^2$ 2. $\frac{16}{\pi} m^2$ 3. $\frac{8}{\pi^2} m^2$ 4. $\frac{8}{\pi} m^2$

Solution: Area of a square $= s^2 = 64m^2 \implies s = 8m$.

Perimeter of a circle = $2 \pi r = s = 8m$. So $r = \frac{8m}{2\pi} = \frac{4m}{\pi}$.

Area of a circle = $\pi r^2 = \pi \cdot \frac{4m}{\pi} \cdot \frac{4m}{\pi} = \frac{16}{\pi} m^2$. So the answer is 2.

2. If the internal angle between any two consecutive sides of a regular polygon with *n* sides is 120° , then n =

1. 4 2. 5 3. 6 4. 8 Solution: Each interior angle of a regular polygon = $\frac{(n-2)180}{n}$.

So
$$\frac{(n-2)180}{n} = 120 \Longrightarrow n = 6$$
. So the answer is 3.

- 3. If two circles intersect at *n* points then the maximum possible value for *n* is
 1. 1
 2. 2
 3. 3
 4. 4
 Solution: Two circles can intersect maximum at two points only. So the answer is 2.
- 4. In Δ ABC, AD is drawn perpendicular to BC. The correct relation, among the following is
 - 1. $AC^2 CD^2 = AB^2 BD^2$ 2. $AB^2 - CD^2 = AC^2 - BD^2$ 3. $AC^2 - AB^2 = BD^2 - CD^2$ 4. $AC^2 - BD^2 = AB^2 - CD^2$ Solution: $AC^2 = AD^2 + CD^2$ and $AB^2 = AD^2 + BD^2$ (by Pythogorous theorem) $\Rightarrow AC^2 - CD^2 = AD^2 = AB^2 - BD^2$. So the answer is 1.
- 5. A parallelogram and a triangle lie on the same base; and the third vertex of the triangle lies on the opposite side parallel to the base. If the area of the parallelogram is 72sq.cm. then the area of the triangle (in sq.cms.) is

 1. 144
 2. 72
 3. 36
 4. 18

 Solution: Area of parallelogram = 72sq.cm.

 1
 1

Area of triangle = $\frac{1}{2}$. Area of parallelogrm = $\frac{1}{2}$ x 72 = 36. So the answer is 3.

- 6. If p is a point on the circle with centre C and if AB is a chord of the circle such that $\angle APB = 30^{\circ}$ then $\angle ACB = 1$. 30° 2. 45° 3. 60° 4. 90° Solution: $\angle ACB = 2 \angle APB = 2(30) = 60^{\circ}$. So the answer is 3.
- 7. If the wheel of a motor cycle makes 1000 revolution in moving a distance 550 meters, then the radius in (in centimetres) of the wheel.

1. 87.5 2. 8.75 3. 0.875 4. 9 Solution: 1000 x $2\pi r = 550$ x 100 cm. So $r = \frac{35}{4} = 8.75$ cm. So the answer is 2.

8. If M, N, R are respectively, the middle points AB, BC and CA of triangle ABC, then the ratio $\triangle ABC: \triangle MNR =$ 1. 2:3 2. 3:2 3. 4:1 4. 1:4 Solution: Area of triangle MNR = $\frac{1}{4}$ area of triangle ABC.

So $\triangle ABC: \triangle MNR = 4:1$. So the answer is 3.

9. If PQRS is a cyclic rhombus, then $\angle Q =$ 1. 60° 2. 150° 3. 120° 4. 90°

Solution: A cyclic rhombus is a square. So $\angle Q = 90^{\circ}$. So the answer is 4.

- 10. In a $\triangle ABC$, AB = 4, AC = 6 and D is a point on BC such that AD is the bisector of $\angle A$ then BD : DC = 1. 3:2 2. 2:3 3. 1:4 4. 4:1 Solution: BD : DC = AB : AC = 4 : 6 = 2 : 3. So the answer is 2.
- 11. An angle θ degrees is such that its complement is equal to one-fourth of its suplement, then $\theta = 1$. 60° 2. 90° 3. 180° 4. 45° Solution: If sum of two angles = 90° . Then the angles are said to be complementary. If sum of two angles = 180° . Then the angles are said to be suplementary.

So 90 - A = $\frac{1}{4}(180 - A) \Rightarrow A = 60^{\circ}$. So the answer is 1.

- 12. The sum of the angles in a regualr hexogon is =
 - 1. 600° 2. 720° 3. 900° 4. 480°

Solution: Sum of all interior angles of a regular polygon = (2n - 4) right angles. Here n = 6. So $(12 - 4)90 = 720^{\circ}$. So the answer is 2.

13. Each interior angle of a regular 18-gon is =

1. 180° 2. 200° 3. 160° 4. 360°

Solution: Each interior angle of a regular polygon = $\frac{(n-2)180}{n}$.

Here n = 18. So $\frac{(18-2)180}{18} = 160^{\circ}$. So the answer is 3.

14. A, B and C are points on a circle wih centre O. If $\angle AOC = 130^{\circ}$, then $\angle ABC =$

1.
$$65^{\circ}$$
 2. 60° 3. 55° 4. 50°

Solution: The angle subtended by an arc of a circle at the centre is double the angle subtended by the same arc at any point on the circumference of the circle.

- So $\frac{130}{2} = 65^\circ$. So the answer is 1.
- 15. An equilateral triangle is inscribed in a circle of radius 6 units. Then the area of the triangle in square units is

1.
$$27\sqrt{3}$$

2. $\sqrt{27}$
3. 27
4. $\frac{27}{\sqrt{3}}$
Solution: $a = \text{side} = \sqrt{3} \text{ radius} = 6\sqrt{3}$.
Area of the equilateral triangle $= \frac{\sqrt{3}}{4}a^2 = \frac{\sqrt{3}}{4} \cdot 6\sqrt{3} \cdot 6\sqrt{3} = 27\sqrt{3}$.
So the answer is 1.
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B
21.
B
B
21.
B
B
21.
C
In the above figure if $\angle ABC = \angle BDC = 90^\circ, BD = AD$, then $\angle BCD = 1$.
3. 30°
2. 45°
3. 60°
4. 75°
Solution: $\angle BCD = 45^\circ$
So the answer is 1.

QUADRATIC EQUATIONS

Concepts and Formulae:

- 1. If $a \neq 0$, b, c are real or complex numbers then $ax^2 + bx + c$ is called a quadratic expression in x and $ax^2 + bx + c = 0$ is called a quadratic equation.
- 2. A real or complex number ' α ' is said to be a root or solution of the quadratic equation $ax^2 + bx + c = 0$ if $a\alpha^2 + b\alpha + c = 0$.
- 3. i) A quadratic equation cannot have more than two roots (or) solutions.
 ii) If ax² + bx + c = 0 is satisfied for more than two values of x, then a = b = c = 0.
- 4. The roots of the quadratic equation $ax^2 + bx + c = 0$ are $\frac{-b \pm \sqrt{b^2 4ac}}{2a}$.
- 5. $\Delta = b^2 4ac$ is called the discriminant of the quadratic equation $ax^2 + bx + c = 0$.

6. i) If α, β are the roots of the quadratic equation $ax^2 + bx + c = 0$ then $\alpha + \beta = \frac{-b}{a}$, $\alpha\beta = \frac{c}{a}$ and $ax^2 + bx + c = a(x - \alpha)(x - \beta)$.

ii) The quadratic equation whose roots are α and β is,

 $(x - \alpha)(x - \beta) = 0 \Longrightarrow x^2 - (\alpha + \beta)x + \alpha\beta = 0.$

- 7. i) \sqrt{b} is irrational. If $a + \sqrt{b}$ is the root to the rational quadratic equation then $a \sqrt{b}$ is also a root.
 - ii) If a + ib is a root of the real quadratic equation then a ib is also a root.
- 8. If a, b, c are real then the nature of the roots of equation ax² + bx + c = 0 is as follows,
 i) If Δ > 0, then the roots are real and distinct.

ii) If $\Delta = 0$, then the roots are real and equal. In this case each root $= -\frac{b}{2a}$, this root is calld the double root or a repeated root.

iii) If $\Delta < 0$, then the roots are two non-real conjugate complex numbers.

- 9. If a, b, c are rational and $a \neq 0$, then the nature of the roots of equation $ax^2 + bx + c = 0$ is as follows,
 - i) If $\Delta > 0$ and is perfect square then the roots are rational and distinct.
 - ii) If $\Delta > 0$ and is not perfect square then the roots are conjugate surds (irrationals).

iii) If $\Delta = 0$, then the roots are rational and equal.

iv)If $\Delta < 0$, then the roots are non-real conjugate complx numbers.

10. Relation between the roots α , β of $ax^2 + bx + c = 0$, a, b, c are real,

i)
$$\alpha + \beta = -\frac{b}{a}, \ \alpha\beta = \frac{c}{a}$$

ii) $\alpha^2 + \beta^2 = (\alpha + \beta)^2 - 2\alpha\beta = \frac{b^2 - 2ac}{a^2}$
iii) $(\alpha - \beta)^2 = (\alpha + \beta)^2 - 4\alpha\beta \Rightarrow |\alpha - \beta| = \frac{\sqrt{b^2 - 4ac}}{|a|} [\text{ if } b^2 - 4ac \ge 0]$
iv) $\frac{1}{\alpha} + \frac{1}{\beta} = \frac{\beta + \alpha}{\alpha\beta} = -\frac{b}{c} \text{ if } c \ne 0$
v) $\alpha^2 - \beta^2 = (\alpha + \beta) (\alpha - \beta) = -\frac{b}{a} = \frac{\sqrt{b^2 - 4ac}}{|a|} [\text{ if } b^2 - 4ac \ge 0]$
vi) $\frac{\alpha}{\beta} + \frac{\beta}{\alpha} = \frac{\alpha^2 + \beta^2}{\alpha\beta} = \frac{b^2 - 2ac}{ac} [\text{ if } c \ne 0]$
vii) $\frac{1}{\alpha^2} + \frac{1}{\beta^2} = \frac{b^2 - 2ac}{ac} [\text{ if } c \ne 0]$
For any quadratic equation $ax^2 + bx + c = 0$,

i) If 'a' and 'c' are of the same sign then product of roots = $\frac{c}{a}$ is +ve \Rightarrow the roots have the same sign.

ii) If 'a' and 'c' are of opposite signs them product of roots =
$$\frac{c}{a}$$
 is -ve

- \Rightarrow the roots will have opposite sign.
- iii) If both the roots are -ve then a, b, c will have the same sign.

iv) If the two roots are +ve then a, c will have the same sign different from the sign 'b'.

v) If a = c then the roots are reciprocal to each other [product of the roots is 1].

vi) If b = 0 then the sum of the roots is equals to zero [the roots have the same absolute value i.e., the roots are in the form $\alpha, -\alpha$].

vii) If a + b + c = 0 then the roots are 1 and $\frac{c}{a}$.

viii) If a - b + c = 0 i.e., a + c = b then the roots are -1 and $-\frac{c}{a}$.

ix) If one root is zero then c = 0.

x) If a = 1, b, c are integers and the roots are rational numbers, then these roots must be integers.

xi) If the roots are in the ratio m: n, then $\frac{(m+n)^2}{mn} = \frac{b^2}{ac} \Rightarrow (m+n)^2 ac = mnb^2$. xii) If one root is k times the other (1:k), then $(1+k)^2 ac = kb^2$.

11.

xiii) If one root is equal to the n^{th} power of the other root (α, α^n), then

$$(ac^{n})^{\frac{1}{n+1}+}(a^{n}c)^{\frac{1}{n+1}+b}=0.$$

xiv) If one root is the square of the other (α, α^2) , then $ac^2 + a^2c + b^3 = 3abc$.

xv) If roots differ by unity $(\alpha, \alpha + 1)$, then $b^2 = 4ac + a^2$.

- 12. If $a_1x^2 + b_1x + c_1 = 0$ and $a_2x^2 + b_2x + c_2 = 0$ have the same roots then $a_1: a_2 = b_1: b_2 = c_1: c_2$.
- 13. If the equations $a_1x^2 + b_1x + c_1 = 0$ and $a_2x^2 + b_2x + c_2 = 0$, $(a_1b_1 a_2b_1 \neq 0)$ have a common root

then
$$(c_1a_2 - c_2a_1)^2 = (a_1b_2 - a_2b_1)(b_1c_2 - b_2c_1)$$
 and the common root is $\frac{c_1a_2 - c_2a_1}{a_1b_2 - a_2b_1}$.

14. If α, β are the roots of $f(x) = ax^2 + bx + c = 0$ then

| S.No. | Roots | Quadratic Equation |
|-------|--|---|
| 1. | -α,-β | f(-x)=0 |
| 2. | $\frac{1}{\alpha}, \frac{1}{\beta}$ | $f\left(\frac{1}{x}\right) = 0$ |
| 3. | $k\alpha, k\beta(k \neq 0)$ | $f\left(\frac{x}{k}\right) = 0$ |
| 4. | $\frac{\alpha}{k}, \frac{\beta}{k} (k \neq 0)$ | f(kx)=0 |
| 5. | $\alpha + h, \beta + h$ | f(x - h) = 0 |
| 6. | $\alpha - h, \beta - h$ | f(x+h)=0 |
| 7. | α^2,β^2 | $f(-\sqrt{x}).f(\sqrt{x}) = 0$ |
| 8. | α^3, β^3 | $f(\sqrt[3]{x}) = 0$ or $a^3 x^2 + (b^3 - 3abc)x + c^3 =$ |
| 9. | $\frac{\alpha}{1+\alpha}, \frac{\beta}{1+\beta}$ | $f\left(\frac{x}{1-x}\right) = 0$ |
| 10. | $m\alpha + k$, $m\beta + k$ | $f\left(\frac{x-k}{m}\right) = 0 \ (\ m \neq 0 \)$ |

15. Let $f(x) = ax^2 + bx + c$ be a quadratic function. Then,

0

i) If
$$a > 0$$
, then $f(x)$ has minimum value at $x = -\frac{b}{2a}$ and the minimum value $=\frac{4ac-b^2}{4a}$.

ii) If a < 0, then f(x) has maximum value at $x = -\frac{b}{2a}$ and the maximum value $=\frac{4ac-b^2}{4a}$

16. If $ax^2 + bx + c$ is a quadratic expression then $ax^2 + bx + c > 0$ (or) $ax^2 + bx + c \ge 0$ (or) $ax^2 + bx + c < 0$ (or) $ax^2 + bx + c \le 0$ is called a quadratic inequation (or) quadratic inequality.

PROBLEMS

- 1. If α, β are the roots of the equation $x^2 + x + 1 = 0$, then the value of $\alpha^{28} \beta^{56} =$ 1. -1 2. $\alpha - \beta$ 3. $\alpha + \beta$ 4. 0 Solution: The roots of $x^2 + x + 1 = 0$ are $\alpha + \beta = -1$ -----(1). We also have $\alpha^2 + \alpha + 1 = 0$, $\beta^2 + \beta + 1 = 0$. So $\beta^2 = -1 - \beta = \alpha \Rightarrow \beta^2 = \alpha \Rightarrow (\beta^2)^{28} =$ $(\alpha)^{28}$ $\Rightarrow \beta^{56} = \alpha^{28} \Rightarrow \alpha^{28} - \beta^{56} = 0$. So the answer is 4.
- 2. If α and β are the roots of the equation $x^2 ax + b = 0$ then the quadratic equation whose roots are $\alpha + \beta + \alpha\beta$ and $\alpha\beta \alpha \beta$ is
 - 1. $x^2 2ax + a^2 b^2 = 0$ 3. $x^2 - 2bx - a^2 + b^2 = 0$ 4. $x^2 - 2bx = b^2 - a^2$

Solution: $\alpha + \beta = a$ and $\alpha\beta = b$. So $\alpha + \beta + \alpha\beta = a + b$ and $\alpha\beta - \alpha - \beta = b - a$. So the required equation is $x^2 - x(a + b + b - a) + (a + b)(b - a) = 0$. $\Rightarrow x^2 - 2bx + b^2 - a^2 = 0$. So the answer is 3.

3. If r is the ratio of the roots of the equation $ax^2 + bx + c = 0$ then $\frac{r}{(r+1)^2} =$

1.
$$ac - b^2$$
 2. $\frac{ac}{b^2}$ 3. $ac + b^2$ 4. $\frac{b^2}{ac}$

Solution: Let α, β be the roots of the equation, then $r = \frac{\alpha}{\beta}$.

So
$$\frac{r}{(r+1)^2} = \frac{\frac{\alpha}{\beta}}{\left(\frac{\alpha}{\beta}+1\right)^2} = \frac{\alpha}{\beta} \cdot \frac{\beta^2}{(\alpha+\beta)^2} = \frac{\alpha\beta}{(\alpha+\beta)^2} = \frac{\frac{c}{a}}{\left(\frac{-b}{a}\right)^2} = \frac{c}{a} \cdot \frac{a^2}{b^2} = \frac{ac}{b^2}.$$

So the ansewr is 2.

- 4. If the product and sum of the roots of a quadratic equation are $\frac{1}{4}$ and $\frac{5}{4}$ respectively, then the
 - equation is 1. $12x^2 - 4x + 3 = 0$ 3. $4x^2 - 5x + 1 = 0$ 4. $4x^2 + 5x - 1 = 0$

Solution: Let α, β be the roots. Given that $\alpha\beta = \frac{1}{4}$, $\alpha + \beta = \frac{5}{4}$. So the answer is 3.

(Note: If α, β are the roots of the quadratic equation $ax^2 + bx + c = 0$ then $\alpha + \beta = \frac{-b}{a}$, $\alpha\beta = \frac{c}{a}$ and $ax^2 + bx + c = a(x - \alpha)(x - \beta)$.

5. If α and β are the roots of the equation $ax^2 + bx + c = 0$, where a and c are not equal to zero

then
$$\frac{\alpha}{\beta^2} + \frac{\beta}{\alpha^2} =$$

1. $\frac{3abc-b^3}{ac^3}$ 2. $\frac{3abc-b^3}{ac^2}$ 3. $\frac{3abc-b^3}{ac}$ 4. 0

Solution:
$$\frac{\alpha^3 + \beta^3}{\alpha^2 \beta^2} = \frac{(\alpha + \beta)(\alpha^2 - \alpha\beta + \beta^2)}{\alpha^2 \beta^2} = \frac{(\alpha + \beta)[(\alpha + \beta)^2 - 3\alpha\beta]}{\alpha^2 \beta^2} = \frac{\frac{-b}{a} \left\lfloor \frac{b^2}{a^2} - \frac{3c}{a} \right\rfloor}{\frac{c^2}{a^2}}$$

$$= -\frac{b}{a} \left[\frac{b^2 - 3ac}{a^2} \right] \frac{a^2}{c^2} = \frac{3abc - b^3}{ac^2}$$
. So the answer is 2

- 6. The maximum value of the expression $5 + 6x x^2$ is 1. 11 2. 12 3. 13 4. 14 **Solution:**Let $f(x) = ax^2 + bx + c$ be a quadratic function. Then, if a < 0, then f(x) has maximum value at $x = -\frac{b}{2a}$ and the maximum value $= \frac{4ac - b^2}{4a}$. Here a = -1, b = 6, c = 5. So the maximum value $= \frac{4(-1)(5) - 6^2}{4(-1)} = \frac{-20 - 36}{-4} = \frac{56}{4} = 14$. **So the answer is 4.**
- 7. If one root of the equation $ax^2 + bx + c = 0$ is double the other root, then 1. $2b^2 = 9ac$ 2. $2b^2 = 8ac$ 3. $b^2 = 9ac$ 4. $2b^2 = ac$ **Solution:** Let α and β are the roots of the equation $ax^2 + bx + c = 0$.

Given that $\alpha = 2\beta$. Now product of the roots $= \frac{c}{a} \Rightarrow \alpha\beta = \frac{c}{a} \Rightarrow 2\beta^2 = \frac{c}{a}$ -----(1) Some of the roots = $-\frac{b}{a} \Rightarrow \alpha + \beta = -\frac{b}{a} \Rightarrow 2\beta + \beta = -\frac{b}{a} \Rightarrow 3\beta = -\frac{b}{a} = ----(2)$ From (1) and (2) $2\left(\frac{-b}{3a}\right)^2 = \frac{c}{a} \Rightarrow \frac{2b^2}{9a^2} = \frac{c}{a} \Rightarrow 2b^2 = 9ac$. So the answer is 1. 8. If $x^2 + 2(k+2)x + 36 = 0$ has equal roots, then k =1. 4 2. 8 3. -4 4. 9 **Solution:** Let α, α be the roots, then $\alpha + \alpha = -2(k+2) \Rightarrow 2\alpha = -2(k+2) \Rightarrow \alpha = -(k+2)$ Now product of the roots = $\alpha^2 = 36 \Rightarrow \alpha = \pm 6$. So k = -8 or 4. So the answer is 1. 9. If the roots of $x^2 + px + 12 = 0$ are in the ratio 1 : 3 then $p^2 =$ 2. 36 1. 49 3. 64 4. 25 **Solution:** Let α, β be the roots. So $\alpha = k, \beta = 3k$. Now sum of the roots k + 3k = -p $\Rightarrow 4k = -p$ and product of the roots $k(3k) = 12 \Rightarrow 3k^2 = 12 \Rightarrow k^2 = 4 \Rightarrow k = +2$. $p^2 = (4k)^2 = 16k^2 = 16(4) = 64$. So the answer is 3. 10. The value of x for which $x^2 - 5x + 6 > 0$ are 2. x > 3 only 3. 2 < x < 34. x < 2 (or) x > 31. x < 2 only **Solution:** $x^2 - 5x + 6 > 0 \Rightarrow (x - 2) (x - 3) > 0$. Now we have two cases case (1) x - 2 > 0 and x - 3 > 0 (or) case (2) x - 2 < 0 and x - 3 < 0 \Rightarrow x > 2 and x > 3 (or) x < 2 and x < 3 $\Rightarrow x > 3$ (or) x < 2. So the answer is 4. 11. If $\sin \theta$ and $\cos \theta$ are the roots of the equation $px^2 + qx + r = 0$ then $q^2 - p^2 = 1$ 1. 2rp 2. rp 3. 2p 3. 2r **Solution:** Sum of the roots $\Rightarrow \sin \theta + \cos \theta = -\frac{q}{n}$, Product of the roots $\Rightarrow \sin \theta \cdot \cos \theta = \frac{r}{p}$. Therefore $(\sin \theta + \cos \theta)^2 = \frac{q^2}{p^2}$ $\Rightarrow \sin^2\theta + \cos^2\theta + 2\sin\theta\cos\theta = \frac{q^2}{n^2} \Rightarrow 1 + 2\frac{r}{n} = \frac{q^2}{n^2} \Rightarrow p^2 + 2rp = q^2.$ So $q^2 - p^2 = 2rp$. So the answer is 1. 12. The number of solutions of $x^2 - 7|x| + 12 = 0$ is 1. 1 2. 2 3. 3 4. 4 **Solution:** $|x|^2 - 7|x| + 12 = 0 \implies (|x| - 3) (|x| - 4) = 0 \implies |x| = 3, |x| = 4$

 $\Rightarrow x = \pm 3, \pm 4$. So the answer is 4.

13. If x + y = 15 and $\frac{1}{x} + \frac{1}{y} = \frac{3}{10}$ then the values of x and y are 1. 5, 10 2. 6, 10 3. -5, -10 4. -6,-10 Solution:x + y = 15 -----(1) $\frac{x + y}{xy} = \frac{3}{10} \Rightarrow 10(x + y) = 3xy$ $\therefore 3xy = 150; xy = 50$ ------(2). From (1) and (2) x = 5, y = 10. So the answer is 1. 14. If $\frac{11}{x} - \frac{7}{y} = 1$ and $\frac{19}{x} - \frac{4}{y} = 6$ then (x, y) =1. $\left\{\frac{1}{2}, \frac{1}{3}\right\}$ 2. $\left\{\frac{1}{3}, -\frac{1}{2}\right\}$ 3. $\left\{\frac{1}{2}, -\frac{1}{3}\right\}$ 4. $-\frac{1}{3}, -\frac{1}{2}$

Solution: Verifying the given options by substituting the values we get the answer as 1.

ICET-2011

- 29. If α,β are the roots of the equation $7x^2 8x + 6 = 0$ then $(\alpha^2 + \beta^2)(\alpha + \beta) =$
 - 1. $\frac{-20}{49}$ 2. $\frac{20}{49}$ 3. $\frac{-160}{343}$ 4. $\frac{160}{343}$

Solution: If α, β are the roots of the equation $ax^2 + bx + c = 0$ then $\alpha + \beta = \frac{-b}{a}$, $\alpha\beta = \frac{c}{a}$

Let α , β be the roots of the equation $7x^2 - 8x + 6 = 0$.

Now sum of the roots $\alpha + \beta = \frac{-b}{a} = \frac{8}{7}$ and product of the roots $\alpha\beta = \frac{c}{a} = \frac{6}{7}$.

Now
$$(\alpha^2 + \beta^2) (\alpha + \beta) = [(\alpha + \beta)^2 - 2\alpha\beta](\alpha + \beta) = \left(\frac{64}{49} - \frac{12}{7}\right)\left(\frac{8}{7}\right) = \frac{-160}{343}.$$

So the answer is 3.

ICET-2012 - NO QUESTION FROM THIS.

PROGRESSIONS

- 1. i) A function $f: N \rightarrow R$ is called a sequence of real numbers (or real sequence).
 - ii) $\{f(n)/n \in N\}$ is the range of the sequence.
 - iii) We denote the elements of sequence as $\{f(n)\}\$ and write them as $\{a_n\}$.
 - iv) If $\{a_n\}$ is a sequence $s_n = a_1 + a_2 + \dots + a_n$ is called the sum of 'n' terms of the sequence.
 - v) The sequence $\{s_n\}$ is calld the series corresponding to $\{a_n\}$. We write it as $\sum a_n$.
 - vi) If $\sum a_n$ consists finite number of terms it is called finite series, otherwise it is said to be infinite.

Arithmetic Progression (A.P.)

- 2. i) A sequence of numbers $a_1, a_2, ..., a_n$ is said to be an Arithmetic Progression or A.P., if the difference between any two successive terms is the same (i.e. a constant)
 - ii) a, a + d, a + 2d, ..., a + (n 1)d, ... is taken as a standard A.P. 'a' is called the first term and 'd' is called the Common Difference.
 - iii) For an A.P., there are two unknows, (i) First term and (ii) Common difference.
 - iv) The n^{th} term of an A.P. with first term 'a' said and Common difference 'd' is 'a + (n 1)d'.

We denote it by $T_n = a + (n - 1)d$.

3. The sum of first 'n' terms of an A.P. is
$$S_n = \frac{n}{2}(2a + (n-1)d)$$
, where 'a' is the first term and

'd' is the common difference. Also $S_n = \frac{n}{2}(a + T_n)$

4. Arithmetic means between two given numbers

- i) If a, b, c are in A.P. then 'b' is called the Arithmetic Mean (A.M.) of two numbers a and c.
- ii) If a, b, c are in A.P. then $b = \frac{a+c}{2}$. Hence the A.M. between two numbers a and c is

$$\frac{a+c}{2}$$

- iii) If a, a_1, a_2, \dots, a_n , b are in A.P. then a_1, a_2, \dots, a_n are called 'n' A.M's between a and b.
- iv) If there are '*n*'A.M's between *a* and *b* then the of the A.P. is $\frac{b-a}{n+1}$.
- v) The sum of 'n'A.M.'s between a and b is $\frac{n}{2}(a+b) = n$ times the A.M. of a and b.
- vi) The 'n'A.M.'s between a and b, are given by

$$a_1 = a + \left[\frac{b-a}{n+1}\right]; a_2 = a + \left[\frac{b-a}{n+1}\right] \dots a_n = a + \frac{n(b-a)}{n+1}$$

vii) The Arithmetic mean of 'n' numbers is $\frac{a_1 + a_2 + a_3 + \dots + a_n}{n}$

5. **Properties of Arithmetic Progression (A.P.)**

- i) If $a_1, a_2, ..., a_n$ are in A.P. and k is any constant then $a_1 + k, a_2 + k, ..., a_n + k$ are also in A.P. with same common difference.
- ii) If $a_1, a_2, ..., a_n$ are in A.P. and k is any number then $a_1, k, a_2, k, ..., a_n, k$ are also in A.P. with of the resulting A.P. is k times that of original A.P.
- iii) If a_1, a_2, \dots, a_n are in A.P., then $\frac{a_1}{k}, \frac{a_2}{k}, \dots, \frac{a_n}{k}$ are also in A.P., where $k \neq 0$.
- iv) In an A.P. with finite number of terms, the sum of terms equidistant from both the ends is a constant and equal to the sum of the first and last terms i.e. if $a_1, a_2, ..., a_n$ are in A.P. then

$$a_1 + a_n = a_2 + a_{n-1} = a_3 + a_{n-2}.$$

v) In an A.P., with first term a and common difference $= d.T_{n-k} = a + (n - k - 1)d$, T_{n+k}

$$=a(n+k-1)d$$
 and $T_n = a(n+1)d$ for $n > k$, $n \neq 1$, then $T_n = \frac{T_{n-k} + T_{n+k}}{2}$, i.e., if the

terms of A.P. are chosen in regular intervals, then the terms form an A.P.

6. General ways of selecting certain terms of A.P. to make easy calculation

- i) Three numbers in A.P may be taken as a d, a, a + d.
- ii) Four numbers in A.P. may be taken as a 3d, a d, a + d, a + 3d.
- iii) Five numbers in A.P. may be taken as a 2d, a d, a, a + d, a + 2d.

7. Geometric Progression (G.P.)

- i) A sequence of non-zero numbers is said to be in GP. if the ratio between two successive terms is a constant. The constant ratio is called the Common Ratio (C.R.)
- ii) $a, ar, ar^2, \dots, ar^{n-1}, \dots$, of non zero terms form a G.P. with first term 'a' and common ratio = r.
- iii) In a G.P. there are two unknowns (i) First term 'a' and (ii) common ratio 'r'.
- iv) The *n*th term of a G.P. with first term '*a*' and C.R. = *r* is $T_n = a \cdot r^{n-1}$.
- v) If a G.P. consists of 'm' terms and m > n, then n^{th} term from the end is $a.r^{m-n}$.

8. Geometric Means (G.M.'s)

- i) If a, b, c are positive and in G.P., b is called the G.M. between a and c and $b = \sqrt{ac}$.
- ii) If $a, g_1, g_2, \dots, g_n, b$ are positive and in G.P. then g_1, g_2, \dots, g_n are called 'n' G.M.'s between a and b.
- iii) The common ratio of the G.P., with '*n*' geometric means is $\left\lceil \frac{b}{a} \right\rceil^{\frac{1}{n+1}}$.

iv) The geometric means are given by
$$g_1 = a \left[\frac{b}{a} \right]^{\frac{1}{n+1}}, g_2 = a \left[\frac{b}{a} \right]^{\frac{2}{n+1}}, \dots, g_n = a \left[\frac{b}{a} \right]^{\frac{n}{n+1}}$$

9. Sum of '*n*' terms of a G.P.

i) The sum of first *n* terms of a G.P., with first term '*a*' and Common Ratio = r is

$$S_n = a \frac{(1-r^n)}{(1-r)}$$
, if $r < 1$; $S_n = a \frac{(r^n - 1)}{(r-1)}$, if $r > 1$.

- ii) If r = 1, a + a + a + ... + a = na. Observe the sequence a, a, a, a, ... is both in A.P. and G.P.
- iii) The sum of infinite of G.P. is $S_{\infty} = \frac{a}{1-r}$ if |r| < 1 and $S_{\infty} = \frac{a}{1-r}$ if r > 1.

10. Harmonic Progression (H.P.):

i) A sequence $a_1, a_2, ..., a_n$ of non zero numbers is said to be in H.P. if the sequence of their reciprocals $\frac{1}{a_1}, \frac{1}{a_2}, ..., \frac{1}{a_n}, ...$ is in A.P.

ii) A H.P. may be written as
$$\frac{1}{a}$$
, $\frac{1}{a+d}$, $\frac{1}{a+2d}$, $\frac{1}{a+(n-1)d}$,

iii) If a_1, a_2, \dots, a_n are in H.P. then the n^{th} term of the corresponding A.P. is

$$T_n = \frac{1}{a_1} + (n-1) \left[\frac{1}{a^2} - \frac{1}{a_1} \right] \quad \therefore n^{\text{th}} \text{ terms of H.P. is } T_n = \frac{1}{\frac{1}{a_1} + (n-1) \left[\frac{1}{a_2} - \frac{1}{a_1} \right]}$$

iv) If a, b, c are in H.P., then b is called the Harmonic Mean (H.M) between a and c.

$$b = \frac{2ac}{a+c}$$

v) If $a, h_1, h_2, ..., h_n$, b are in H.P. then $h_1, h_2, ..., h_n$ are called 'n' H.M.'s between a and b. The common difference of the corresponding A.P. is $d = \frac{a-b}{(n+1)ab}$.

11. Harmonic Mean of 'n' non zero numbers

i) If
$$a_1, a_2, \dots, a_n$$
 are 'n' non zero numbers then their H.M. = $\frac{n}{a_1 + a_2 + \dots + a_n}$.

12. Relationship of A, G, H (A.M., G.M. and H.M.)

i) If A is the A.M., G is the G.M. and H is the H.M. between two positive numbers then (1) $A \ge G \ge H$ and (2) $G^2 = AH$. ii) A, G, H form a descending G.P.

13. Arithmetic - Geometric Progression (A.G.P)

- i) A sequence of the form a, (a + d)r, $(a + 2d)r^2$,..., $[a + (n 1)dr^{n-1}$,... is called an Arithmetico Geometric Progression or shortly A.G.P.
- ii) In the A.G.P. $a, (a + d)r, (a + 2d)r^2 \dots [a + (n 1)d]r^{n-1}, \dots$ a) $a, a + d, a + 2d, \dots$ is an A.P.
 - b) 1, *r*, *r*².... is a G.P.
- iii) n^{th} term of A.G.P. is $[a + (n 1)d]r^{n-1}$.

iv)
$$S_n = \frac{a}{1-r} + \frac{dr(1-r^{n-1})}{(1-r)^2} - \frac{[a+(n-1)d]r^n}{1-r}$$

v) If
$$|r| < 1$$
, $S_{\infty} = \frac{a}{1-r} + \frac{dr}{(1-r)^2}$

14. i) The sum of the first 'n' natural numbers is denoted by $\sum n \ 1+2+3+...+n=\frac{n(n+1)}{2}$.

ii) The sum of the squares of first *n*-natural numbers is

$$= \sum n^2 = 1^2 + 2^2 + 3^2 + \dots + n^2 = \frac{n(n+1)(2n+1)}{6}$$

iii) The sum of the cubes of first *n*-natural numbers is

$$= \sum n^{3} = 1^{3} + 2^{3} + 3^{3} + \dots + n^{3} = \frac{n^{2}(n+1)^{2}}{4} (\sum n)^{2}.$$
PROBLEMS

1. The harmonic mean of 15, 10 is 1. 12.5 2. 13 3. 13.5 4. 12 **Solution:** The harmonic mean of *a* and *b* is $\frac{2ab}{a+b}$. Here a = 15, b = 10. 2(10)(15)

The harmonic mean = $\frac{2(10)(15)}{10+15}$ = 12. So the answer is 4.

- 2. The Geometric mean of 4 and x is 10, then x is equal to
 - 1. $\frac{5}{2}$ 2. 5 3. 25 4. 50

Solution: The harmonic mean of *a* and *b* is \sqrt{ab} . So $\sqrt{4x} = 10 \Rightarrow 4x = 100 \Rightarrow x = 25$. So the answer is 3.

- 3. If the 3rd and 7th terms of an arithmetic progression are 8 and 20 respectively, then the 5th term in that progression is
 - 1. 10 2. 12 3. 14 4. 16

Solution: $t_3 = a + (3 - 1)d = 8 \implies a + 2d = 8$; $t_7 = a + (7 - 1)d = 20 \implies a + 6d = 20$; From these we get $4d = 12 \implies d = 3$. Then a = 2. $t_5 = a + (5 - 1)d = 2 + 4(3) = 2 + 12 = 14$. So the answer is 3.

4. The least value of *n* such that $1 + 3 + 3^2 + \dots + 3^n > 2007$ is 1. 7 2. 8 3. 9 4. 10 **Solution:** The sum of first *n* terms of a G.P., with first term '*a*' and Common Ratio = *r* is

$$S_n = a \frac{(r^n - 1)}{(r - 1)}$$
, if $r > 1$. Here $a = 1, r = 3$.

Let us try with n = 7, then $S_7 = 1 \frac{(3^7 - 1)}{(3 - 1)} = \frac{2187 - 1}{2} = \frac{2186}{2} = 1093$.

Let us try with n = 8, then $S_8 = 1 \frac{(3^8 - 1)}{(3 - 1)} = \frac{6561 - 1}{2} = \frac{6560}{2} = 3280$.

So the least value of *n*=8. So the answer is 2.

Note: 3³=27;3⁴=81;3⁵=243;3⁶=729;3⁷=2187;3⁸=6561;

5. If $a_k = (\sqrt{3})^k$ for k = 1, 2, 3, ... and $\sum_{k=1}^n a_k = 39 + 13\sqrt{3}$ then n = 1.6 2.8 3.7 4.2

Solution:
$$\sum_{k=1}^{n} a_{k} = a_{1} + a_{2} + a_{3} + a_{4} + a_{5} + a_{6} + a_{7} + \dots$$
$$= (\sqrt{3})^{1} + (\sqrt{3})^{2} + (\sqrt{3})^{3} + (\sqrt{3})^{4} + (\sqrt{3})^{5} + (\sqrt{3})^{6} + (\sqrt{3})^{7} + \dots$$
$$= \sqrt{3} + 3 + 3\sqrt{3} + 9 + 9\sqrt{3} + 27 + 27\sqrt{3} + \dots$$
$$= 39 + 13\sqrt{13} + 27\sqrt{3}$$
. So $n = 6$. So the answer is 1.

6. If *m*, *n*, *r* are in arithmetic progression and *a*, *b*, *c* are in geometric progression then a^{n-r} . b^{r-m} . $c^{m-n} =$

1. 0 2. 1 3.
$$\sqrt{2}$$
 4. 2

Solution: *m*, *n*, *r* are in arithmetic progression, so $n = \frac{m+r}{2} \Rightarrow r = 2n - m$.

and *a*, *b*, *c* are in geometric progression then, $b = \sqrt{ac}$. So $c = \frac{b^2}{a}$.

Substituting these in a^{n-r} . b^{r-m} . $c^{m-n} = a^{n-2n+m}$. $b^{2n-m-m} \cdot \left(\frac{b^2}{a}\right)^{m-n} = a^{m-n} \cdot b^{2n-2m} \cdot (b^2)^{m-n} \cdot a^{n-m}$ = $a^{m-n+n-m} \cdot b^{2n-2m+2m-2n} = a^0 \cdot b^0 = 1$. 1 = 1. So the answer is 2. 7. If $a = b^2$ then $a^{\frac{1}{3}} a^{\frac{1}{9}} a^{\frac{1}{27}} \dots =$ 1. a 2. b 3. $\frac{1}{a}$ 4. $\frac{1}{b}$

Solution:
$$a^{\frac{1}{3}} a^{\frac{1}{9}} a^{\frac{1}{27}} \dots = a^{\frac{1}{3} + \frac{1}{9} + \frac{1}{27} + \dots} = a^{\frac{1}{3} + \frac{1}{3^2} + \frac{1}{3^3} + \dots} = a^{\frac{\overline{3}}{3}} a^{\frac{1}{1 - \frac{1}{3}}} = a^{\frac{1}{2}} = b.$$

So the answer is 2.

- (Note: $\frac{1}{3} + \frac{1}{3^2} + \frac{1}{3^3} + \dots$ is an infinite geometric progression. The sum of infinite of G.P. is $S_{\infty} = \frac{a}{1-r} \text{ if } |r| < 1. \text{ Here } a = \frac{1}{3}, r = \frac{1}{3})$
- 8. If the second term of an arithmetic progression is 20 and its fifth term is double the first then the sum to 20 terms of the series is

1. 64
2. 108
3. 1080
4. 2160
Solution:
$$t_2 = a + d = 20 \Rightarrow a = 20 - d$$
. -----(1)
Given that $t_5 = 2t_1 \Rightarrow a + 4d = 2a \Rightarrow 4d = a = 20 - d$ (from(1))
 $\Rightarrow 5d = 20 \Rightarrow d = 4$, then from (1) $a = 20 - 4 = 16$. Some of the first 20 terms
 $S_{20} = \frac{20}{2} [2a + (20 - 1)d] = 10[2(16) + (19)4] = 10[32 + 76] = 10[108] = 1080.$
So the answer is 3.

9. If
$$a_1 = 7$$
, $a_2 = 11$, $a_3 = 15$,.... and $a_n = 403$ then $n = 1$. 97 2. 98 3. 99 4. 100
Solution: $t_1 = a_1 = a = 7$; $t_2 = a_2 = a + d = 11 \Rightarrow d = 11 - a = 11 - 7 = 4$.
 $t_3 = a + 2d = 15 \Rightarrow 2d = 15 - a = 15 - 7 = 8 \Rightarrow d = 4$. So the given series is an A.P.
 $t_n = a_n = a + (n - 1)d = 403 \Rightarrow 7 + (n - 1)4 = 403 \Rightarrow 4n - 4 = 403 - 7 = 396$
 $\Rightarrow 4n = 396 + 4 = 400 \Rightarrow n = 100$. So the answer is 4.
10. $\frac{1}{16^3} \ge \frac{1}{16^9} \ge \frac{1}{16^{27}} \ge \frac{1}{16^{27}} \ge \frac{1}{16^3} = \frac{1}{16^3 + \frac{1}{9} + \frac{1}{27}} = \frac{1}{16^3 + \frac{1}{3^2} + \frac{1}{3^3}} = \frac{\frac{1}{16} = 1}{16^3 + \frac{1}{9} + \frac{1}{27}} = \frac{1}{16^3 + \frac{1}{3^2} + \frac{1}{3^3}} = \frac{1}{16^3 + \frac{1}{9} + \frac{1}{16^3}} = \frac{1}{16^3 + \frac{1}{9} + \frac{1}{16^3 + \frac{1}{9} + \frac{1}{16^3}} = \frac{1}{16^3 + \frac{1}{16^3$
(Note: $\frac{1}{3} + \frac{1}{3^2} + \frac{1}{3^3} + \dots$ is an infinite geometric progression. The sum of infinite of G.P. is $S_{\infty} = \frac{a}{1-r} \text{ if } |r| < 1. \text{ Here } a = \frac{1}{3}, r = \frac{1}{3})$

- 11. If the first two terms in an H.P are 6 and 3 then the third term is 1. 1 2. 2 3. 3 4 5 **Solution:** $t_1 = \frac{1}{a} = 6 \Rightarrow a = \frac{1}{6}; t_2 = \frac{1}{a+d} = 3 \Rightarrow a+d = \frac{1}{3}.$ So $d = \frac{1}{3} - a = \frac{1}{3} - \frac{1}{6} = \frac{1}{6}$. Now $a + 2d = \frac{1}{6} + 2 \cdot \frac{1}{6} = \frac{3}{6} = \frac{1}{2} \Rightarrow \frac{1}{a + 2d} = 2$. So $t_3 = \frac{1}{a+2d} = 2$. So the answer is 2. 12. $\tan\left(\frac{7\pi}{6}\right)$, $\tan\left(\frac{9\pi}{4}\right)$ and $\tan\left(\frac{10\pi}{3}\right)$ are in 1. A.P. 2. H.P. 3. G.P. 4. the ratio 1:2:3Solution: $\tan\left(\frac{7\pi}{6}\right) = \tan\left(\pi + \frac{\pi}{6}\right) = \tan\frac{\pi}{6} = \frac{1}{\sqrt{3}}; \ \tan\left(\frac{9\pi}{4}\right) = \tan\left(2\pi + \frac{\pi}{4}\right) = \tan\frac{\pi}{4} = 1;$ $\tan\left(\frac{10\pi}{3}\right) = \tan\left(3\pi + \frac{\pi}{3}\right) = \frac{\pi}{3} = \sqrt{3}$. So they are in G.P., where $a = \frac{1}{\sqrt{3}}$; $r = \text{common ratio} = \frac{1}{\sqrt{3}}$. So the answer is 3. 13. If the n^{th} term of an A.P. is 3n + 2 then the sum of the first 8 terms is 3. 136 4. 169 1. 112 2. 124 **Solution:** Given that $t_n = 3n + 2 \Longrightarrow t_1 = a = 3 + 2 = 5$ and $t_2 = a + d = 3(2) + 2 = 6 + 2 = 8$. So d = 8 - a = 8 - 5 = 3. Now the sum of first 8 terms, $S_8 = \frac{8}{2} [2a + (8 - 1)d] = 4[2(5) + 7(3)]$ = 4[10 + 21] = 4[31] = 124. So the answer is 2.
- 14. If k + 2, 4k 6 and 3k 2 are three consecutive terms of an A.P. then k is 1. 4 2. 3 3. 2 4. 1 **Solution:** $t_1 = k + 2$; $t_2 = 4k - 6$; $t_3 = 2k - 2$. So $t_3 - t_2 = t_2 - t_1 \Longrightarrow (3k - 2) - (4k - 6) = (4k - 6) - (k + 2) \Longrightarrow 3k - 2 - 4k + 6 = 4k - 6 - k - 2$ $\Rightarrow -k + 4 = 3k - 8 \Longrightarrow 8 + 4 = 3k + k \Longrightarrow 12 = 4k \Longrightarrow k = 3$. So the anwer is 2.
- 15. The Geometric mean between a^2 and b^2 is

1. |ab| 2. a^2b^2 3. ab 4. $\frac{b^2}{a^2}$

Solution: The Geometric mean between a^2 and b^2 is $\sqrt{a^2b^2} = \pm ab = |ab|$. So the answer is 1.

16. If the first and the ninth terms of an A.P. are -2 and 22 respectively then the thirteenth term in it is

1. 7 2. 8 3. 34 4. 22 **Solution:** $t_1 = a = -2$; $t_9 = a + 8d = 22 \Rightarrow 8d = 22 - a = 22 + 2 = 24 \Rightarrow d = 3$. $t_{13} = a + 12d = -2 + 12(3) = -2 + 36 = 34$. So the answer is 3.

17. If a, b, c are three unequal numbers in A.P. and a, b - a, c - a are in G.P. then a:b:c=1. 1:3:5 2. 3:5:1 3. 5:1:3 4. 2:3:4 **Solution:**Considering the first option, let a = k, b = 3k, c = 5k. Clearly a, b - a, c - a respectively k, 2k, 4k are in G.P. So a:b:c=k:3k:5k=1:3:5. **So the answer is 1.**

18. If
$$\frac{1}{a^x} = \frac{1}{b^y} = \frac{1}{c^z}$$
 and a, b, c are in G.P., then $x + 3 =$
1. $2y$ 2. y 3. y^2 4. $-y$
Solution: $\frac{1}{a^x} = \frac{1}{b^y} = \frac{1}{c^z} = k$. So $a = k^x = b = k^y = c = k^z$
Since a, b, c are in G.P. $b^2 = ac \Rightarrow (k^y)^2 = k^x.k^z \Rightarrow 2y = x + z$. So the answer is 1.
19. If 8th term of an A.P. is 17 and term is 39 then its 25th term is
1. 45 2. 47 3. 51 4. 56
Solution: $t_8 = a + 7d = 17$; $t_9 = a + 18d = 39$. Subtracting we get $11d = 22 \Rightarrow d = 2$.
So $a = 17 - 7d = 17 - 14 = 3$. So $t_{25} = a + 24d = 3 + 48 = 51$. So the answer is 3.
20. If $a_1, a_2, ..., a_{10}$ are arthmetic means between two numbers 3 and 47 then $a_5 =$
1. 19 2. 23 3. 29 4. 32
Solution: The 'n'A.M.'s between a and b , are given by
 $a_1 = a + \left[\frac{b-a}{n+1}\right]; a_2 = a + \left[\frac{b-a}{n+1}\right]... a_n = a + \frac{n(b-a)}{n+1}$.
Here $a = 3; \ b = 47; \ d = \frac{b-a}{10+1} = \frac{47-3}{11} = \frac{44}{11} = 4$.
So $a_5 = a + 5d = 3 + 5(4) = 23$. So the answer is 2.
21. If $x = \frac{1}{1,2} + \frac{1}{2,3} + \frac{1}{3,4} + ... + \frac{1}{n(n+1)}, \ y = \frac{1}{2} + \frac{1}{2^2} + \frac{1}{2^3} +$ then $xy =$

1. 1
2.
$$\frac{1}{2}$$

3. $\frac{1}{3}$
4. $\frac{1}{4}$
Solution: $x = \sum \frac{1}{n(n+1)} = \sum \left(\frac{1}{n} - \frac{1}{n+1}\right) = \left(1 - \frac{1}{2}\right) + \left(\frac{1}{2} - \frac{1}{3}\right) + \dots = 1$

$$y = y_{\infty} = \frac{a}{1-r} = \frac{\overline{2}}{1-\frac{1}{2}} = 1.$$
 So $xy = 1$. So the answer is 1.

22. If the third and fifth terms of a G.P. are 12 and 48 respectively then the second term in it is

1.
$$\frac{1}{2}$$
 2. 6 3. 4 4. 9

Solution: $t_3 = ar^2 = 12$; $t_5 = ar^4 = 48$. So $\frac{t_5}{t_3} = r^2 = \frac{48}{12} \Rightarrow r = 2$.

Then
$$a = \frac{12}{r^2} = \frac{12}{2^2} = \frac{12}{4} = 3$$
. So $t_2 = ar = 3(2) = 6$. So the answer is 2.

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23. The 8th term of the progression 162, 54, 18,... is

1.
$$\frac{2}{9}$$
 2. $\frac{2}{81}$ 3. $\frac{2}{27}$ 4. $\frac{2}{243}$

Solution: The given series is a geometric progression with first term 'a' and common ratio = r. The n^{th} term of a G.P. with first term 'a' and C.R. = r is $T_n = a \cdot r^{n-1}$. Here a = 162;

Common ratio =
$$r = \frac{1}{3}$$
. So 8 th term = $162 \ge \left(\frac{1}{3}\right)^{8-1} = 162 \ge \left(\frac{1}{3}\right)^7 = \frac{2}{27}$.

So the answer is 3.

24. The sum of the first 10 terms of the series 1, 3, 5, 7,.... is 1. 75 2. 50 3. 100 4. 121 Solution: The given series is arithmetic progression first term a = 1. So d = 3 - 1 = 2. Now the sum of first 10 terms, $S_{10} = \frac{10}{2} [2a + (10 - 1)d] = 5[2(1) + 9(2)]$

$$= 5[2+18] = 5[20] = 100$$
. So the answer is 3

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- 25. The 11^{th} term of the series $81, 27, 9, \dots$ is
 - 1. $\frac{1}{729}$ 2. $\frac{1}{243}$ 3. $\frac{1}{2187}$ 4. $\frac{1}{3^{10}}$

Solution: The given series is a geometric progression with first term 'a' and common ratio = r.

The *n*th term of a G.P. with first term '*a*' and C.R. = *r* is $T_n = a.r^{n-1}$. Here a = 81;

Common ratio = $r = \frac{1}{3}$. So 11 th term = 81 x $\left(\frac{1}{3}\right)^{10-1} = 81 x \left(\frac{1}{3}\right)^9 = \frac{1}{729}$. So the answer is 1.

26. The sum of first 12 terms of the series 5, 3, 1, -1,... is 1.-72 2. -36 3. -48 4. -108 **Solution:** The given series is arithmetic progression first term a = 5 .So d = 3 - 5 = -2. Now the sum of first 12 terms, $S_{12} = \frac{12}{2} [2a + (12 - 1)d] = 6[2(5) + 11(-2)]$ = 6[10 - 22] = 6[-12] = -72. So the answer is 1.

POLYNOMIALS

- 1. If *n* is a non negative integer and $a_0, a_1, a_2, ..., a_n$ are real or complex numbers and $a_0 \neq 0$, then an expression $f(x) = a_0 x^n + a_1 x^{n-1} + a_2 x^{n-2} + ... + a_n$ is called a polynomial in *x* of degree *n*.
- 2. If f(x) is a polynomial of degree n > 0, then teh equation f(x) = 0 is called a polynomial equation of degree n. It is also called as an algebric equation of degree n. If n = 0, then f(x) is said to be constant polynomial.

If $a_i = 0 \forall i$, we call the resulting polynomial as the zero polynomial.

- 3. If f(x) is a polynomial, then the remainder of f(x) when divided by (x a) is f(a).
- 4. If f(x) is a polynomial, then $f(a) = 0 \Leftrightarrow (x a)$ is a factor of f(x).
- 5. If $f(\alpha) = 0$ then $\alpha \in C$ is a root of the equation f(x) = 0.
- 6. Evey non constant non zero polynomial equation has atleast one root.
- 7. Every polynomial equation of degree 'n' has at most 'n' distinct roots.
- 8. For a polynomial equation with real coefficients, complex roots occur in conjugate pairs.
- 9. In an equation with rational coefficients, irrational roots occur in pairs of conjugate surds.
- 10. A polynomial equation of odd degree with real coefficients, has atleast one real root.
- 11. In an equation, if all the power of x are odd and all the coefficients are of the same sign, then the equation has no real roots except 0.
- 12. In an equation, if all the powers of x are even and all the coefficients are of the same signs, then the equation has no non zero real root.
- 13. If the expressions f(a) and f(b) have opposite signs signs then at least one (or) an odd number of roots of f(x) = 0 will lie between *a* and *b*; and if f(a)f(b) > 0 then either an even number of roots lie between *a* and *b* or no root lies between *a* and *b*.
- 14. If a root α of a polynomial equation f(x) = 0 occurs exactly *m* times (*m* being a positive integer greater than one), then α is said to be a repeated root or a multiple root of multiplicity *m*.
- 15. If α is a multiple root of f(x) = 0 of multiplicity *m*, then α is a root of f'(x) = 0 of multiplicity (m-1) if m > 2 and α is a root of f'(x) = 0 if m = 2.
- 16. Let f(x) = 0 be a polynomial equation. Let g(x) be a H.C.F. of f(x) and f'(x). If α is a root of g(x) = 0 with multiplicity k, then α is a multiple root of f(x) = 0 with multiplicity (k+1).
- 17. Suppose $\alpha_1, \alpha_2, ..., \alpha_n$ are the roots of f(x) = 0, then
 - i) The equation whose roots are $-\alpha_1, -\alpha_2, ..., -\alpha_n$ is f(-x) = 0.
 - ii) The equation whose roots are $k\alpha_1, k\alpha_2, ..., k\alpha_n$ ($k \neq 0$) is $f\left(\frac{x}{k}\right) = 0$.

iii) If
$$\alpha_i \neq 0$$
, for $i = 1, 2, ..., n$, the equation whose roots are $\frac{1}{\alpha_1}, \frac{1}{\alpha_2}, ..., \frac{1}{\alpha_n}$ is $x^n f\left(\frac{1}{x}\right) = 0$.

iv) The equation whose roots are $\alpha_1 + k$, $\alpha_2 + k$,..., $\alpha_n + k$ is f(x - k) = 0

v) The equation whose roots are α_1^2 , α_2^2 ,..., α_n^2 is $f(\sqrt{x}) f(-\sqrt{x}) = 0$

PROBLEMS

- 1. When $x^3 2x^2 3$ is divided by x 3, the remainder is 1. -48 2. 48 3. -6 4. 6 Solution: Let $f(x) = x^3 - 2x^2 - 3$. So the remainder is $f(3) = 3^3 - 2(3)^2 - 3 = 27 - 18 - 3 = 6$. So the answer is 4.
- 2. A polynomial p(x) leaves a remainders -1 and 3 when divided x 3 and x + 1 respectively. Then the remainder, when the polynomial p(x) is divided by $x^2 - 2x - 3$ is

1. x + 1 2. 1 - x 3. 2 + x 4. 2 - x **Solution:** Let r(x) = ax + b, be the remainder when p(x) is divided by $x^2 - 2x - 3 = (x - 3) (x + 1)$ but given that $r(3) = -1 \Rightarrow 3a + b = -1$ -----(1) and $r(-1) = 3 \Rightarrow -a + b = 3$ -----(2). From (1) and (2) we get a = -1, b = 2. So r(x) = 2 - x. So the answer is 4.

3. For any $x \in R$ the maximum value of the polynomial $7 + 10x - 5x^2$ is 1. 14 2. 12 3. 10 4. 8 Solution: The maximum value of the polynomial $ax^2 + bx + c$ is $\frac{4ac - b^2}{4c}$.

Here a = -5, b = 10, c = 7. Substituting and simply fing we get maximum value = 12. So the answer is 2.

4. A factor of $(a + b + c)^3 - a^3 - b^3 - c^3$, among the following, is 1. a + 2b 2. b + 2c 3. c + 2a 4. a + bSolution: $(a + b + c)^3 - a^3 - b^3 - c^3$ $= (a + b + c)^3 - (a^3 + b^3 + c^3)$ $= (a + b + c)^3 - (a + b + c)^3 + 3(a + b) (b + c) (c + a)$ = 3(a + b) (b + c) (c + a)

So the answer is 4.

- 5. If $f(x) = x^2 4$ and $g(x) = x^3 3$ then the degree of the polynomial f(g(x)) is 1. 6 2. 5 3. 3 4. 1 **Solution:** $f(g(x)) = f(x^3 - 3) = (x^3 - 3)^2 - 4 = x^6 - 6x^3 + 9 - 4 = x^6 - 6x^3 + 5$. So the degree of the polynomial f(g(x)) is 6. **So the answer is 1**.
- 6. If $x^2 + x 2$ is a factor of the polynomial $x^4 + ax^3 + bx^2 12x + 16$ then the ordered pair (a, b) =1. (-3, 8) 2. (3, -8) 3. (-3, -8) 4. (3, 8) Solution: $x^2 + x - 2 = (x + 2) (x - 1)$.

x - 1 is a factor. So 1 + a + b - 12 + 16 = 0 ⇒ a + b + 5 = 0 ⇒ a + b + 5 = 0 x + 2 is a factor. So 16 - 8a + 4b + 24 + 16 = 0 ⇒ -8a + 4b + 56 = 0 ⇒ -2a + b + 14 = 0. Subtract this values we get 3a - 9 = 0 ⇒ a = 3. So b = -8 So the answer is 2. 7. If x^2 - 1 divides $x^3 + ax^2 - bx + 6$, then the ordered pair (a, b) =1. (6, 1) 2. (-6, -1) 3. (-6, 1) 4. (6, -1) Solution: x^2 - 1 = (x - 1) (x + 1). x - 1 is a factor. So 1 + a - b + 6 = 0 ⇒ a - b + 7 = 0 -----(1) x + 1 is a factor. So -1 + a + b + 6 = 0 ⇒ a + b + 5 = 0 -----(2) Adding (1) and (2) we get 2a + 12 = 0 ⇒ a = -6. So b = 1. So (a, b) = (-6, 1) So the answer is 3.

8. If
$$f(x) = 2x^2 + 5x + 1$$
 and $g(x) = x - 4$ then $\{a \in R : g(f(Q) = 0\}$
1. $\{-\frac{1}{2}, 1\}$ 2. $\{-\frac{1}{2}, -3\}$ 3. $\{\frac{1}{2}, 3\}$ 4. $\{\frac{1}{2}, -3\}$
Solution: $f(\alpha) = 2\alpha^2 + 5\alpha + 1; g(f(\alpha)) = 2\alpha^2 + 5\alpha + 1 - 4 = 0 \Rightarrow 2\alpha^2 + 5\alpha - 3 = 0$
 $\alpha = \frac{-5 \pm \sqrt{25 + 24}}{4} = \frac{-5 \pm 7}{4} = \frac{-5 + 7}{4}, \frac{-5 - 7}{4} = \frac{1}{2}, -3.$ So the answer is 4.
9. If $\frac{11}{x} - \frac{7}{y} = 1$ and $\frac{9}{x} - \frac{4}{y} = 6$ then $(x, y) =$
1. $\left(-\frac{1}{2}, \frac{1}{3}\right)$ 2. $\left(-\frac{1}{2}, -\frac{1}{3}\right)$ 3. $\left(\frac{1}{2}, -\frac{1}{3}\right)$ 4. $\left(\frac{1}{2}, \frac{1}{3}\right).$
Solution: $\left(\frac{11}{x} - \frac{7}{y}\right)4 = 4 \Rightarrow \frac{44}{x} - 4 = \frac{28}{y} \Rightarrow \frac{44}{x} - 4 = \frac{63}{x} - 42$
 $\left(\frac{9}{x} - \frac{4}{y}\right)7 = 42 \Rightarrow \frac{63}{x} - 42 = \frac{28}{y} \Rightarrow \frac{44}{x} - \frac{63}{x} = -42 - 4 \Rightarrow -\frac{19}{x} = -38 \Rightarrow x = \frac{1}{2}$
Using this we get $18 - 6 = \frac{4}{y} \Rightarrow y = \frac{4}{12} = \frac{1}{3}$. So $(x, y) = \left(\frac{1}{2}, \frac{1}{3}\right)$.
So the answer is 4.
10. If $3^{x+1} + 3^{2x+1} = 270$, then $x =$
1. 1 2. 0 3. 2 4. 4
Solution: $3(3^x + 3^{2x}) = 90 \Rightarrow 3^x + 3^{2x} = 90$. So $x = 2$. $(3^2 + 3^4 = 9 + 81 = 90)$

11. The remainder when $x^5 + x^4 + x^3 + x^2 + x + 1$ is divided by x + 1 is

So the answer is 3.

1. 0 2. 1 3. 2 4. 6 Solution: Let $f(x) = x^5 + x^4 + x^3 + x^2 + x + 1$. When f(x) is divided by x + 1, the remainder is f(-1) = -1 + 1 - 1 + 1 - 1 + 1 = 0So the answer is 1.

12. If $f(x) = a^3(b-c) + b^3(c-a) + c^3(a-b)$, then the remainder when f(a) is divided by a + b + c is

1. a - b 2. b - c 3. -1 4. 0 Solution: $f(a) = a^3(b - c) + b^3(c - a) + c^3(a - b)$ $f(a + b + c) = (a + b + c)^3 (b - c) + b^3(c - a - b - c) + c^3(a + b + c - b)$ $= (a + b + c)^3 (b - c) - b^3(a + b) + c^3(a + c) = 0$

So the answer is 4.

13. If x - a is a factor of $x^3 - a^2x + x + 2$ then a = 1. -2 2. 2 3. 1 4. -1 Solution: $f(a) = 0 \Longrightarrow a^3 - a^3 + a + 2 = 0 \Longrightarrow a = -2$. So the answer is 1.

14. The remainder when $x^4 + 2x^3 - 3x^2 + x - 1$ is divided by (x + 2) is

1. 15 2. -15 3. 16 4. -16 Solution: $f(x) = x^4 + 2x^3 - 3x^2 + x - 1$. $f(-2) = (-2)^4 + 2(-2)^3 - 3(-2)^2 - 2 - 1 = 16 - 16 - 12 - 2 - 1 = -15$.

So the answer is 2.

15. If
$$f(x) = 2\left(x^2 + \frac{1}{x^2}\right) - 3\left(x + \frac{1}{x}\right)$$
 then $\{\alpha \in R / f(\alpha) = 0\}$ is
1. $\left\{1, \frac{1}{2}\right\}$ 2. $\left\{2, \frac{1}{2}\right\}$ 3. $\left\{3, \frac{1}{3}\right\}$ 4. $\left\{-2, \frac{1}{2}\right\}$

Solution: We have to find $\alpha \in R$ such that $f(\alpha) = 0$, using the given options we have the following

$$f(1) = 2\left(1 + \frac{1}{1}\right) - 3\left(1 + \frac{1}{1}\right) - 1 = 2(2) - 3(2) - 1 = 4 - 6 - 1 = -3 \neq 0$$

$$f(2) = 2\left(4 + \frac{1}{4}\right) - 3\left(2 + \frac{1}{2}\right) - 1 = 8 + \frac{1}{2} - 6 - \frac{3}{2} - 1 = 1 - 1 = 0.$$

So the example is 2

So the answer is 2.

16. The remainder when $6x^3 - 3x + 2$ is divided by 2x - 3 is

1. $\frac{71}{4}$ 2. $\frac{71}{2}$ 3. $\frac{70}{4}$ 4. $\frac{70}{2}$

Solution: Let $f(x) = 6x^3 - 3x + 2$. The remainder is $f\left(\frac{3}{2}\right) = 6\left(\frac{3}{2}\right)^3 - 3\left(\frac{3}{2}\right) + 2$

$$= 6\left(\frac{27}{8}\right) - \frac{9}{2} + 2 = \frac{81}{4} - \frac{9}{2} + 2 = \frac{81 - 18 + 8}{4} = \frac{71}{4}$$
. So the answer is 1.

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17. A polynomial in x leaves remainders -1 and 7 when it is divided by x + 1 and x - 3 respectively. If that polynomial is divided by $x^2 - 2x - 3$, then the remainder is 1. -7 2. 7x - 1 3. 6 4. 2x + 1 **Solution:** f(x) = 2x + 1. f(-1) = -2 + 1 = -1; f(3) = 6 + 1 = 2. **So the answer is 4.**

18. If 73 x 74 x 75 x 76 is divided by 14, then the remainder is 1. 0 2. 5 3. 10 4. 12 Solution: 73 x 74 x 75 x 76 = (70 + 3) (70 + 4) (70 + 5) (70 + 6)= a multiple of 70 + (3)(4)(5)(6). Then the remainder is 10.

Because (3)(4)(5)(6)/14=360/14 leaves remainder 10. Answer is 4.

19. If *f*: **R** → **R** is a function satisfying the condition $2f(x) - 3f\left(\frac{1}{x}\right) = x^2$ for any $x \neq 0$, then $f(3) = \frac{1}{3}$ 1. $-\frac{11}{3}$ 2. 3 3. -3 4. $-\frac{10}{3}$ **Solution:** $2f(x) - 3f\left(\frac{1}{x}\right) = x^2 \Rightarrow 2f(3) - 3f(\frac{1}{3}) = 9$ and $2f(\frac{1}{3}) - 3f(3) = \frac{1}{9}$. $\Rightarrow 4f(3) - 6f(\frac{1}{3}) = 18$ and $6f(\frac{1}{3}) - 9f(3) = \frac{1}{3}$. Adding the se we get $f(3) = -\frac{11}{3}$. **So the answer is 1.** 20. If the polynomial $-a^2x^3 - 2ax^2 + b^2x + 1$ is divisible by x + 1, then a - 1 = 1. $\pm b$ 2. $\pm 2b$ 3. $\pm (b + 1)$ 4. $\pm (b - 1)$ **Solution:** Let $f(x) = -a^2x^3 - 2ax^2 + b^2x + 1$. Now $-a^2x^3 - 2ax^2 + b^2x + 1$ is divisible by x + 1. $\Rightarrow f(-1) = 0 \Rightarrow a^2 - 2a - b^2 + 1 = 0 \Rightarrow (a - 1)^2 - b^2 = 0 \Rightarrow (a - 1)^2 = b^2 \Rightarrow a - 1 = \pm b$

So the answer is 1.

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21. If $x^4 - 8x^3 + 18x^2 - 8x + 1 = 0$, then the value of $x + \frac{1}{x}$ is 1.1 2. 2 3. 3 4. 4 **Solution:** $x^4 - 8x^3 + 18x^2 - 8x + 1 = 0 \implies x^4 + 18x^2 + 1 = 8x^3 + 8x = 8x(x^2 + 1)$ $\Rightarrow \frac{x^2 + 1}{x} = \frac{x^4 + 18x^2 + 1}{8x^2} = \frac{1}{8} \left(x^2 + 18 + \frac{1}{x^2} \right) = \frac{1}{8} \left((x + \frac{1}{x})^2 + 16 \right).$ Let $a = x + \frac{1}{x}$, then from the above we get $a = \frac{1}{8}(a^2 + 16) \Rightarrow a^2 + 16 = 8a$ $\Rightarrow a^2 + 16 - 8a = 0 \Rightarrow (a - 4)^2 = 0 \Rightarrow a = 4$. So $x + \frac{1}{x} = 4$. Answer is 4. 22. The remainder when $91 \times 93 \times 95 \times 97$ is divided by 18 is 1. 12 2. 10 3. 15 4. 8 **Solution:** $91 \times 93 \times 95 \times 97 = (90 + 1)(90 + 3)(90 + 5)(90 + 7)$ = a multiple of 90 +(1)(3)(5)(7). Then the remainder is 15. Because (1)(3)(5)(7)/18=105/14 leaves remainder 15. Answer is 3. 23. If $f(x) = 12x^3 - 8x^2 + 4x - 1$ then f(-2) + f(2) + f(-1) + f(1) = 11. -84 2. 84 3. 0 4. 434 **Solution:** $f(x) = 12x^3 - 8x^2 + 4x - 1$.

 $\Rightarrow f(-2) = -96 - 32 - 8 - 1; \ f(2) = 96 - 32 + 8 - 1; \ f(-1) = -12 - 8 - 4 - 1 \ and \ f(1) = 12 - 8 + 4 - 1$ f(-2) + f(2) + f(-1) + f(1) = -84 Answer is 1.

24. A polynomial in x leaves remainders 2 and 3 when divided by x + 1 and x - 1 respectively. Then the remainder we get when that polynomial is divided by x^2-1 is

1.
$$\frac{3x+2}{2}$$
 2. $\frac{3x-2}{2}$ 3. $\frac{x-5}{2}$ 4. $\frac{x+5}{2}$
Solution: $f(x) = \frac{x+5}{2}$
 $f(-1) = \frac{-1+5}{2} = \frac{4}{2} = 2;$ $f(1) = \frac{1+5}{2} = \frac{6}{2} = 3.$ So the answer is 4.

Coordinate Geometry

- 1. Origin = (0, 0).
- 2. Equation of the line in standard form is ax + by + c = 0.
- 3. Equation of the line having slope 'm' and passing through the point (x_1, y_1) is $y y_1 = m(x x_1)$. It is known as poin slope form.
- 4. Equation of a line whose slope is 'm' and 'y' intercept is 'c' y = mx + c. It is known aslope intercept form.
- 5. Equation of a line having slpe *m* and *x* intercept '*a*' is y = m(x a).
- 6. Equation of the line passing through the points (x_1, y_1) and (x_2, y_2) is $(x_1, x_2) (y y_1) = (y_1 y_2)$
 - $(x x_1)$. It is known as two point form.
- 7. Equation of the line having x intercept a and y-intercept b is $\frac{x}{a} + \frac{y}{b} = 1$.
- 8. The area of the triangle formed by coordinate axis and the line $\frac{x}{a} + \frac{y}{b} = 1$ is $\frac{1}{2}|ab|$ sq units.
- 9. The area of the triangle formed by the coordinate axis and the line ax+by c = 0 is $\frac{c^2}{2ab}$ sq units.
- 10. If a = b then the line $\frac{x}{a} + \frac{y}{b} = 1$ encloses maximum area with the co-ordinate axes.
- 11. The figure formed by the lines ax + by + c = 0 (or) |ax| + |by| + c = 0 is a rhombus and its area is $\frac{2c^2}{ab}$ sq. units.

12. The perpendicular distance from a point $P(x_1, y_1)$ to the line ax + by + c = 0 is $\frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$.

13. If (h, k) is the image form (x_1, y_1) to the line ax + by + c = 0 then

$$\frac{(h-x_1)}{a} = \frac{(k-y_1)}{b} = \frac{-2(ax_1+by_1+c)}{(a^2+b^2)}.$$

- 14. The image of the line lx + my + n = 0 with respect to ax + by + c = 0 is $(a^2 + b^2) (lx + my + n) 2(la + mb) (ax + by + c) = 0.$
- 15. Reflection ax + by + c = 0 in the line lx + my + n = 0 is $(ax + by + c) / (l^2 + m^2) - 2(la + mb)$ (lx + my + n = 0).
- 16. The lines $a_1x + b_1y + c_1 = 0$, $a_2x + b_2y + c_2 = 0$ are

a) Coincident if
$$\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$$
 b) Parallel if $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$

c) Perpendicular if $a_1a_2 + b_1b_2 = 0$

d) Intersect if $a_2b_2 - a_2b_1 \neq 0$ and point of intersection $= \frac{(b_1c_2 - b_2c_1)}{(a_1b_2 - a_2b_1)}, \frac{(c_1a_2 - c_2a_1)}{(a_1b_2 - a_2b_1)}$

17. The distance between two parallel lines $ax + by + c_1 = 0$ and $a_2x + by + c_2 = 0$ is

$$\frac{|c_1-c_2|}{\sqrt{a^2+b^2}}$$

- 18. The distance between the points A(x₁, y₁) and B(x₂, y₂) is AB = $\sqrt{(x_2 x_1)^2 + (y_2 y_1)^2}$.
- 19. The point which divides the line segment joining the points $A(x_1, y_1)$, $B(x_2, y_2)$ in the ratio *l*: *m*.

i) internally is
$$\left(\frac{lx_2 + mx_1}{l+m}, \frac{ly_2 + my_1}{l+m}\right) (l+m \neq 0)$$

ii) externally is $\left(\frac{lx_2 - mx_1}{l-m}, \frac{ly_2 - my_1}{l-m}\right) (l \neq m)$

- 20. Let A, B be two points. The point which divide \overline{AB} is the ratio 1 : 2 and 2 : 1 are called points of trisection of \overline{AB} .
- 21. If P(x, y) lies on the line joining $A(x_1, y_1)$, $B(x_2, y_2)$ then $\frac{x_1 x}{x x_2} = \frac{y_1 y}{y y_2}$ and P divides \overline{AB} in the ratio $x_1 x : x x_2$ that is also equals to $y_1 y : y y_2$.
- 22. x-axis divides the line segment joining $(x_1, y_1), (x_2, y_2)$ in the ratio $-y_1 : y_2$.
- 23. y-axis divides the line segment joining $(x_1, y_1), (x_2, y_2)$ in the ratio $-x_1 : x_2$.
- 24. If $D(\alpha_1, \beta_1)$, $E(\alpha_2, \beta_2)$, $F(\alpha_3, \beta_3)$ are the mid points of the sides \overline{BC} , \overline{CA} , \overline{AB} of $\triangle ABC$, then $A(\alpha_2 + \alpha_3 - \alpha_1, \beta_2 + \beta_3 - \beta_1)$, $B = (\alpha_3 + \alpha_1 - \alpha_2, \beta_3 + \beta_1 - \beta_2)$,

 $C = (\alpha_1 + \alpha_2 - \alpha_3, \beta_1 + \beta_2 - \beta_3).$

- 25. If (x_1, y_1) , (x_2, y_2) , (x_3, y_3) are three consecutive vertices of a parallelogram, then the fourth vertex is $(x_1 x_2 + x_3, y_1 y_2 + y_3)$.
- 26. If a point *P* divides the line segment joining the points *A*, *B* in the ratio l:m, then the point *Q* which divides \overline{AB} in the ratio l:-m is called harmonic conjugate of *P* with respect to *A* and *B*.
- 27. The line passing through a vertex and mid-point of its opposite side of a triangle is called a median. The medians of a triangle are concurrent and the point of concurrence is called centroid or centre of gravity of the triangle.
- 28. Let *G* be the centroid of $\triangle ABC$ and *D*, *E*, *F* be the mid points of *BC*, *CA*, *AB* respectively. Then *G* divides the medians *AD*, *BE*, *CF* in the ratio 2 : 1.
- 29. The centroid of the triangle formed by the points $A(x_1, y_1)$, $B(x_2, y_2)$, $C(x_3, y_3)$ is

$$\left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

- 30. If the perpendicular bisectors of the sides of a triangle are concurrent then the point of concurrence is called circumcentre of the triangle.
- 31. If *S* is the circumcentre of $\triangle ABC$, then SA = SB = SC. The circle with centre *S* and radius *SA* passes through the three vertices A, *B*, *C* of the triangle. The circle is called circumcircle of the triangle. The radius of circumcircle of $\triangle ABC$ is called circumradius and it is denoted by *R*.
- 32. The circumcentre of a right angled triangle is the mid point of the hypotenuse.
- 33. The altitudes of a triangle are concurrent. The point of concurrent is called orthocenter of the triangle.
- 34. The orthocenter of a right angled triangle is the vertex at the right angle.
- 35. The internal bisectors of angles of a triangle are concurrent. The point of concurrence is called incentre. It is denoted by *I*.
- 36. If $A(x_1, y_1)$, $B(x_2, y_2)$, $C(x_3, y_3)$ are the vertices of $\triangle ABC$ and if a = BC, b = CA, c = AB then $\begin{bmatrix} ax_1 + bx_2 + cx_3 & ay_1 + by_2 + cy_3 \end{bmatrix}$

incenter
$$I = \left[\frac{ax_1 + bx_2 + cx_3}{a + b + c}, \frac{ay_1 + by_2 + cy_3}{a + b + c}\right]$$

- 37. Orthocenter *H*, centroid *G*, circumcentre *S* of a triangle are collinear and *G* divides *HS* in the ratio 2 : 1. The line passing through *H*, *G*, *S* is called Euler's line. If the triangle is an equilateral triangle than H = G = S = I where *I* is the incentre.
- 38. The area of the triangle formed by teh points $A(x_1, y_1)$, $B(x_2, y_2)$ and $C(x_3, y_3)$ is
 - $\frac{1}{2} \begin{vmatrix} x_1 & x_2 & x_3 & x_1 \\ y_1 & y_2 & y_3 & y_1 \end{vmatrix}.$

39. The area of the triangle is denoted by $\frac{1}{2} |\sum x_1(y_2 - y_1)|$ or $\frac{1}{2} |\sum x_1y_2 - x_2y_1)| =$.

40. The area of the quadrilateral formed by the points $A(x_1, y_1)$, $B(x_2, y_2)$, $C(x_3, y_3)$, $D(x_4, y_4)$

taken in order is
$$\frac{1}{2} \begin{vmatrix} x_1 & x_2 & x_3 & x_4 & x_1 \\ y_1 & y_2 & y_3 & y_4 & y_1 \end{vmatrix}$$
.

41. The incentre of the triangle formed by (0, 0), (a, 0), (0, b) is

$$\left[\frac{ab}{a+b+\sqrt{a^2+b^2}},\frac{ab}{a+b\sqrt{a^2+b^2}}\right].$$

Problems

1.The area, in square units, of the rectangle formed by the lines $x = \pm 4$ and $y = \pm 3$ is1.122.483.1444.72Solution: Length = 8, breadth = 6. So area = $l \ge b = 8 \ge 6 = 48$. So the answer is 2.

The equation of the straight line that makes intercepts $\frac{1}{5}$ and $\frac{1}{7}$ on X and Y-axis respec-2.

tively is

1. 5x + 7y = 35 2. 5x + 7y = 1 3. 7x + 5y = 35 4. 7x + 5y = 1Solution. Formula is $\frac{x}{a} + \frac{y}{b} = 1$ where $a = \frac{1}{5}$, $b = \frac{1}{7}$. So we get 5x + 7y = 1. So the answer is 2. The perpendicular distance from the point (2, -3) to the line 3x + 4y - 4 = 0 is 1. $\frac{4}{5}$ units 3. $\frac{2}{5}$ units 2. 2 units 4. 4 units **Solution:** The perpendicular distance from the point (x, y) to the line ax + by + c = 0 is $\frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$. Here $x_1 = 2$, $y_1 = -3$, a = 3, b = 4, c = -4. So the distance $=\frac{|6-12-4|}{\sqrt{3^2+4^2}} = \frac{10}{\sqrt{9+16}} = \frac{10}{\sqrt{25}} = \frac{10}{5} = 2$ units. So the answer is 2. The intercept made by the line passing through the points (4, -5), (5, 1) on X-axis is 1. $\frac{29}{6}$ 2. $\frac{31}{6}$ 3. 29 4. 31 Solution: The equation of the line passing through $(x_1, y_1), (x_2, y_2)$ is $(y - y_1) (x_2, x_1) = (y_2 - y_2) (x - x_1).$ Here $x_1 = 4$, $y_1 = -5$, $x_2 = 5$, $y_2 = 1$. Substituting these we get $(y + 5) (5 - 4) = (1 + 5) (x - 4) \Rightarrow (y + 5) = 6x - 24$. $6x - y = 29 \Rightarrow \frac{6x}{29} - \frac{y}{29} = 1$. So X-intercept = $\frac{29}{6}$. So the answer is 1. A line drawn through A(5, 3) makes an angle of 45° , with the X-axis at B. Then the distance between the points A and B is 3. $2\sqrt{3}$ 1. $4\sqrt{3}$ 2. $4\sqrt{2}$ 4. $3\sqrt{2}$ **Solution:** Let the point B on X axis is (a, 0). Given that the line through A(5, 3) makes an angle 45° with X-axis. So $\tan 45^\circ = \text{solope} = \frac{y_2 - y_1}{x_2 - x_1} \Longrightarrow 1 = \frac{0 - 3}{a - 5} \Longrightarrow a - 5 = -3 \Longrightarrow a = 2.$ So distance between A(5, 3), B(2, 0) is = $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $=\sqrt{(2-5)^2+(0-3)^2}=\sqrt{9+9}=\sqrt{18}=\sqrt{9\times 2}=3\sqrt{2}$. So the answer is 4. The foot of the perpendicular from the point (3, -4) to Y-axis is 1. (3, 0)2. (0, -4)3. (-3, 4) 4. (-4, 0) **Solution:** If (h, k) is the foot of the perpendicular from (x_1, y_1) on to the line ax + by + c =0

6.

3.

4.

5.

then $\frac{h-x_1}{a} = \frac{k-y_1}{b} = \frac{-(ax_1+by_1+c)}{a^2+b^2}$. Here Y-axis $\Rightarrow x = 0$. So $a = 1, b = 0, c = 0 \Rightarrow x_1 = 3, y_1 = -4$. Substituting these we get $\frac{h-3}{1} = \frac{k+4}{0} = \frac{-(3+0+0)}{1^2+0^2} \Rightarrow \frac{h-3}{1} = \frac{k+4}{0} = \frac{-3}{1}$ So we get $h - 3 = -3 \Longrightarrow h = 0$ and $k + 4 = 0 \Longrightarrow k = -4$. So the answer = (h, k) = (0, -4). So the answer is 2. The equation of the straight line passing through the points (2, -3), (3, 5) is 7. 1. 8x - y = 192. 6x + v = 94. 5x - 3y = 03. x + 3y = 10The equation of the line passing through $(x_1, y_1), (x_2, y_2)$ is $(y - y_1) (x_2 - x_1) = (y_2 - y_1) (x - x_1)$. Here $x_1 = 2, y_1 = -3, x_2 = 3, y_2 = 5$. Substituting we get $(y + 3) (3 - 2) = (5 + 3) (x - 2) \Rightarrow y + 3 = 8x - 16 \Rightarrow 8x - y = 19$. So the answer is 3. 8. The point of intersection of 7x - 2y + 10 = 0 and 7x + 2y - 10 = 0 is 1. (5, 0)2. (-5, 0) 3. (0, 5)4. (0, -5)**Solution:** Adding the equations we get $14x = 0 \Rightarrow x = 0$. Substituting x = 0 in II-equation $0 + 2y - 10 \Rightarrow 2y = 10 \Rightarrow y = 5$. So the point of inter section is (0, 5). So the answer is 3. 9. The equation of the line passing through (4, 5) and whose sum of intercepts is zero, is 2. x + y - 1 = 0 3. x - y + 1 = 01. x - y - 1 = 04. x + v + 1 = 0**Solution:** The equation of the line with intercepts *a* and *b* is $\frac{x}{a} + \frac{y}{b} = 1$. Given that $a + b = 0 \Longrightarrow b = -a$. So we get $\frac{x}{a} + \frac{y}{-a} = 1 \Longrightarrow x - y = a$. It is passing through (4, 5). So $4 - 5 = a \implies a = -1$. So the required equation is $x - y = -1 \Rightarrow x - y + 1 = 0$. So the answer is 3. 10. The point of concurrence of the attitudes of a triangle is its 4. Centroid 1. Incentre 2. Orthocentre 3. Circumcentre Solution: Point of concurrence of the attitudes of a triangle is orthocentre. Point of concurrence of the medians of a triangle is centroid. Point of concurrence of the perpendicular bisectors of sides of a triangle is circumcentre. Point os concurrence of the internal angular bisectors of a triangle is incentre. So the answer is 2. 11. If the points (k, -3), (2, -5) and (-1, -8) are collinear then k =1. 0 2. 4 3. -2 4. -3

Solution: Slopes are equal $\frac{-5+3}{2-k} = \frac{-8+5}{1-2} \Rightarrow (-2)(-3) = -3(2-k) \Rightarrow 6$ $=-6 + 3k \Rightarrow 3k = 12 \Rightarrow k = 4$. So the answer is 2. 12. The equation of the line with slope $-\frac{3}{4}$ and y-intercept 2 is 4. 3x + 4y = 41. 3x + 4y = 8 2. 3x - 4y = 83. 4x + 3y = 2Solution: y = mx + c, $y = -\frac{3}{4}x + 2 = \frac{-3x + 8}{4}$ $(m = \frac{-3}{4}, c = 2)$ $4y = -3x + 8 \Longrightarrow 3x + 4y = 8$. So the answer is 1. 13. If the lines $\alpha x + 2y + 1 = 0$, $\beta x + 3y + 1 = 0$ and $\gamma x + 4y + 1 = 0$ pass through a point then $\alpha + \gamma =$ 1. β 2. 2β 3. $1/\beta$ 4. $1/2\beta$ **Solution:** $\alpha(3, -4) - \beta(2 - 4) + \gamma(2 - 3) = 0$ $-\alpha + 2\beta - \gamma = 0 \implies \alpha + \beta = 2\beta$. So the answer is 2. The area of the quadrilateral formed by the points A = (a, 0), B = (0, a), C = (-a, 0) and 14. D = (0, -1) is 2. $2a^2$ $3 a^2$ 1. $4a^2$ 4. $8a^2$ **Solution:** It is a square. With side $\sqrt{2}a$. So area = $(a\sqrt{2})^2 = 2a^2$. So the answer is 2. 15. If the point of intersection of the lines x + 2y - 10 = 0 and 2x - y - 5 = 0 lies on the straight line x - 2y + k = 0, then the value of k is 2. 2 3. 0 4. 1 1. -2 **Solution:** We have 2x - y - 5 = 0 and x + 2y - 10 = 0. Solving these we get x = 4, y = 3. Substituting these in x - 2y + k = 0. We get 4 - 6 + $k = 0 \Longrightarrow k = 2$. So the answer is 2. 16. The image of the origin with respect to the straight line 4x + 3y - 25 = 0 is 2.(8,6)3. (-8, 6) (6, -8)1. (2,3)**Solution:** If (h, k) is the image of the point (x_1, y_1) with respect to the line ax + by + c = 0then $\frac{h-x_1}{a} = \frac{k-y_1}{b} = \frac{-2(ax_1+by_1+c)}{a^2+b^2}$. Here $a = 4, b = 3, c = -25, x_1 = 0, y_1 = 0.$ Substituting these we get $\frac{h-0}{4} = \frac{k-0}{3} = \frac{-2(0+0-25)}{4^2+3^2} \Longrightarrow \frac{h}{4} = \frac{k}{3} = \frac{2}{1}$ So we get h = 8 and k = 6. So the answer is (8, 6). So the answer is 2. 17. If $x + y + \mu = 0$ and $\lambda x - 5y - 5 = 0$ represent the same line then $\lambda + \mu =$

2. 0 1. 1 3. -4 4. -1 **Solution:** If $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ represents the same line, then $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}; \quad \frac{\lambda}{1} = \frac{-5}{1} = \frac{-5}{\mu} = \lambda = -5; \quad \mu = 1; \quad \lambda + \mu = -5 + 1 = -4.$ So the answer is 3. 18. The points (x, 2), (-3, 4) and (7, -1) are collinear, then the value of x is 3. -1 1. 1 2. 0 4. 2 Solution: Points are colinear means slopes are equal. So $\frac{4-2}{-3-r} = \frac{-1-4}{7+3}$ $\Rightarrow 2(10) = -5(-3-x) \Rightarrow 20 = 15 + 5x \Rightarrow 5x = 5 \Rightarrow x = 1$. So the answer is 1. 19. Equation of the line passing through the point (2, -3) and perpendicular to the line segment joining the points (1, 2), (-1, 5) is 1. 2x - 3y - 13 = 0 2. 2x - 3y - 9 = 0 3. 2x - 3y - 11 = 0 4. 2x - 3y - 7 = 00

Solution: Slope of the line passing through (1, 2), (-1, 5) is $\frac{5-2}{-1-1} = -\frac{3}{2}$.

Slope of the line perpendicular to this line = $\frac{2}{3}$. So equation of the line is $y + 3 = \frac{2}{3}(x - 2)$.

We get 2x - 3y - 13 = 0. So the answer is 1.

- 20. The two sides forming the light angle of a triangle whose area is 24 sq.cm. are in the ratio 3 : 4. Then the length of the hypotenuse in cm is
 - 1. 12 2. 10 3. 8 4. 5

Solution: Let sides be 3x, 4x. Area of the triangle = $\frac{1}{2} \times 3x \times 4x = 6x^2$.

But it was given as 24. So $6x^2 = 24 \implies x = 2$. So the two sides are 6, 8.

Hypotenuse = $\sqrt{6^2 + 8^2} = \sqrt{100} = 10$. So the answer is 2.

21. The equation of the straight line which cuts off equal intercepts from the axis and pusses through the point (1, -2) is

1. 2x + 2y + 1 = 0 2. x + y + 1 = 0 3. x + y - 1 = 0 4. 2x + 2y - 1 = 0

Solution: The equation of the line with intercepts *a* and *b* is $\frac{x}{a} + \frac{y}{b} = 1$.

Given that a = b. So we get x + y = a. It is passing through (1, -2). So a = 1 - 2 = -1. So required equation is x + y = -1 or x + y + 1 = 0. So the answer is 2.

22. If the lines 2x + 3y = 6, 8x - 9y + 4 = 0, ax + 6y - 13 = 0 are concurrent, then a = 0

1. 3 3. 5 4. 7 2. 4 **Solution:** Solving the first two equations, we get $x = 1, y = \frac{4}{2}$. Substituting these in third equation, we get a + 8 - 13 = 0. So a = 5. So the answer is 3. 23. In $\triangle ABC$ if $\angle A = \frac{\pi}{2}$, then the ortho center of the triangle lies at the point 1. A 2. B 3. C 4. P the mid point of AC Solution: It is a right angle triangle. So the arthocentre is mid point of AC. So the answer is 4. 24. The distance between the lines 3x + 4y + 1 = 0 and 6x + 8y - 1 = 0 is 2. 0.2 3. 0.3 1. 0.1 4. 0.4 **Solution:** The distance between two parallel lines $ax + by + c_1 = 0$ and $a_2x + by + c_2 = 0$ is $\frac{|c_1 - c_2|}{\sqrt{a^2 + b^2}}$. Here a = 3, b = 4, $c_1 = 1$, $c_2 = \frac{-1}{2}$. Substituting these we get $\frac{1}{10} = 0.1$.

So the answer is 1.

25. If $a \neq b$, the point of intersection of the lines $\frac{x}{a} + \frac{y}{b} = 1$ and $\frac{x}{b} + \frac{y}{a} = 1$ lies on 1. ax + by = 0 2. ay + bx = 0 3. x + y = 0 4. x - y = 0Solution: The given equations are bx + ay - ab = 0 and ax + by - ab = 0. From these we have $bx + ay = ab = ax + by \Rightarrow (b - a)x - (b - a)y = 0$ $\Rightarrow x - y = 0$. So the answer is 4.

26. The equation of the line passing through (1, -1) and perpendicular to 5x - 2y + 4 = 0 is 1. 2x + 5y + 3 = 0 2. 2x + 5y - 3 = 0 3. 2x - 5y + 3 = 0 4. 2x - 5y - 3 = 0

Solution: The equation of the line passing through (x_1, y_1) and perpendicular to the line ax + by + c = 0 is $b(x - x_1) - a(y - y_1) = 0$. Here $x_1 = 1$, $y_1 = -1$, a = 5, b = -2. Substituting we get 2x + 5y + 3 = 0. So the answer is 1.

27. The lines x = 2, y = 3 meet at the point

1.
$$(0,3)$$
 2. $(2,3)$
 3. $(2,0)$
 4. $(3,2)$

 Amount is 2

Answer is 2.

28. The equation of the line perpendicular to y = 4 and passing through (10, 4) is

1. y = 10 2. y = -10 3. x = 10 4. x = -10

Solution: The equation of the line passing through (x_1, y_1) and perpendicular to the line ax + by + c = 0 is $b(x - x_1) - a(y - y_1) = 0$. Here $x_1 = 10$, $y_1 = 4$, a = 0, b = 1. Substituting these we get x = 10. So the answer is 3.

ANSWERS

| 1. 2 | 2. 2 | 3. 2 | 4. 1 | 5. 4 | 6. 2 | 7. 3 | 8. 3 | 9. 3 | 10. 2 |
|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| 11. 2 | 12. 1 | 13. 2 | 14. 2 | 15. 2 | 16. 2 | 17. 3 | 18. 1 | 19. 1 | 20. 2 |
| 21. 2 | 22. 3 | 23. 4 | 24. 1 | 25. 4 | 26. 1 | 27. 2 | 28. 3 | | |

ICET-2012

29. If a straight line is passing through the points (3,3) and (7,6), then the length of the portion of the line intercepted between the coordinate axes is

1. 4/5 2. 4/7 3. 5/4 4. 7/4Solution: Equation of the line passing through these two points is (3x - 4y + 3 = 0).

The coordates of the points on the axes are $(0, \frac{3}{4})$ and (-1, 0).

The length of the portion of the line intercepted between the coordinate axes = distance between

$$(0, \frac{3}{4})$$
 and $(-1, 0) = \frac{5}{4}$. Answer is 3.

- 30. The equation of a straightline whose slope is 1 and X-intercept is 4, is 1. x+y+4=0 2. x+y-4=0 3. x-y-4=0 4. x-y+4=0Solution: Equation of the line with the slope *m* and X-intercept *a* is y = m(x - a). Here m = 1, a = 4. So we get $y = 1(x - 4) \Rightarrow x - y - 4 = 0$. Answer is 3.
- 31. The foot of the perpendicular of the point (1, 2) on the line 3x + 4y = 1 is

1.
$$\left(\frac{-1}{5}, \frac{2}{5}\right)$$
 2. $\left(\frac{1}{5}, \frac{-2}{5}\right)$ 3. $\left(\frac{11}{25}, \frac{2}{25}\right)$ 4. $\left(\frac{1}{25}, \frac{-2}{25}\right)$

Solution: If (h, k) is the foot of the perpendicular from (x_1, y_1) on to the line ax + by + c = 0

then $\frac{h-x_1}{a} = \frac{k-y_1}{b} = \frac{-(ax_1+by_1+c)}{a^2+b^2}$. Here $a = 3, b = 4, c = -1 \Longrightarrow x_1 = 1, y_1 = 2$. Substituting these we get $h = \frac{-1}{5}$ and $k = \frac{2}{5}$. Answer is 1.

32. The area (in square units) of the polygon whose vertices taken in oder are (0, 0), (6, 0), (6, 6), (4, 4) and (0, 6) is

1. 24 2. 26 3. 30 4. 36 **Solution:** Area of the polygon = Area of the rectangle formed with the points (0, 0), (6, 0), (4, 4), (0, 4) + area of the triangle formed by the points (0, 4), (4, 4), (0, 6) + area of the triangle formed by the points (0, 4), (4, 4), (0, 6) + area of the triangle formed by the points (0, 4), (4, 4), (0, 6) + area of the triangle formed by the points (0, 4), (4, 4), (0, 6) + area of the triangle formed by the points (0, 4), (4, 4), (0, 6) + area of the triangle formed by the points (0, 4), (4, 4), (0, 6) + area of the triangle formed by the points (0, 4), (4, 4), (0, 6) + area of the triangle formed by the points (4, 4), (6, 6), (6, 4) = 24 + 4 + 2 = 30. Answer is 3.

33. If two circles of radii 5cm and 12cm touch each other externally, then the distance between their centres (in centimetres) is

1. 13 2. 17 3. 7 4. 12 Solution: Distance between their centres = sum of radii = 5 + 12 = 17. Answer is 2. ICET-2011

34. The slope of the line
$$\frac{3x+5}{4y-7} = \frac{1}{2}$$
 is

1. $\frac{3}{2}$ 2. $\frac{-3}{2}$ 3. $\frac{2}{3}$ 4. $\frac{-2}{3}$

Solution: $\frac{3x+5}{4y-7} = \frac{1}{2} \Rightarrow 6x + 10 = 4y - 7 \Rightarrow 4y = 6x + 17 \Rightarrow y = \frac{6}{4}x + \frac{17}{4} = \frac{3}{2}x + \frac{17}{4}$

y = mx + c, where *m* is slope. Here $m = \frac{3}{2}$. Answer is 1.

35. The Y-intercept of the line
$$\frac{3y-7}{4} = \frac{4x+1}{5}$$
 is

1. $\frac{-7}{3}$ 2. $\frac{7}{3}$ 3. $\frac{-39}{15}$ 4. $\frac{39}{15}$

Solution:
$$\frac{3y-7}{4} = \frac{4x+1}{5} \Rightarrow 15y - 35 = 16x + 4 \Rightarrow 16x - 15y = -39 \Rightarrow \frac{x}{-39} + \frac{y}{15} = 1.$$

So Y is intercept is $\frac{39}{15}$. Answer is 4.

36. The distance (in metres) between two parallel tangents drawn to a circle of area 616 sq.m is

(Take
$$\pi = \frac{22}{7}$$
)

1. 14 2. 28 3. $\frac{14}{\pi}$ 4. $\frac{28}{\pi}$

Solution:
$$\pi r^2 = 616 \implies r^2 = 616 \ge \frac{7}{22} = 196 \implies r = 14.$$

Distance between two parallel tangents = 2r = 2(14) = 28. Answer is 2.

MATRICES

- 1. Matrix: A rectangular array of numbers having 'm' rows and 'n' columns is called a matrix of order m by n.
- 2. Square matrix: If m = n then it is known as square matrix.
- 3. Rectangular matrix: If $m \neq n$ then it is known as rectangular matrix.
- 4. Row matrix: If only one row is present (m = 1) in a matrix then it is known as row matrix.
- 5. Column matrix: If only one column is present (n = 1) in a matrix then it is known as column matrix.
- 6. Equal matrices: Same type, same order and corresponding elements are equal.
- 7. Null matrix or zero matrix: all the elements are zero.
- 8. Principal diagonal: In a matrix all those elements a_{ij} for which i = j is called elements of principle diagonal.
- 9. Diagonal matrix: The square matrix is called diagonal matrix if all the elements of a matrix are zero except those of principal diagonal matrix.
- 10. Trace: Sum of the principal diagonal elements of a square matrix is called trace of the matrix. Trace (A+B) = Trace A + Trace B; Trace (KA) = K Trace A
- 11. Scalar matrix: A diagnal matrix in which the diagonal elements are equal all other elements being zero is called scalar matrix.
- 12. Identity of Unit matrix (I): In scalar matrix if the diagonal elements are unity then it is identity matrix.
- 13. Determine of matrix: The determine of the square matrix $\begin{pmatrix} a & b \\ c & d \end{pmatrix}$ is the unique number

(determine = ad - bc).

- 14. The determinant of a square matrix is the sum of the product of the element of any column (row) with there corresponding cofactors.
- 15. Singular matrix; det = 0.
- 16. Non-singular matrix: det $\neq 0$.
- 17. Idempotent matrix: A square matrix A is said to be idempotent matrix is $A^2 = A$.
- 18. Nilpotent matrix: for square matrix A if $A^n = 0$, then A is called nilpotent matrix.
- 19. Involuntary matrix: A square matrix A is said to be involuntary matrix $A^2 = 1$.
- 20. Tranpose of matrix: The matrix obtained from a given matrix A by interchanging its rows and columns is called transpose of the matrix A.

1. $(A^{T})^{T} = A;$ 2. $(A + B)^{T} = A^{T} + B^{T};$ 3. $(AB)^{T} = B^{T}.A^{T}$ 4. $(ABC)^{T} = C^{T}B^{T}A^{T}$

21. Orthogonal matrix: A square matrix A is said to be orthogonal matrix if $AA^T = A^TA = I$.

- 22. Symmetric matrix: A square matrix A is symmetric of $A^T = A$.
- 23. Skew-symmetric matrix: $A^{T} = -A$
- 24. Addition of two matrices are possible if they are of same type and order.
- 25. Rules for multiplication: The product of two matrices A and B are possible if No. of columns of

A = No. of rows of B.

- 26. Conjugate of matrix: The matrix obtained from any given matrix A on replacing its elements by conjugate complex number is called conjugate of A and is written as \overline{A} .
- 27. Adjoint matrix: Let A be a square matrix. The transpose of matrix obtained from A by replacing the elements of A by cofactors is called the adjoint of A.
- 28. Inverse of matrix; If AB = BA = I then B is called inverse fo A and $B = A^{-1}$.
- 29. The determinant of a triangular matrix is the product of the elements of the principal diagonal of the matrix.

PROBLEMS

1. If
$$A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$$
 and det $A = 5$, then the determinant of the matrix $\begin{bmatrix} 4a & 4b \\ 3c & 3d \end{bmatrix}$ is

Solution: det A = ad - bc = 5. So $\begin{vmatrix} 4a & 4b \\ 3c & 3d \end{vmatrix} = 12 ad - 12 bc = 12(ad - bc) = 12(5) = 60$.

So the answer is 4.

2. If $A = \begin{bmatrix} 3 & -1 \\ 0 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 1 \\ 4 & -1 \end{bmatrix}$ then the determinant of 2A + 3B is 1. 12 2. 72 3. 48 4. 60 Solution: $2A + 3B = 2\begin{bmatrix} 3 & -1 \\ 0 & 5 \end{bmatrix} + 3\begin{bmatrix} 2 & 1 \\ 4 & -1 \end{bmatrix} = \begin{bmatrix} 6 & -2 \\ 0 & 10 \end{bmatrix} + \begin{bmatrix} 6 & 3 \\ 12 & -3 \end{bmatrix} = \begin{bmatrix} 12 & 1 \\ 12 & 7 \end{bmatrix}$

So the determinent of 2A + 3B = 12(7) - 12(1) = 84 - 12 = 72. So the answer is 2.

3. The inverse of the matrix
$$\begin{bmatrix} \cos\theta & \sin\theta\\ \sin\theta & -\cos\theta \end{bmatrix}$$
 is
1. $\begin{bmatrix} -\cos\theta & -\sin\theta\\ \sin\theta & \cos\theta \end{bmatrix}$ 2. $\begin{bmatrix} \cos\theta & \sin\theta\\ \sin\theta & -\cos\theta \end{bmatrix}$
3. $\begin{bmatrix} -\cos\theta & \sin\theta\\ -\sin\theta & \cos\theta \end{bmatrix}$ 4. $\begin{bmatrix} -\cos\theta & \sin\theta\\ \sin\theta & \cos\theta \end{bmatrix}$

Solution: If $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$ and if $ad - bc \neq 0$, then $A^{-1} = \frac{1}{ad - bc} \begin{bmatrix} d & -b \\ -c & a \end{bmatrix}$. Here $a = \cos \theta$, $b = \sin \theta$, $c = \sin \theta$, $d = -\cos \theta$. So $ad - bc = -\cos^2 \theta - \sin^2 \theta = -1$. So the inverse of given matrix $= (-1) \begin{bmatrix} -\cos \theta & -\sin \theta \\ -\sin \theta & \cos \theta \end{bmatrix} = \begin{bmatrix} \cos \theta & \sin \theta \\ \sin \theta & -\cos \theta \end{bmatrix}$

So the answer is 2.

4. If $A = \begin{bmatrix} 4 & -1 \\ 2 & 3 \end{bmatrix}$, then $A^2 - 7A =$ 1. 14 2.14 I 3. -14 4. -14 I Solution: $A^2 - 7A = \begin{bmatrix} 4 & -1 \\ 2 & 3 \end{bmatrix} \begin{bmatrix} 4 & -1 \\ 2 & 3 \end{bmatrix} - 7 \begin{bmatrix} 4 & -1 \\ 2 & 3 \end{bmatrix} = \begin{bmatrix} 4(4) - 1(2) & 4(-1) - 1(3) \\ 2(4) + 3(2) & 2(-1) + 3(3) \end{bmatrix} -$ $\begin{vmatrix} 28 & -7 \\ 14 & 21 \end{vmatrix}$ $= \begin{bmatrix} 16-2-28 & -4-3+7 \\ 8+6-14 & -2+9-21 \end{bmatrix} = \begin{bmatrix} -14 & 0 \\ 0 & -14 \end{bmatrix} = -14 \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} = -14 \text{ I. So the answer is 4.}$ 5. Let A be a 3 x 3 matrix and det A = 5, then det 5A =1. 54 2. 5^3 3. 5^2 4. 5 Solution: det $5A = 5^3 x det A = 5^3 x 5 = 5^4$. So the answer is 1. 6. If $i = \sqrt{-1}$ and $A = \begin{bmatrix} i & 0 \\ 0 & -i \end{bmatrix}$ then $A^7 =$ 3. A 1. I 2. -I 4. -A **Solution:** A is a triangular matrix. So $A^7 = \begin{vmatrix} i^7 & 0 \\ 0 & (-i)^7 \end{vmatrix} = \begin{bmatrix} -i & 0 \\ 0 & i \end{bmatrix} = -A.$ **So the answer is 4.** (note $i^2 = -1$, $i^4 = 1$, $i^6 = -1$, $i^7 = -i$) 7. $\begin{bmatrix} 2 & 6 \\ 1 & 3 \end{bmatrix} \begin{bmatrix} 3 & -6 \\ -1 & 2 \end{bmatrix} =$ 1. $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ 2. $\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$ 3. $\begin{bmatrix} -1 & 0 \\ 0 & -1 \end{bmatrix}$ 4. $\begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$ Solution: $\begin{bmatrix} 2(3)+6(-1) & 2(-6)+6(2) \\ 1(3)+3(-1) & 1(-6)+3(2) \end{bmatrix} = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$. So the answer is 4.

8. If
$$f(\alpha) = \begin{bmatrix} \sin \alpha & -\cos \alpha \\ \cos \alpha & \sin \alpha \end{bmatrix}$$
 then $\sin \alpha \cdot f(\alpha) + \cos \alpha \cdot f\left(\frac{\pi}{2} + \alpha\right) =$
1. $\begin{bmatrix} 1 & -1 \\ -1 & 1 \end{bmatrix}$ 2. $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ 3. $\begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$ 4. $\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$
Solution: $f\left(\frac{\pi}{2} + \alpha\right) = \begin{bmatrix} \sin\left(\frac{\pi}{2} + \alpha\right) & -\cos\left(\frac{\pi}{2} + \alpha\right) \\ \cos\left(\frac{\pi}{2} + \alpha\right) & \sin\left(\frac{\pi}{2} + \alpha\right) \end{bmatrix} = \begin{bmatrix} \cos \alpha & \sin \alpha \\ -\sin \alpha & \cos \alpha \end{bmatrix}$
 $\sin \alpha \cdot f(\alpha) + \cos \alpha \cdot f\left(\frac{\pi}{2} + \alpha\right) = \sin \alpha \begin{bmatrix} \sin \alpha & -\cos \alpha \\ \cos \alpha & \sin \alpha \end{bmatrix} + \cos \alpha \begin{bmatrix} \cos \alpha & \sin \alpha \\ -\sin \alpha & \cos \alpha \end{bmatrix}$
 $= \begin{bmatrix} \sin^2 \alpha & -\sin \alpha \cos \alpha \\ \sin \alpha \cos \alpha & -\sin^2 \alpha \end{bmatrix} + \begin{bmatrix} \cos^2 \alpha & \sin \alpha \cos \alpha \\ -\sin \alpha & \cos \alpha \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$. So the answer is 2.
9. If $0 < \theta < 90^{\theta}$ and the matrix $\begin{bmatrix} \sin^2 \theta & 1 \\ 1 & \sec^2 \theta \end{bmatrix}$ has no inverse then $\theta =$
1. 30^{θ} 2. 45^{θ} 3. 60^{θ} 4. 75^{θ}
Solution: The matrix has no inverse, so its det value = 0. So we get $\sin^2 \theta \cdot \sec^2 \theta - 1 = 0$.
 $\Rightarrow \frac{\sin^2 \theta}{\cos^2 \theta} = 1 \Rightarrow \sin^2 \theta = \cos^2 \theta \Rightarrow \theta = 45^{\theta}$. So the answer is 2.
10. If $\begin{bmatrix} 2 & -1 \\ 1 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 4 \\ 5 \end{bmatrix}$, then $2x - 3y =$
1. 1 2. -1 3. 2 4. 0
Solution: $\begin{bmatrix} 2x - y \\ x + y \end{bmatrix} = \begin{bmatrix} 4 \\ 5 \end{bmatrix}$. So $2x - y = 4$ and $x + y = 5$.
Adding we get $3x = 9 \Rightarrow x = 3$. Then we get $y = 2$. So $2x - 3y = 6 - 6 = 0$
So the answer is 4.
11. The inverse of matrix A = $\begin{bmatrix} 3 & 5 \\ 1 & 2 \end{bmatrix}$ is

1. $\begin{bmatrix} 2 & 5 \\ 1 & -3 \end{bmatrix}$ 2. $\begin{bmatrix} 2 & -5 \\ -1 & 3 \end{bmatrix}$ 3. $\begin{bmatrix} -2 & -5 \\ 1 & 0 \end{bmatrix}$ 4. $\begin{bmatrix} 5 & -3 \\ 2 & -1 \end{bmatrix}$ Solution: If $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$ and if $ad - bc \neq 0$, then $A^{-1} = \frac{1}{ad - bc} \begin{bmatrix} d & -b \\ -c & a \end{bmatrix}$. Here a = 3, b = 5, c = 1, d = 2. So ad - bc = 6 - 5 = 1

So the inverse of given matrix = $(1)\begin{bmatrix} 2 & -5\\ -1 & 3 \end{bmatrix} = \begin{bmatrix} 2 & -5\\ -1 & 3 \end{bmatrix}$

So the answer is 2.

ICET-2012

12. If
$$A = \begin{pmatrix} 0 & -2 \\ 2 & 0 \end{pmatrix}$$
 and $B = \begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}$, then $AB + BA =$
1. $\begin{pmatrix} 0 & -2 \\ 2 & 0 \end{pmatrix}$ 2. $\begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}$ 3. $\begin{pmatrix} 0 & 0 \\ 0 & 0 \end{pmatrix}$ 4. $\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$
Solution: $AB + BA = \begin{bmatrix} 0 & 2 \\ 2 & 0 \end{bmatrix} + \begin{bmatrix} 0 & -2 \\ -2 & 0 \end{bmatrix} = \begin{pmatrix} 0 & 0 \\ 0 & 0 \end{pmatrix}$.

So the answer is 3.

13. If A, B are square matrices of same order such that $B = -A^{-1}BA$, then $(A+B)^2 = 1$. 0 2. A+B 3. A^2+B^2 4. $A^2+2AB+B^2$ Solution: Given that $B = -A^{-1}BA \Rightarrow AB = A(-A^{-1}BA) = -AA^{-1}BA = -BA \Rightarrow AB+BA = O$. Now $(A+B)^2 = (A+B)(A+B) = A(A+B)+B(A+B) = A^2+AB+BA+B^2 = A^2+B^2$. Answer is 3.

ICET-2011

14. If A, B are 3 x 3 marices such that A = 2, det B = -1, then det (4 AB) = 1. -8 2. -32 3. 8 4. -128 Solution:det $(4 AB) = 4^{3}(det A)(det B) = 4^{3}(2)(-1) = -128$. Answer is 4.

15. If
$$A = \begin{bmatrix} 2x+3 & -4 \\ x+7 & 2 \end{bmatrix}$$
 and if det $A = 0$, then $x =$
1. $\frac{17}{4}$ 2. $\frac{14}{7}$ 3. $\frac{-14}{7}$ 4. $\frac{-17}{4}$
Solution: det $A = 0 \Rightarrow \begin{vmatrix} 2x+3 & -4 \\ x+7 & 2 \end{vmatrix} = 0 \Rightarrow 2(2x+3)+4(x+7)=0$

 $\Rightarrow 4x+6+4x+28=0 \Rightarrow 8x+34=0 \Rightarrow 8x = -34 \Rightarrow x = \frac{-17}{4}$. Answer is 4.

ICET - 2013

16.If A is a square matrix and A^T denotes its transpose, then the matrix A.A^T is always
1. a symmetric matrix 2. a skew symmetric matrix
3. an orthogonal matrix
Answer is 1.4. a null matrix
4. a null matrix
4. a null matrix
Answer is 1.17.If A is a 3 x 3 square matrix and if $A.adjA = \begin{bmatrix} 4 & 0 & 0 \\ 0 & 4 & 0 \\ 0 & 0 & 0 \end{bmatrix}$, then det (2A)=

1. 4 2. 32 3. 8 4. 64 Solution:det $(2A)=2^{3}x det A = 8x 4 = 32$ Answer is 2.

ICET - 2014:

 18. If A and B are two matrices such that AB = A, BA = B, then $A^2 + B^2 =$

 1. A + B
 2. A - B
 3. 2A + B
 4. A + 2B

 Solution: $A^2 + B^2 = AA + BB = ABA + BAB = AB + BA = A + B$ Answer is 1.

 19. $\begin{bmatrix} 2 & 16 \\ -8 & 0 \end{bmatrix} = \begin{bmatrix} a & b^2 \\ c^3 & 0 \end{bmatrix}$, $c < 0, b < 0 \Rightarrow 3a + b + c =$

 1. 2
 2. -2
 3. 4
 4. 0

 Solution: 3a + b + c = 3(2) + (-4) + (-2) = 0 Answer is 4.

Telangana ICET - 2015:

20. Let A be a 3 x 3 matrix and det A = 5, then det 5A =1. 5^4 2. 5^3 3. 5^2 4. 5

Solution: det $5A = 5^3 x det A = 5^3 x 5 = 5^4$. So the answer is 1.

21. $A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix} \Rightarrow A^2 - 4A =$ The answer is 4. 1. 2I 2. 3I 3. 4I 4. 5I

Trignometry:

- 1. $\sin\theta\csc\theta = 1$; $\tan\theta\cot\theta = 1$; $\cos\theta\sec\theta = 1$; $\tan\theta = \frac{\sin\theta}{\cos\theta}$, $\cot\theta = \frac{\cos\theta}{\sin\theta}$
- 2. $\sin^2\theta + \cos^2\theta = 1$; $\sec^2\theta \tan^2\theta = 1$; $\csc^2\theta \cot^2\theta = 1$
- 3. $\sin 15^{\circ} = \frac{\sqrt{3}-1}{2\sqrt{2}}$; $\cos 15^{\circ} = \frac{\sqrt{3}+1}{2\sqrt{2}}$; $\tan 15^{\circ} = 2-\sqrt{3}$; $\cot 15^{\circ} = 2+\sqrt{3}$

4. Sin
$$18^{\circ} = \frac{\sqrt{5} - 1}{4}$$
; Cos $18^{\circ} = \frac{\sqrt{10 + 2\sqrt{5}}}{4}$; Cos $36^{\circ} = \frac{\sqrt{5} + 1}{4}$; Sin $36^{\circ} = \frac{\sqrt{10 - 2\sqrt{5}}}{4}$

- 5. $\operatorname{Sin}(A+B) = \sin A \cos B + \cos A \sin B$; $\operatorname{Sin}(A-B) = \sin A \cos B \cos A \sin B$
- 6. $\cos(A+B) = \cos A \cos B \sin A \sin B$; $\cos(A-B) = \cos A \cos B + \sin A \sin B$

7.
$$\operatorname{Tan}(A+B) = \frac{\tan A + \tan B}{1 - \tan A \tan B}; \qquad \operatorname{Cot}(A+B) = \frac{\cot A \cot B - 1}{\cot B + \cot A}$$

8. $Sin(A+B) Sin(A-B) = sin^2 A - sin^2 B = cos^2 B - cos^2 A$ $Cos(A+B) Cos(A-B) = cos^2 A - sin^2 B = cos^2 B - sin^2 A$

9.
$$\operatorname{Tan}(A+B)\operatorname{Tan}(A-B) = \frac{\tan^2 A - \tan^2 B}{1 - \tan^2 A \tan^2 B}$$
10.
$$\operatorname{Cot}(A+B)\operatorname{Cot}(A-B) = \frac{\cot^2 A \cot^2 B - 1}{\cot^2 B - \cot^2 A}$$
11.
$$\operatorname{Tan}(45+\theta) = \frac{1 + \tan \theta}{1 - \tan \theta} = \frac{\cos \theta + \sin \theta}{\cos \theta - \sin \theta}; \quad \operatorname{Tan}(45-\theta) = \frac{1 - \tan \theta}{1 + \tan \theta} = \frac{\cos \theta - \sin \theta}{\cos \theta + \sin \theta}$$
12.
$$\operatorname{Sin} 2\theta = 2 \sin \theta \cos \theta = \frac{2 \tan \theta}{1 + \tan^2 \theta}$$
13.
$$\operatorname{Cos} 2\theta = \cos^2 \theta = 1 - 2\sin^2 \theta = 2\cos^2 \theta - 1 = \frac{1 - \tan^2 \theta}{1 + \tan^2 \theta}$$
14.
$$\operatorname{Cos}^2 \theta = \frac{1 + \cos 2\theta}{2}; \quad \operatorname{Sin}^2 \theta = \frac{1 - \cos 2\theta}{2}$$
15.
$$\operatorname{Tan} 2\theta = \frac{2 \tan \theta}{1 - \tan^2 \theta}; \quad \operatorname{Sin} 3\theta = 3 \sin \theta - 4\sin^3 \theta; \quad \operatorname{Cos} 3\theta = 4 \cos^3 \theta - 3 \cos \theta$$

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- 16. $\sin C + \sin D = 2 \sin \frac{(C+D)}{2} \cos \frac{(C-D)}{2}$ 17. $\sin C - \sin D = 2 \cos \frac{(C+D)}{2} \sin \frac{(C-D)}{2}$ 18. $\cos C + \cos D = 2 \cos \frac{(C+D)}{2} \cos \frac{(C-D)}{2}$ 19. $\cos C - \cos D = 2 \sin \frac{(C+D)}{2} \sin \frac{(C-D)}{2}$ 20. $\sin(A+B) + \sin(A-B) = 2 \sin A \cos B$; $\sin(A+B) - \sin(A-B) = 2 \cos A \sin B$ 21. $\cos(A+B) - \cos(A-B) = 2 \cos A \cos B$; $\cos(A+B) - \cos(A-B) = 2 \sin A \sin B$
- 22. Maximum value of $a \cos x + b \sin x + c$ is $C + \sqrt{a^2 + b^2}$.
- 23. Minimum value of $a \cos x + b \sin x + c$ is $C \sqrt{a^2 + b^2}$

Problems

1. Cot $15^0 =$

1. $2+\sqrt{3}$ 2. $2-\sqrt{3}$ 3. $\sqrt{3}-2$ 4. $3-\sqrt{2}$

Solution: $\cot (A - B) = \frac{\cot A \cot B + 1}{\cot B - \cot A}$. So $\cot 15 = \cot (45 - 30) =$

 $\frac{\cot 45 \cot 30 + 1}{\cot 30 - \cot 45}$

$$=\frac{1(\sqrt{3})+1}{\sqrt{3}-1}=\frac{\sqrt{3}+1}{\sqrt{3}-1} \times \frac{\sqrt{3}+1}{\sqrt{3}+1}=\frac{3+1+2\sqrt{3}}{3-1}=2+\sqrt{3}.$$
 So the answer is 1.

- 2. If $0 < \theta < \frac{\pi}{2}$, and $\cot \theta + \csc \theta = 3$, then $\cos \theta =$
 - 1. $\frac{2}{3}$ 2. $\frac{3}{2}$ 3. $\frac{4}{5}$ 4. $\frac{3}{4}$

Solution: $\operatorname{cosec} \theta + \cot \theta = \frac{p}{q} \Longrightarrow \cos \theta = \frac{p^2 - q^2}{p^2 + q^2}.$

Given $\csc \theta + \cot \theta = 3 \Longrightarrow \cos \theta = \frac{3^2 - 1}{3^2 + 1} = \frac{8}{10} = \frac{4}{5}$. So the answer is 3.

3. $\frac{\cot 15^{\circ} - \sin 15^{\circ}}{\cot 15^{\circ} + \sin 15^{\circ}} =$

1.
$$\frac{\sqrt{3}}{2}$$
 2. $2 + \sqrt{3}$ 3. $\sqrt{3}$ 4. $\frac{1}{\sqrt{3}}$
Solution: $\frac{\cos \theta - \sin \theta}{\cos \theta + \sin \theta} = \tan (45 - \theta)$. So $\frac{\cos 15 - \sin 15}{\cos 15 + \sin 15} = \tan (45 - 15) = \tan 30$
 $= \frac{1}{\sqrt{3}}$.
So the answer is 4.
4. Sin 945°
1. $\frac{\sqrt{3}}{2}$ 2. $-\frac{\sqrt{3}}{2}$ 3. $\frac{1}{\sqrt{2}}$ 4. $-\frac{1}{\sqrt{2}}$
Solution: $\sin(5 \times 180^{\circ} + 45^{\circ}) = -\sin 45^{\circ} = -\frac{1}{\sqrt{2}}$. So the answer is 4.
5. A tower on horizontal ground is of height 100mt and subtends an angle of 30° at a point A on the ground. Then the distance of A from the foot of the lower is
1. $\frac{100}{\sqrt{3}}$ 2. $100m$ 3. $100\sqrt{3}$ 4. $100(2\sqrt{3})m$
Solution: $\tan 30^{\circ} = \frac{100}{d}$. So $\frac{1}{\sqrt{3}} = \frac{100}{d}$. So $d = 100\sqrt{3}$. So the answer is 3.
6. $\frac{1 + \sin \theta}{\cos \theta} + \frac{\cos \theta}{1 + \sin \theta} =$
1. $2\sin \theta$ 2. $2\cos \theta$ 3. $2 \sec \theta$ 4. $2\tan \theta$
Solution: $\frac{(1 + \sin \theta)^2 + \cos^2 \theta}{\cos \theta(1 + \sin \theta)} = \frac{1 + 2\sin \theta + \sin^2 \theta + \cos^2 \theta}{\cos \theta(1 + \sin \theta)} = \frac{2(1 + \sin \theta)}{\cos \theta(1 + \sin \theta)} =$
2 sec θ .
So the answer is 3.
7. $(\sin A \cos B - \cos A \sin B)^2 + (\cos A \cos B + \sin A \sin B)^2 =$
1. $2 \sin A \cos B$ 2. $2 \cos A \sin B$ 3. 1 4. 0
Solution: $(\sin A \cos B - \cos A \sin B)^2 + (\cos A \cos B + \sin A \sin B)^2 =$
1. $2 \sin A \cos B$ 2. $2 \cos A \sin B$ 3. 1 4. 0
Solution: $(\sin A \cos B - \cos A \sin B)^2 + (\cos A \cos B + \sin A \sin B)^2 =$
(sin $(A - B))^2 + (\cos(A - B))^2 = \sin^2(A - B) + \cos^2(A - B) = 1$. So the answer is 3.
8. If $\cos \alpha = \sin \beta = \frac{1}{2}$ and $0 < \alpha, \beta < \frac{\pi}{2}$ then $\alpha + 2\beta =$

1.
$$\frac{\pi}{4}$$
 2. $\frac{\pi}{6}$ 3. $\frac{\pi}{3}$ 4. $\frac{2\pi}{3}$
Solution: $\cos \alpha = \frac{1}{2} \Rightarrow \alpha = \frac{\pi}{3}$; $\sin \beta = \frac{1}{2} \Rightarrow \beta = \frac{\pi}{6}$
So $\alpha + 2\beta = \frac{\pi}{3} + \frac{\pi}{6} = \frac{2\pi}{3}$. So the answer is 4.
9. From the top of a building of height 85 meters on the bank of a river observed that the angle of depression of the other side of the bank is 45°. The breadth of the river (in meters) is x
1. 42.5 2. 85 3. 130 4. 202
Solution: $\tan 45^{0+}\frac{85}{x} \Rightarrow 1 = \frac{85}{x} \Rightarrow x = 85$. So the answer is 2.
10. $\frac{(1 - \sec \theta)^2 + (1 + \sec \theta)^2}{1 + \sec^2 \theta} =$
1. -1 2. 0 3. 1 4. 2
Solution: $\frac{1 + \sec^2 \theta - 2 \sec \theta + 1 + \sec^2 \theta + 2 \sec \theta}{1 + \sec^2 \theta} = \frac{2(1 + \sec^2 \theta)}{1 + \sec^2 \theta} = 2$. So the answer is 4.
11. $\cos 90^{0} \cos 60^{0} + \sin 90^{0} \sin 60^{0} + (\sin 30^{0}) (\cos 45^{0}) =$
1. $\frac{1}{4}(\sqrt{12} + \sqrt{2})$ 2. $\frac{1}{2}(\sqrt{2} - \sqrt{2})$ 3. $2 + \sqrt{12}$ 4. $2 - \sqrt{12}$
Solution: $\cos(A - B) = \cos A \cos B + \sin A \sin B$.
So $\cos (90-60) + (\sin 30^{0}) (\cos 45^{0}) = \frac{\sqrt{3}}{2} + \frac{1}{2} \frac{1}{\sqrt{2}} = \frac{\sqrt{6} + 1}{2\sqrt{2}} = \frac{1}{4}(\sqrt{12} + \sqrt{2})$. So answer is 1.
12. If $\sin 0 + \csc \theta = 2$, then $\sin^4 \theta + \csc^4 \theta =$
1. 16 2. 8 3. 4 4. 2
Solution: $\sin \theta + \csc \theta = 2 \Rightarrow \theta = 90^{0}$, then $\sin^4 90^{0} + \csc^4 90^{0} = 1 + 1 = 2$.
So the answer is 4.
13. If $x \cos \theta - y \sin \theta = \alpha$ and $x \sin \theta + y \cos \theta = \beta$, then $x^2 + y^2 =$
1. α^2 2. β^2 3. $\alpha^2 + \beta^2$ 4. $\alpha^2 - \beta^2$
Solution: $\alpha^2 + \beta^2 = x^2(\sin^2 \theta + \cos^2 \theta) + y^2(\sin^2 \theta + \cos^2 \theta) = x^2 + y^2$.
So the answer is 3.
14. $(\tan 47^0 + \cot 47^0) (\sin 47^0 x \cos 47^0) =$

1. 0 2. 1 3.
$$\frac{1}{2}$$
 4. $\frac{\sqrt{3}}{2}$

Solution: $(\tan 47^{\circ} + \cot 47^{\circ}) (\sin 47^{\circ} x \cos 47^{\circ}) = (\frac{\sin 47}{\cos 47} + \frac{\cos 47}{\sin 47}) (\sin 47^{\circ} x \cos 47^{\circ})$

 $=\sin^2 47^0 + \cos^2 47^0 = 1$. So the answer is 2.

15. For $0 < \theta < \pi$ and $\theta \neq \frac{\pi}{2}$, if $1 + \sin \theta + \sin^2 \theta + \dots + \infty = 4 + 2\sqrt{3}$, then $\sin \theta = 1$

1.
$$\frac{1}{\sqrt{2}}$$
 2. $\frac{\sqrt{3}}{2}$ 3. $\frac{1}{2}$ 4. $\frac{2}{\sqrt{5}}$

Solution: It is geometric progression. $a = \text{first term} = 1, r = \text{common ratio} = \sin \theta$.

Sum of infinite terms
$$= \frac{a}{1-r} = \frac{1}{1-\sin\theta} = 4 + 2\sqrt{3} \implies 1-\sin\theta = \frac{1}{4+2\sqrt{3}}$$

 $\implies \sin\theta = 1 - \frac{1}{4+2\sqrt{3}} = 1 - \frac{4-2\sqrt{3}}{16-12} = 1 - \frac{4-2\sqrt{3}}{4} = \frac{\sqrt{3}}{2}$. So the answer is 2.

16. If $\tan \theta + \cot \theta = 2$, then $\tan^8 \theta + \cot^8 \theta =$

1. 1 2. 2 3. 8 4. 16 Solution: $\tan \theta + \cot \theta = 2 \implies \theta = 45$, then $\tan^8 \theta + \cot^8 \theta = 1 + 1 = 2$. So the answer is 2.

17.
$$\frac{1 + \sec A}{2 \tan A} + \frac{\tan A}{2(1 + \sec A)} =$$
1.
$$\sin A$$
2.
$$\sec A$$
3.
$$\csc A$$
4.
$$\cos A$$
Solution:
$$\sec A = \frac{1}{\cos A}, \tan A = \frac{\sin A}{\cos A}$$
substitute these two and simplify we get cosec A.
So the answer is 3.

18. 300 meters away from the foot of a tower, the top of the tower is observed at an angle of elevation of 30° . Then the height of the tower (in meters) is ?

1. 100
2.
$$100 + \sqrt{3}$$

3. $100 - \sqrt{3}$
4. $100\sqrt{3}$
Solution: $\tan 30 = \frac{h}{300}$. So $h = 300 \tan 30 = 300 \times \frac{1}{\sqrt{3}} = 100\sqrt{3}$.
So the answer is 4.

19. If
$$\cos \theta = \frac{5}{13}$$
, then $\tan \theta =$
1. $\frac{5}{13}$ 2. $\frac{12}{25}$ 3. $\frac{12}{13}$ 4. None
Solution: $\cos \theta = \frac{5}{13}$. So $\sin \theta = \frac{12}{13}$, then $\tan \theta = \frac{12}{5}$. So the answer is 4.
20. The angles of elevation of the top of two vertical towers as seen from the middle point of the line joining the foot of the towers, are 60° and 30° respectively. The ratio of theri heights of the towers is
1. $2:1$ 2. $\sqrt{3}:1$ 3. $3:2$ 4. $3:1$
Solution: $\tan 60 = \frac{h_1}{x}$, $\tan 30 = \frac{h_2}{x}$. So $h_1: h_2 = x\sqrt{3}: \frac{x}{\sqrt{3}} = 3:1$. So the answer is 4.
21. If $A + C = B$, then $\tan A \tan B \tan C =$
1. $\tan B + \tan A - \tan C$ 2. $\tan B + \tan A + \tan C$
3. $\tan B - \tan A + \tan C$ 4. $\tan A + \tan B + \tan C$
Solution: $\frac{\tan A + \tan C}{1 - \tan A \tan C} = \tan B \Rightarrow \tan A + \tan C = \tan B - \tan A \tan B \tan C$
So $\tan A \tan B \tan C = \tan B - \tan A - \tan C$. So the answer is 1.
22. If $\sin \theta = \frac{15}{17}$, then for $0^{0} < \theta < 90^{0} \frac{15 \cot \theta - 17 \sin \theta}{8 \tan \theta + 16 \sec \theta} =$
1. $\frac{23}{49}$ 2. $\frac{22}{49}$ 3. $\frac{18}{49}$ 4. $\frac{17}{49}$
Solution: $\sin \theta = \frac{15}{17}$. So $\cos \theta = \frac{8}{17}$, $\tan \theta = \frac{15}{8}$, $\cot \theta = \frac{8}{15}$, $\sec \theta = \frac{17}{8}$.
Substituting these and simplifying we get $\frac{23}{49}$. So the answer is 1.
23. If a flag staff of 6 metres height, place on the top of a tower throws a shadow of $2\sqrt{3}$ metres along the ground, then the angle is degrees that the sun makes with the grouns is
1. 30° 2. 45° 3. 60° 4. 75°
Solution: $\tan \theta = \frac{6}{2\sqrt{3}} = \sqrt{3}$. So $\theta = 60^{\circ}$. So the answer is 3.
24. The period of $\sin^{1}x + \cos^{1}x$ is

1. $\frac{\pi}{2}$ 2. π 3. 2π 4. $\frac{2\pi}{3}$

Solution: The period of $\sin^3 x = 2\pi$, the period of $\cos^3 x = 2\pi$.

So the period of $\sin^3 x + \cos^3 x$ is 2π . So the answer is 3. 25. If $\sqrt{\sin x} + \cos x = 0$ then $\sin x =$

1.
$$\frac{\sqrt{5}+1}{2}$$
 2. $\frac{\sqrt{5}+1}{8}$ 3. $\frac{\sqrt{5}-1}{8}$ 4. $\frac{\sqrt{5}-1}{2}$

Solution: $\sqrt{\sin x} = -\cos x \Rightarrow \sin x = \cos^2 x = 1 - \sin^2 x \Rightarrow \sin^2 x + \sin x - 1 = 0$

$$\sin x = \frac{-1 \pm \sqrt{1+4}}{2} = \frac{\pm \sqrt{5} - 1}{2} . \ \sin x > 0 \Longrightarrow \sin x = \frac{\sqrt{5} - 1}{2} . \ \text{So the answer is 4.}$$

26. If the area of the triangle ABC is $a^2 - (b - c)^2$, then $\tan \frac{A}{2} =$

1.
$$\frac{1}{4}$$
 2. $\frac{1}{2}$ 3. $\frac{3}{4}$ 4. 0
Solution: Area $\Delta = a^2 - (b - c)^2 = (a + b + c)(a - b + c) = 2(s - b)2(s - c)$
 $\Rightarrow \frac{(s - b)(s - c)}{\Delta} = \frac{1}{4}$. So $\tan \frac{A}{2} = \frac{1}{4}$. (because $2s = a + b + c$)

So the answer is 1.

27.
$$\sin^{4}\theta + \cos^{4}\theta + 2\sin^{2}\theta\cos^{2}\theta - 1 =$$

1. 1 2. -1 3. 0 4. 2
Solution: $\sin^{4}\theta + \cos^{4}\theta + 2\sin^{2}\theta\cos^{2}\theta - 1 = (\sin^{2}\theta + \cos^{2}\theta)^{2} - 1 = 1 - 1 = 0$
So the answer is 3.

28. If $90^{\circ} < \theta < 180^{\circ}$ and $\tan \theta = \frac{-12}{5}$, then $\cos \theta =$

1.
$$-\frac{5}{13}$$
 2. $-\frac{5}{12}$ 3. $\frac{5}{13}$ 4. $\frac{5}{12}$

Solution: $\cos \theta = -\frac{5}{13}$ (θ is in second quadrant so it is negative). So the answer 1. 29. If A + B = 45^o then (1 + tan A) (1 + tan B) =

1. -2 2. 1 3. 0 4. 2
Solution:
$$\tan(A+B) = \tan 45 \rightarrow \frac{\tan A + \tan B}{\tan 4 + \tan B} = 1 \rightarrow \tan A + \tan B = 1 - \tan A$$

Solution: $\tan(A+B) = \tan 45 \Rightarrow \overline{1 - \tan A \tan B} = 1 \Rightarrow \tan A + \tan B = 1 - \tan A \tan B$ $\Rightarrow \tan A + \tan B + \tan A \tan B = 1 \Rightarrow (1 + \tan A)(1 + \tan B) = 2$. So the answer is 4.

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30. From the point, mid way between two towers the angles of elevation of their tops are found to 60° and 45° . The ratio of the heights of the tower is ?

2. $1:\sqrt{2}$ 3. $\sqrt{3}:1$ 4. $\sqrt{2}:\sqrt{3}$ 1. 1:2 **Solution:** $\tan 60 = \frac{h_1}{r}$, $\tan 45 = \frac{h_2}{r}$. So $h_1 : h_2 = x\sqrt{3} : x = \sqrt{3} : 1$. So the answer is 3. 31. If $270^{\circ} < \theta < 360^{\circ}$ and $\sin \theta = -\frac{3}{5}$ then $\cos \theta + \tan \theta =$ 2. -0.05 3. 0.01 4. -0.01 1. 0.05 Solution: $\cos \theta = \frac{4}{5}$, $\tan \theta = -\frac{3}{4}$ then $\cos \theta + \tan \theta = \frac{4}{5} - \frac{3}{4} = \frac{1}{20} = 0.05$. So the answer is 1. 32. $(\sec \theta + \tan \theta - 1) (\sec \theta - \tan \theta + 1) - 2 \tan \theta =$ 2 -1 3. 1 1. 0 4. 2 **Solution:** $(\sec^2 \theta - (\tan \theta - 1)^2 - 2 \tan \theta = \sec^2 \theta - \tan^2 \theta - 1 + 2 \tan \theta - 2 \tan \theta = 1 - 1 = 0.$ **So** answer is 1. 33. If $\sin 30^{\circ} \cos x + \cos 30^{\circ} \sin x = 1$ then x = 2.45° 3.60° 1. 30° 4. 90° **Solution:** $\sin A \cos B + \cos A \sin B = \sin (A+B)$. We have $\sin 30^{\circ} \cos x + \cos 30^{\circ} \sin A \sin x + \cos 30^{\circ} \sin 30^{\circ} \sin 30^{\circ} \sin 30^{\circ} \sin 30^{\circ} \sin 30^{\circ} \sin 30^{\circ}$ x = 1 $\Rightarrow \sin (30^{\circ}+x) = \sin 90^{\circ} \Rightarrow 30^{\circ}+x = 90^{\circ} \Rightarrow x = 60^{\circ}$. So the answer is 3. 34. The height of a pole is 100mt. The angle of elevation of the top of the pole from two

ships on either side of the pole are 45° and 30°. What is the distance between two ships?

1. 100 2. $\frac{100}{\sqrt{3}}$ 3. $100\sqrt{3}$ 4. $100(1+\sqrt{3})$

Solution: $\tan 30^{0} = \frac{100}{x} \Rightarrow \frac{1}{\sqrt{3}} = \frac{100}{x} \Rightarrow x = 100\sqrt{3}$.

The distance between two ships = $100+100\sqrt{3} = 100(1+\sqrt{3})$.

So the answer is 4.

35. $a \sin \theta + b \cos \theta = m$, $a \cos \theta - b \sin \theta = n$ then $m^2 + n^2 =$ 1. ab 2. 2ab 3. $2(a^2 + b^2)$ 4. $a^2 + b^2$ Solution: $m^2 + n^2 = a^2 \sin^2 \theta + b^2 \cos^2 \theta + 2ab \sin \theta \cos \theta + a^2 \cos^2 \theta + b^2 \sin^2 \theta - 2ab \sin \theta \cos \theta$ $= a^2 (\sin^2 \theta + \cos^2 \theta) + b^2 (\sin^2 \theta + \cos^2 \theta) = a^2 + b^2$ So the answer is 4.

36. If
$$\tan A = \frac{\sqrt{3}}{4 - \sqrt{3}}$$
, $\tan B = \frac{\sqrt{3}}{4 + \sqrt{3}}$ then $\frac{\tan A - \tan B}{1 + \tan A \tan B} =$
1. 0.375 2. 0.275 3. 0.175 4. 0.075

Solution: Substituting the values and simplifying we get $\frac{3}{8} = 0.375$.

So the answer is 1.

37. Sin $15^0 =$

1.
$$\frac{\sqrt{3}+1}{\sqrt{2}}$$
 2. $\frac{\sqrt{3}-1}{2\sqrt{2}}$ 3. $\frac{\sqrt{3}+1}{2\sqrt{2}}$ 4. $\frac{\sqrt{3}-1}{\sqrt{2}}$

Solution: $\sin 15 = \sin(45 - 30) = \sin 45 \cos 30 - \cos 45 \sin 30 = \frac{1}{\sqrt{2}} \cdot \frac{\sqrt{3}}{2} - \frac{1}{\sqrt{2}} \cdot \frac{1}{2} =$

$$\frac{\sqrt{3}-1}{2\sqrt{2}}$$

So the answer is 2.

38. A ladder of 20 feet long leans against the side of a building and the angle between the ladder and the building is 30°. Then the distance from the bottom of the ladder to the building is ----- feet ?

1. 5 2. 10 3. 12 4. 14
Solution:
$$\cos 60^{\circ} = \frac{x}{20} \Rightarrow x = 20 \cos 60^{\circ} = 20 \text{ x} \frac{1}{2} = 10$$
. So the answer is 2.
39. If $\frac{\sin^2 x}{1 - \cot x} + \frac{\cos^2 x}{1 - \tan x} = \sin x \cos x + k$ then $k =$
1. -1 2. -2 3. 1 4. 2
Solution: $\frac{\sin^2 x}{1 - \cot x} + \frac{\cos^2 x}{1 - \tan x} = \frac{\sin^3 x}{\sin x - \cos x} - \frac{\cos^3 x}{\sin x - \cos x}$
 $= \frac{\sin x - \cos x}{\sin x - \cos x} (\sin^2 x + \cos^2 x + \sin x \cos x) = 1 + \sin x \cos x$. So $k = 1$.
So the answer is 3.
(note: we have used $a^3 - b^3 = (a - b) (a^2 + b^2 + ab)$.
40. If $x = 2b \cos A \cos 2A - b \cos A$; $y = 2b \cos A \sin 2A - b \sin A$, then $x^2 + y^2 =$
1. $-b^2$ 2. $-2b^2$ 3. $2b^2$ 4. b^2
Solution: Put $A = 0$, then $x = b$, $y = 0$. So $x^2 + y^2 = b^2$. So the answer is 4.

41. If $k(\csc \alpha - \cot \alpha) = (\csc \alpha + \cot \alpha) \sin^2 \alpha$, then k =

1. $(1 - \cos \alpha)^2$ 2. $(1 + \cos \alpha)^2$ 3. $\sin^2 \alpha$ 4. $\cos^2 \alpha$ Solution: $k(\csc^2 \alpha - \cot^2 \alpha) = (\csc \alpha + \cot \alpha)^2 \sin^2 \alpha$ (because multiplying with $\csc \alpha + \cot \alpha$) $\Rightarrow k \cdot 1 = [\csc^2 \alpha + \cot^2 \alpha + 2 \csc \alpha \cot \alpha] \sin^2 \alpha = 1 + \cot^2 \alpha \sin^2 \alpha + 2 \cos \alpha$ $\Rightarrow k = 1 + (\csc^2 \alpha - 1) \sin^2 \alpha + 2 \cos \alpha = 1 + 1 - \sin^2 \alpha + 2 \cos \alpha$ = $1 + \cos^2 \alpha + 2 \cos \alpha = (1 + \cos \alpha)^2$. So the answer is 2. 42. $\log_{10} \tan 1^0 + \log_{10} \tan 2^0 + \dots + \log_{10} \tan 89^0 =$ 3. 1 2. 2 1. 3 4. 0 **Solution:** $\log_{10} \tan 1^0 \tan 2^0$ $\tan 89^0 = \log_{10} 1^0 = 0$. (since $A + B = 90^0 \Longrightarrow \tan A$ $\tan B = 1$) So the answer is 4. 43. $\cos 1^{\circ}$. $\cos 2^{\circ}$. $\cos 3^{\circ}$. $\cos 4^{\circ}$ $\cos 179^{\circ}$ = 2. 0 3. $\frac{1}{4}$ 4. 1 1. $-\frac{1}{2}$ **Solution:** $\cos 1^{\circ}$. $\cos 2^{\circ}$. $\cos 3^{\circ}$. $\cos 4^{\circ}$ $\cos 90^{\circ}$ $\cos 179^{\circ} = 0$ (since $\cos 90^{\circ}$ = 0)So the answer is 2. 44. $\sin \theta + \sin^2 \theta = 1$; $\cos^2 \theta + \cos^2 \theta =$ 2. $\frac{1}{2}$ 3. 1 1. 0 4. 2 45. If $\sec \theta + \tan \theta = 4$ then $\sec \theta - \tan \theta =$ 2. $\frac{1}{4}$ 3. 4 4. $-\frac{1}{4}$ 1. -4 **Solution:** $\sec^2 \theta - \tan^2 \theta = 1 \Longrightarrow (\sec \theta + \tan \theta) (\sec \theta - \tan \theta) = 1$ \Rightarrow (sec θ - tan θ) = $\frac{1}{4}$. So the answer is 2. 46. A tower of height 100 feet. If 2 boys standing on the both sides of the tower observe the top with angles of elevation 30° and 45° , the distance between them (in feet) is 2. $100\sqrt{3}$ 3. $100(\sqrt{3}+1)$ 4. $100\sqrt{2}$ 1. 100 Solution: $\tan 30^{\circ} = \frac{100}{x} \Rightarrow \frac{1}{\sqrt{3}} = \frac{100}{x} \Rightarrow x = 100\sqrt{3}$. The distance between two boys = $100 + 100\sqrt{3} = 100(1 + \sqrt{3})$. So the answer is 3.
47. $\tan 85^{\circ} \tan 50^{\circ} - \tan 85^{\circ} - \tan 50^{\circ} =$ 1. 1 2. -1 3. $\tan 45^{\circ}$ 4. $\tan 5^{\circ}$ Solution: $\tan(135^{\circ}) = \tan(85^{\circ} + 50^{\circ}) = \frac{\tan 85^{\circ} + \tan 50^{\circ}}{1 - \tan 85^{\circ} \tan 50^{\circ}}$ $\Rightarrow -1 + \tan 85^{\circ} \tan 50^{\circ} = \tan 85^{\circ} + \tan 50^{\circ} \Rightarrow \tan 85^{\circ} \tan 50^{\circ} - \tan 85^{\circ} - \tan 50^{\circ} =$ 1 So the answer is 1. [because $\tan 135^{\circ} = \tan(90 + 45) = -\tan 45^{\circ} = -1$]

48. If $\cos \theta = -\frac{12}{13}$ and θ is not in third quadrant, then $\sin \theta + \tan \theta =$

1. $\frac{125}{156}$ 2. $\frac{5}{156}$ 3. $\frac{-125}{156}$ 4. $\frac{-5}{156}$

Solution: $\sin \theta + \tan \theta = \frac{5}{13} - \frac{5}{12} = \frac{60 - 65}{156} = \frac{-5}{156}$. So the answer is 4. 49. $\sin 75^\circ =$

1.
$$\frac{\sqrt{3}+1}{\sqrt{3}-1}$$
 2. $\frac{\sqrt{3}-1}{2\sqrt{2}}$ 3. $\frac{\sqrt{3}-1}{\sqrt{3}+1}$ 4. $\frac{\sqrt{3}+1}{2\sqrt{2}}$

Solution: $\sin(75^\circ) = \sin(45^\circ + 30^\circ) = \sin 45^\circ \cos 30^\circ + \cos 45^\circ \sin 30^\circ$

$$=\frac{1}{\sqrt{2}}\cdot\frac{1\sqrt{3}}{2}+\frac{1}{\sqrt{2}}\cdot\frac{1}{2}=\frac{\sqrt{3}+1}{2\sqrt{2}}$$
. So the answer is 4.

50. The maximum value of 7 - 5 $\cos x$ - 12 $\sin x$ is

1. 20 2. -5 3. -6 4. 2

Solution: Maximum values of $a \cos x + b \sin x + c$ is $c - \sqrt{a^2 + b^2}$

So maximum value = $7 + \sqrt{(-5)^2 + (-12)^2} = 7 + \sqrt{25 + 144} = 7 + \sqrt{169} = 7 + 13$ = 20

51. If sec θ - tan θ = 5, then sin θ =

1. $\frac{12}{13}$ 2. $\frac{5}{13}$ 3. $\frac{-12}{13}$ 4. $\frac{-5}{13}$ **Solution:** $\sec^2 \theta - \tan^2 \theta = 1$. So $(\sec \theta + \tan \theta) (\sec \theta - \tan \theta) = 1$. So we get $\sec \theta + \tan \theta = \frac{1}{5}$

Adding
$$\sec \theta - \tan \theta = 5$$
 and $\sec \theta + \tan \theta = \frac{1}{5}$ we get $2 \sec \theta = \frac{26}{5}$.
So $\cos \theta = \frac{5}{13}$, $\sin \theta = \frac{12}{13}$. So the answer is 1.
52. $\frac{\sin \theta}{\sec \theta - 1} - \frac{\sin \theta}{\sec \theta + 1} =$
1. $2 \cos \theta \cot \theta$ 2. $2 \sin \theta \sec \theta$ 3. $2 \cos \theta \tan \theta$ 4. $2 \cot \theta \csc \theta$
Solution: $\frac{\sin \theta \sec \theta + \sin \theta - \sin \theta \sec \theta + \sin \theta}{\sec^2 \theta - 1} = \frac{2 \sin \theta}{\tan^2 \theta} = 2 \cos \theta \cot \theta$.
So the answer is 1.

53. The angle of elevation of the sun, when the length of the shadow of a tower is 4 times the height of the tower, is

2. $\tan^{-1}4$ 3. 60° 4. $\tan^{-1}\frac{1}{4}$ 1. 45° **Solution:** $\tan \theta = \frac{h}{4h}$. So $\theta = \tan^{-1} \frac{1}{4}$. So the answer is 4.

Answers

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Trignometry

| 1.1 | 2. 3 | 3.4 | 4. 4 | 5. 3 | 6. 3 | 7. 3 | 8. 4 | 9. 2 | 10. 4 | 11. 1 |
|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| 12. 4 | 13. 3 | 14. 2 | 15. 2 | 16. 2 | 17. 3 | 18. 4 | 19. 4 | 20. 4 | 21. 1 | 22. 1 |
| 23. 3 | 24. 3 | 25. 4 | 26. 1 | 27. 3 | 28.1 | 29. 4 | 30. 3 | 31. 1 | 32. 1 | 33. 3 |
| 34. 4 | 35. 4 | 36. 1 | 37. 2 | 38. 2 | 39. 3 | 40. 4 | 41. 2 | 42. 4 | 43. 2 | 44. 1 |
| 45. 2 | 46. 3 | 47. 1 | 48. 4 | 49. 4 | 50. 1 | 51. 1 | 52. 1 | 53. 4 | | |

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54. $\cos 208^\circ \sin 238^\circ + \sin 152^\circ \cos 122^\circ =$

1.
$$\frac{1}{2}$$
 2. $\frac{1}{\sqrt{2}}$ 3. $\frac{\sqrt{3}}{2}$ 4. 1
Solution: $\cos 208^{\circ} \sin 238^{\circ} + \sin 152^{\circ} \cos 122^{\circ}$
 $= \cos(180+28^{\circ}) \sin(180+58^{\circ}) + \sin(180-28^{\circ}) \cos(180-58^{\circ})$
 $= \cos 28^{\circ} \sin 58^{\circ} - \sin 28^{\circ} \cos 58^{\circ}$
 $= \sin(58 - 28) = \sin 30^{\circ} = 1/2$. **Answer is 1.**

55. If
$$0 < \alpha$$
, $\beta < \frac{\pi}{4}$, $\cos(\alpha + \beta) = \frac{4}{5}$ and $\sin(\alpha - \beta) = \frac{5}{13}$ then $\tan 2\alpha =$

CEDM

1.
$$\frac{56}{33}$$
 2. $\frac{33}{56}$ 3. $\frac{16}{63}$ 4. $\frac{16}{63}$

Solution: $\cos(\alpha + \beta) = \frac{4}{5} \Rightarrow \tan(\alpha + \beta) = \frac{3}{4}$

$$\sin(\alpha-\beta)=\frac{5}{13} \Rightarrow \tan(\alpha-\beta)=\frac{5}{12}$$

 $\tan 2\alpha = \tan(\alpha + \beta + \alpha - \beta) = \frac{\tan(\alpha + \beta) + \tan(\alpha - \beta)}{1 - \tan(\alpha + \beta)\tan(\alpha - \beta)} = \frac{56}{33}.$ Answer is 1.

56. If
$$x = a \cos \theta + b \sin \theta$$
 and $y = a \sin \theta - b \cos \theta$, then $x^2 + y^2 =$
1. 1 2. a^2 3. b^2 4. $a^2 + b^2$
Solution: $x^2 + y^2 = a^2 \cos^2 \theta + b^2 \sin^2 \theta + 2ab \sin \theta \cos \theta + a^2 \sin^2 \theta + b^2 \cos^2 \theta - 2ab \cos \theta \sin \theta$

$$=a^{2}(\cos^{2}\theta+\sin^{2}\theta)+b^{2}(\sin^{2}\theta+\cos^{2}\theta)=a^{2}+b^{2}.$$
 Answer is

57.
$$\frac{\tan 10^{0} + \tan 50^{0}}{1 - \tan 10^{0} \tan 50^{0}} =$$
1.
$$\frac{\sqrt{3} + 1}{2\sqrt{2}}$$
2.
$$\frac{\sqrt{3} - 1}{2\sqrt{2}}$$
3.
$$\sqrt{3}$$
4.
$$\frac{1}{\sqrt{3}}$$
Solution:
$$\frac{\tan A + \tan B}{1 - \tan A \tan B} = \tan(A + B) = \tan(10^{0} + 50^{0}) = \tan 60^{0} = \sqrt{3}$$
. Answer is 3.

58. A man in a boat rowing away from the cliff 150 meters high, observed that it takes 2 minutes to change the angle of elevation of the top of the cliff from 60° to 45°, then the speed of the boat in km/hour is

1.
$$\frac{9-3\sqrt{3}}{2}$$
 2. $\frac{9+3\sqrt{3}}{2}$ 3. $9-\sqrt{3}$ 4. $9+\sqrt{3}$
Solution: Boat travels $150-\frac{150}{\sqrt{3}}$ in 2 minutes \Rightarrow It travels $\frac{150-\frac{150}{\sqrt{3}}}{120}$ mt per second

 $\Rightarrow \text{It travels } \frac{5\sqrt{3}-5}{4\sqrt{3}} \times \frac{18}{5} \text{ km per hour i.e } \frac{9-3\sqrt{3}}{2} \text{ km/hour. Answer is 1.}$

ICET-2011

59. $\cos 1^{\circ} .\cos 2^{\circ} .\cos 3^{\circ} ... \cos 179^{\circ} =$ 1. 1 2. 0 3. 180° 4. 90 **Solution:** $\cos 1^{\circ} .\cos 2^{\circ} .\cos 3^{\circ} ... \cos 179^{\circ} =\cos 1^{\circ} .\cos 2^{\circ} .\cos 3^{\circ} ... \cos 90^{\circ} ... \cos 179^{\circ} =0$, because $\cos 90^{\circ} = 0$. **Answer is 2.**

60. $\tan 170^{\circ} + \tan 55^{\circ} + \tan 170^{\circ}$. $\tan 55^{\circ} =$ 1. $\tan 115^{\circ}$ 2. $\tan 45^{\circ}$ 3. $\tan 105^{\circ}$ 4. $\tan 135^{\circ}$ **Solution:** $\tan (170^{\circ} + 55^{\circ}) = \tan 225^{\circ} = \tan(180^{\circ} + 45^{\circ}) = \tan 45^{\circ} = 1$

$$\Rightarrow \tan (170^{\circ} + 55^{\circ}) = 1 \Rightarrow \frac{\tan 170^{\circ} + \tan 55^{\circ}}{1 - \tan 170^{\circ} \tan 55^{\circ}} = 1 \Rightarrow \tan 170^{\circ} + \tan 55^{\circ} = 1$$

 $1 - \tan 170^{\circ} \tan 55^{\circ}$ $\Rightarrow \tan 170^{\circ} + \tan 55^{\circ} + \tan 170^{\circ} \cdot \tan 55^{\circ} = 1.$ Answer is 1.

61. $\sin 83^{\circ} \cos 53^{\circ} - \cos 83^{\circ} \sin 53^{\circ} =$

1. $\frac{1}{\sqrt{2}}$ 2. $\frac{\sqrt{3}}{2}$ 3. $\frac{1}{2}$ 4. 0

Solution: $\sin A \cos B - \cos A \sin B = \sin (A-B)$

$$\sin 83^{\circ} \cos 53^{\circ} - \cos 83^{\circ} \sin 53^{\circ} = \sin (83^{\circ} - 53^{\circ}) = \sin 30^{\circ} = \frac{1}{2}.$$

Answer is 3.

62. If $180^{\circ} < A < 270^{\circ}$, $90^{\circ} < B < 180^{\circ}$, $\tan A = \sqrt{3}$ and $\sin B = \frac{\sqrt{3}}{2}$, then the value of $\sin (A-B) =$

1. 0 2. 1 3. $\frac{1}{2}$ 4. $\frac{\sqrt{3}}{2}$

Solution: sin(A-B) = sin A cos B - cos A sin B

$$= \left(\frac{-\sqrt{3}}{2}\right)\left(\frac{-1}{2}\right) - \left(\frac{-1}{2}\right)\left(\frac{\sqrt{3}}{2}\right) = \frac{\sqrt{3}}{4} + \frac{\sqrt{3}}{4} = \frac{2\sqrt{3}}{4} = \frac{\sqrt{3}}{2}.$$
 Answer is 4.

63.
$$\frac{4\operatorname{cosec150^{0}} + 3\operatorname{sec}^{2}210^{0}}{5\tan 225^{0} + 6\operatorname{cot}^{2}330^{0}} =$$

1.
$$\frac{12}{23}$$
 2. $\frac{-12}{23}$ 3. $\frac{7}{11}$ 4. $\frac{-7}{11}$

Solution: cosec $150^{\circ} = \operatorname{cosec}(90^{\circ} + 60^{\circ}) = \sec 60^{\circ} = 2$.

$$\sec 210^{0} = \sec (180^{0} + 30^{0}) = -\sec 30^{0} = \frac{-2}{\sqrt{3}}; \ \tan 225^{0} = \tan(180^{0} + 45^{0}) = \tan(45^{0} = 1)$$

$$\cot 330^{0} = \cot(360^{0} - 30^{0}) = -\cot 30^{0} = -\sqrt{3}.$$
 Substituting these values

$$\frac{4\csc 150^{0} + 3\sec^{2} 210^{0}}{5\tan 225^{0} + 6\cot^{2} 330^{0}} = \frac{12}{23}.$$
 Answer is 1.

64. A person on walking 20 metres towards a chimney in a horizontal line through its base observes that its angle of elevation of the top of chimney changes from 30° to 45°. Then the height (in metres) of the chimney is

1.
$$10\sqrt{3}$$
 2. $10(\sqrt{3}+1)$ 3. $20\sqrt{3}$ 4. 20
Solution to 200 $\frac{x}{10} = \frac{1}{100} \frac{x}{100}$

Solution:
$$\tan 30^\circ = \frac{1}{x+20} \Rightarrow \frac{1}{\sqrt{3}} = \frac{1}{x+20} \Rightarrow x+20 = x\sqrt{3}$$

$$\Rightarrow x(\sqrt{3}-1) = 20 \Rightarrow x = \frac{20}{\sqrt{3}-1} \Rightarrow x = 10(\sqrt{3}+1).$$
 Answer is 2.

ICET-2013

65. If θ lies in the first quadrant and $5 \tan \theta = 4$, then $\frac{5 \sin \theta - 3 \cos \theta}{\sin \theta + 2 \cos \theta} =$

1.
$$\frac{1}{14}$$
 2. $\frac{2}{14}$ 3. $\frac{3}{14}$ 4. $\frac{5}{14}$
Solution: $\frac{5\sin\theta - 3\cos\theta}{\sin\theta + 2\cos\theta} = \frac{5\tan\theta - 3}{\tan\theta + 2} = \frac{4-3}{4/5+2} = \frac{5}{14}$. Answer is 4.

66. Two poles of height 15 metres and 30 metres stand upright on a play ground. If the feet of the poles are 36 metres apart, the distance between their tops are

1. 35 metres2. 37 metres3. 39 metres4. 41 metresSolution:ByPythogoroustheorem
$$x^2 = 15^2 + 36^2 = 9(25 + 144) = 9(169) = 3^2 \times 13^2$$

So the distance between their tops are $3 \times 13 = 39$ metres. Answer is 3.

67. If $\theta + \phi = 45^{\circ}$ then $(1 + \tan \theta)(1 + \tan \phi) =$ 1. -2 2. 1 3. 0 4. 2 Solution: $\tan(\theta + \phi) = \tan 45$.

We know that $\tan(A+B) \frac{\tan A + \tan B}{1 - \tan A \tan B} = 1$ and $\tan 45 = 1$.

So using these we get $\tan \theta + \tan \phi = 1 - \tan \theta \tan \phi$

 $\Rightarrow \tan \theta + \tan \phi + \tan \theta \tan \phi = 1 \Rightarrow (1 + \tan \theta) (1 + \tan \phi) = 2.$

So the answer is 4.

68. $(\cos^2 15^\circ - \cos^2 75^\circ)(\sin 65^\circ .\cos 35^\circ - \cos 65^\circ .\sin 35^\circ) =$

1.
$$\frac{1}{2}$$
 2. $\frac{\sqrt{3}}{2}$ 3. $\sqrt{3}$ 4. $\frac{\sqrt{3}}{4}$

Solution: We know that $\cos 75^\circ = \sin 15^\circ$, Sin(A - B) = sin A cos B - cos A sin B and

$$\cos 2\theta = \cos^2 \theta - \sin^2 \theta$$
, $\cos 30^0 = \frac{\sqrt{3}}{2}$, $\sin 30^0 = \frac{1}{2}$ Answer is 4.

 $(\cos^2 15^0 - \cos^2 75^0)(\sin 65^0 \cdot \cos 35^0 - \cos 65^0 \cdot \sin 35^{\circ} \text{cps} 30^0 \cdot \sin 30^0 = \frac{\sqrt{3}}{2} \cdot \frac{1}{2} = \frac{\sqrt{3}}{4}$

ICET-2014

69.
$$\sin 120^{\circ} \cos 60^{\circ} \cot 30^{\circ} \csc^{2} 30^{\circ} =$$

1. -2 2. 3 3. 0 4. 2
Solution: $\sin 120^{\circ} \cos 60^{\circ} \cot 30^{\circ} \csc^{2} 30^{\circ} =$

$$=\cos 30^{\circ}\cos 60^{\circ}\cot 30^{\circ}\csc^{2}30^{\circ}=\frac{\sqrt{3}}{2}\cdot\frac{1}{2}\cdot\sqrt{3}\cdot4=3$$

Answer is 2.

70.
$$\tan \theta = \frac{5}{12} \Rightarrow \frac{5 \sin \theta + 4 \cos \theta}{4 \sin \theta + 5 \cos \theta} =$$

1. $\frac{73}{80}$ 2. $\frac{80}{73}$ 3. $\frac{7}{80}$ 4. $\frac{3}{80}$

Solution:
$$\frac{5\sin\theta + 4\cos\theta}{4\sin\theta + 5\cos\theta} = \frac{5\tan\theta + 4}{4\tan\theta + 5} = \frac{73}{80}$$
 Answer is 1.
71.
$$4\cos\theta\sin^3\theta - 4\sin\theta\cos^3\theta =$$
$$1. 0 \qquad 2. 1 \qquad 3. \ \sin 4\theta \qquad 4. -\sin 4\theta$$
Solution:
$$4\cos\theta\sin^3\theta - 4\sin\theta\cos^3\theta = 4\sin\theta\cos\theta[\sin^2\theta - \cos^2\theta] =$$
$$= 2.2\sin\theta\cos\theta[-\cos 2\theta] = -2\sin 2\theta\cos 2\theta = -\sin 4\theta$$
. Answer is 4.

72. A pole subtends angles $30^{\circ}, 45^{\circ}, 60^{\circ}$ respectively at points A,B,C all lying on a

horizontal line through the foot of the pole. Then $\frac{AB}{AC}$ =

Answer is 3.

1.
$$\frac{1}{\sqrt{3}}$$
 2. $\sqrt{3} + 1$ 3. $\sqrt{3}$ 4. $\sqrt{3} - 1$

Telangana ICET-2015:

73.
$$\frac{2 \tan \theta}{\tan^2 \theta + 1} =$$

1. $\sqrt{3}$ 2. $\frac{\sqrt{3}}{2}$ 3. $-\sqrt{3}$ 4. $-\frac{\sqrt{3}}{2}$
Solution: We know that $\tan 30^{\circ} = \frac{1}{\sqrt{3}}$. So $\frac{2 \tan \theta}{\tan^2 \theta + 1} = \frac{\sqrt{3}}{2}$ Answer is 2.
74. $\left(\frac{\sin 45^{\circ} + \cos 45^{\circ} + \tan 45^{\circ}}{\sin 45^{\circ} - \cos 45^{\circ} - \tan 45^{\circ}}\right)^2 =$
1. $\frac{1}{2}[2 + \sqrt{2}]$ 2. $\frac{1}{2}[2 - \sqrt{2}]$ 3. $3 + 2\sqrt{2}$ 4. $6 + 4\sqrt{2}$
Solution: We know that $\sin 45^{\circ} = \frac{1}{\sqrt{2}}$, $\cos 45^{\circ} = \frac{1}{\sqrt{2}}$, $\tan 45^{\circ} = 1$.
So $\left(\frac{\sin 45^{\circ} + \cos 45^{\circ} + \tan 45^{\circ}}{\sin 45^{\circ} - \cos 45^{\circ} - \tan 45^{\circ}}\right)^2 = \left(\frac{\sqrt{2} + 1}{-1}\right)^2 = 3 + 2\sqrt{2}$.
Answer is 3

Answer is 3.

75.
$$\frac{1 - \cos \theta}{\sin \theta} + \frac{\sin \theta}{1 - \cos \theta} =$$

1.
$$2 \sin \theta$$
 2.
$$2 \cos \theta$$
 3.
$$2 \sec \theta$$
 4.
$$2 \csc \theta$$

Solution:
$$\frac{(1 - \cos \theta)^2 + \sin^2 \theta}{\sin \theta (1 - \cos \theta)} = \frac{2(1 - \cos \theta)}{\sin \theta (1 - \cos \theta)} = \frac{2}{\sin \theta} = 2 \csc \theta.$$

Answer is 4.

76. In $\triangle ABC$, $\angle ABC = 45^{\circ}$, $\angle CAB = 30^{\circ}$ and CD is perpendicular to AB. If CD = 100, then AB=

1. $100(\sqrt{3}+1)$ 2. $100(\sqrt{3}-1)$ 3. $50(\sqrt{3}+1)$ 4. $50(\sqrt{3}-1)$ Answer is 1.

LIMITS

- 1. In $n \in N$ and $a \in R$ then $\lim_{x \to a} x^n = a^n$.
- 2. If a > 0 and $n \in R$ then $\lim_{x \to a} x^n = a^n$.
- 3. If m and n are real numbers and a is a positive real number, then

i)
$$\lim_{x \to a} \frac{x^n - a^n}{x - a} = na^{n-1}$$
 ii) $\lim_{x \to a} \frac{x^n - a^n}{x^m - a^m} = \frac{n}{m}a^{n-m}$

When x is measured in radians,

i) $\lim_{x \to 0} \sin x = 0$ (ii) $\lim_{x \to 0} \cos x = 1$ (iii) $\lim_{x \to 0} \frac{\sin x}{x} = 1$ (iv) $\lim_{x \to 0} \frac{\sin ax}{x} = a$

v)
$$\lim_{x \to 0} \frac{\tan x}{x} = 1$$
 (vi) $\lim_{x \to 0} \frac{\tan ax}{x} = a$ (vii) $\lim_{x \to 0} \frac{1}{(1+x)^x} = e$ (viii) $\lim_{x \to 0} \frac{1}{(1+px)^x} = e^{pq}$

ix)
$$\lim_{x \to 0} \left(1 + \frac{1}{x}\right)^x = e$$
 x) $\lim_{x \to 0} \left(1 + \frac{p}{x}\right)^{qx} = e^{pq}$

xi)
$$\lim_{x \to 0} \frac{a^x - 1}{x} = \log_e a$$
 xii) $\lim_{x \to 0} \frac{e^x - 1}{x} = \log_e e = 1$

L'Hospital's Rule: If f(x) and g(x) are two functions, and f(a) = g(a) = 0 or $f(a) = g(a) = \infty$

then $\lim_{x \to a} \frac{f(x)}{g(x)} = \lim_{x \to a} \frac{f'(x)}{g'(x)}$ provided the limit on the right exists.

PROBLEMS

1. $\lim_{\theta \to 0} \frac{\sin 7\theta - \sin \theta}{\sin 10\theta - \sin 7\theta} =$ 1. 2 2. $\frac{7}{10}$ 3. $\frac{48}{51}$ 4. ∞ Solution: $\lim_{\theta \to 0} \frac{\sin 7\theta - \sin \theta}{\sin 10\theta - \sin 7\theta} = \lim_{\theta \to 0} \frac{7 \cos 7\theta - \cos \theta}{10 \cos 10\theta - 7 \cos 7\theta} = \frac{7 - 1}{10 - 7} = \frac{6}{3} = 2.$ So the answer is 1. 2. $\lim_{x \to 5} \frac{(x^2 - 4x - 5)^2}{|x - 5|}$ 1. 6 2. -63. 04. 36

Solution:
$$\lim_{x \to 5} \frac{(x^2 - 4x - 5)^2}{|x - 5|} = \lim_{x \to 5} \frac{(x + 1)^2 (x - 5)^2}{|x - 5|}$$
R.H.L. =
$$\lim_{x \to 5^+} \frac{(x + 1)^2 (x - 5)^2}{|x - 5|} = \lim_{x \to 5^+} \frac{(x + 1)^2 (x - 5)^2}{x - 5} = \lim_{x \to 5^+} (x + 1)^2 (x - 5) = 0$$
L.H.L. =
$$\lim_{x \to 5^-} \frac{(x + 1)^2 (x - 5)^2}{|x - 5|} = \lim_{x \to 5^-} \frac{(x + 1)^2 (x - 5)^2}{-(x - 5)} = -\lim_{x \to 5^-} (x + 1)^2 (x - 5) = 0$$
So the answer is 3.
3.
$$\lim_{x \to 0} \frac{\sqrt{4 + x} - \sqrt{4 - x}}{x} =$$
1. 2 2. 4 3.
$$\frac{1}{2}$$
 4.
$$\frac{1}{4}$$
Solution:
$$\lim_{x \to 0} \frac{\sqrt{4 + x} - \sqrt{4 - x}}{x} = \lim_{x \to 0} \frac{\sqrt{4 + x} - \sqrt{4 - x}}{x} = \frac{\sqrt{4 + x} + \sqrt{4 - x}}{\sqrt{4 + x} + \sqrt{4 - x}}$$

$$= \lim_{x \to 0} \frac{4 + x - 4 + x}{x} = \lim_{x \to 0} \frac{2}{\sqrt{4 + x} + \sqrt{4 - x}} = \frac{2}{\sqrt{4 + \sqrt{4} + x} + \sqrt{4 - x}}$$
So the answer is 3.
4.
$$\lim_{x \to 3} \frac{x^3 - 27}{x^2 - 9} =$$
1. 3 2.
$$\frac{9}{2}$$
 3. 9 4.
$$\frac{27}{2}$$
Solution:
$$\lim_{x \to 3} \frac{x^3 - 27}{x^2 - 9} = \lim_{x \to 3} \frac{3x^2}{2x} = \frac{3.3^2}{2.3} = \frac{9}{2}$$
. So the answer is 2.
5.
$$\lim_{x \to \frac{\pi}{2}} \frac{3\cos^4 x}{1 - \sin^3 x} =$$
1. 0 2. -8 3. 2 4. 3
Solution:
$$\lim_{x \to \frac{\pi}{2}} \frac{3\cos^4 x}{(\sin x)} = \lim_{x \to \frac{\pi}{2}} \frac{12(\cos^3 x)(-\sin x)}{(-(\sin x)^2)(\cos x)} = \lim_{x \to \frac{\pi}{2}} \frac{4(\cos^2 x)}{(\sin x)} = \frac{4(0)}{1} = 0$$
.
So the answer is 1.
6.
$$\lim_{x \to 3} \frac{x^{-3}}{\sqrt{x^2 - 2 - \sqrt{4 - x}}} = \lim_{x \to 3} \frac{x^{-3}}{\sqrt{x^2 - 2 - \sqrt{4 - x}}} = \lim_{x \to 3} \frac{x^{-3}}{\sqrt{x^2 - 2 - \sqrt{4 - x}}} = \frac{1}{x}$$

$$= \lim_{x \to 3} \frac{(x-3)(\sqrt{x-2} + \sqrt{4-x})}{x-2-4-x} = \lim_{x \to 3} \frac{(x-3)(\sqrt{x-2} + \sqrt{4-x})}{2(x-3)} =$$

$$= \lim_{x \to 3} \frac{(\sqrt{x-2} + \sqrt{4-x})}{2}$$

$$= \frac{(\sqrt{3-2} + \sqrt{4-x})}{2} = \frac{1+1}{2} = 1. \text{ So the answer is 2.}$$
7.
$$\lim_{x \to 4} \frac{2x^2}{x^2-15} =$$
1. 10 2. 11 3. 12 4. 14
Solution:
$$\lim_{x \to 4} \frac{2x^2}{x^2-15} = \frac{2(4)^{\frac{3}{2}} - \sqrt{4}}{4^2-15} = \frac{2(2^2)^{\frac{3}{2}} - 2}{16-15} = \frac{2(2^3) - 2}{1} = 14.$$
So the answer is 4.
8.
$$\lim_{x \to \frac{4}{2}} \frac{1+\cos 3x}{1-\cos 5x} =$$
1. 0 2. 1 3. $\frac{3}{5}$ 4. $\frac{9}{25}$
Solution:
$$\lim_{x \to \frac{4}{2}} \frac{1+\cos 3x}{1-\cos 5x} = \frac{1-0}{1-0} = 1.$$
 So the answer is 2.
9.
$$\lim_{x \to 0} \frac{\sqrt{1+x} - \sqrt{1-x}}{x} =$$
1. -1 2. 0 3. $\frac{1}{2}$ 4. $\frac{4}{2}$ 2.
So the answer is 3.
10.
$$\lim_{x \to 0} \frac{\sqrt{1+x} - \sqrt{1-x}}{x} = \lim_{x \to 0} \frac{\sqrt{1+x} - \sqrt{1-x}}{x} = \frac{\sqrt{1+x} + \sqrt{1-x}}{\sqrt{1+x} + \sqrt{1-x}} = \frac{2}{(\sqrt{1+0} + \sqrt{1-0})} = \frac{2}{1+1} = 1.$$
So the answer is 3.
10.
$$\lim_{x \to \infty} \frac{\sqrt{x^2+1}}{2x-1} =$$
1. 0 2. 1 3. $\frac{1}{2}$ 4. $-\frac{1}{2}$

Solution:
$$\lim_{x \to \infty} \frac{\sqrt{x^2 + 1}}{2x - 1} = \lim_{x \to \infty} \frac{x\sqrt{1 + \frac{1}{x^2}}}{x(2 - \frac{1}{x})} = \frac{\sqrt{1 + \frac{1}{\infty}}}{(2 - \frac{1}{\infty})} = \frac{\sqrt{1 - 0}}{2 - 0} = \frac{1}{2}$$
. So the answer is 3.
11.
$$\lim_{x \to \infty} \frac{x(x + 1)(2x + 3)}{x^3} = 1$$
1. 0 2. ∞ 3. -2 4. 2
Solution:
$$\lim_{x \to \infty} \frac{x(x + 1)(2x + 3)}{x^3} = \lim_{x \to \infty} \frac{x.x\left(1 + \frac{1}{x}\right)x\left(2 + \frac{3}{x}\right)}{x^3} = \left(1 + \frac{1}{\infty}\right)\left(2 + \frac{3}{\infty}\right)$$

$$= (1 + 0)(2 + 0) = 2$$
. So the answer is 4.
12.
$$\lim_{x \to 0} \frac{\sqrt{8 + x} - 2}{x} = 1$$
1.1 2.0 3. $\frac{4}{3}$ 4. $-\frac{4}{3}$
Solution:
$$\lim_{x \to 0} \frac{\sqrt{8 + x} - 2}{x} = \lim_{x \to 0} \frac{1}{3}(8 + x)^{\frac{2}{3}} = \frac{1}{3}(8 + 0)^{\frac{2}{3}} = \frac{1}{3}(2^3)^{\frac{2}{3}} = \frac{1}{3}(2^2) = \frac{4}{3}$$
.
So the answer is 4.
13.
$$\lim_{x \to 1} \frac{x^3 - x^2 + 2x - 2}{x^2 - 1} = 1$$
1. $\frac{3}{2}$ 2. $-\frac{3}{2}$ 3. $-\frac{4}{3}$ 4. $\frac{4}{3}$
Solution:
$$\lim_{x \to 1} \frac{x^3 - x^2 + 2x - 2}{x^2 - 1} = \lim_{x \to 1} \frac{3x^2 - 2x + 2}{2x} = \frac{3 - 2 + 2}{2} = \frac{3}{2}$$
. So the answer is 1.
14.
$$\lim_{x \to 0} \left(\frac{a^x - b^x}{x}\right) = 1$$
1. $-\log \frac{b}{a}$ 2. $\log \frac{b}{a}$ 3. $-\log \frac{a}{b}$ 4. $\log \frac{a}{b}$
Solution:
$$\lim_{x \to 0} \left(\frac{a^x - b^x}{x}\right) = \lim_{x \to 0} \left(\frac{a^x \log a - b^x \log b}{1}\right) = \left(\frac{a^0 \log a - b^0 \log b}{1}\right)$$
 $= \log a - \log b = \log \frac{a}{b}$. So the answer is 4.

15.
$$\lim_{x \to 2} \left(\frac{1}{x-2} - \frac{1}{x^2 - 3x + 2} \right) =$$

1. 0 2. ∞ 3. -2 4. 1

$$\lim_{x \to 2} \left(\frac{1}{x-2} - \frac{1}{x^2 - 3x + 2} \right) = \lim_{x \to 2} \frac{x^2 - 3x + 2 - x + 2}{(x-2)(x^2 - 3x + 2)} = \lim_{x \to 2} \frac{x^2 - 4x + 4}{(x-2)(x^2 - 3x + 2)} =$$

$$= \lim_{x \to 2} \frac{2x - 4}{(x-2)(2x-3) + (x^2 - 3x + 2)} = \lim_{x \to 2} \frac{2}{(2x-3) + 2(x-2) + (2x-3)}$$

$$= \lim_{x \to 2} \frac{2}{6x - 10} = \frac{2}{12 - 10} = 1.$$
So the answer is 4.

ICET-2012

17.
$$\lim_{x \to 1} \frac{x^2 - \sqrt{x}}{\sqrt{x} - 1} =$$

1. 1 2. 3 3. 4 4. ∞

Solution:
$$\lim_{x \to 1} \frac{x^2 - \sqrt{x}}{\sqrt{x} - 1} = \lim_{x \to 1} \frac{2x - \frac{1}{2\sqrt{x}}}{\frac{1}{2\sqrt{x}}} = \lim_{x \to 1} \frac{4x\sqrt{x} - 1}{1} = 4 - 1 = 3.$$

So the answer is 2.

18.
$$\lim_{n \to \infty} \frac{1^2 + 2^2 + \dots + n^2}{n^3}$$

1. 0 2. $1/2$ 3. $1/3$ 4. 1
Solution:
$$\lim_{n \to \infty} \frac{1^2 + 2^2 + \dots + n^2}{n^3} = \lim_{n \to \infty} \frac{n(n+1)(2n+1)}{6n^3} = \frac{(1+0)(2+0)}{6} = \frac{1}{3}.$$

Answer is 3.

ICET-2011

21.
$$\lim_{x \to 0} \frac{\tan x - x}{x} =$$

1. 1 2. -1 3. 0 4. does not exist
Solution: $\lim_{x \to 0} \frac{\tan x - x}{x} = \lim_{x \to 0} \frac{\tan x}{x} - 1 = 1 - 1 = 0.$ Answer is 3.

22.
$$\lim_{x \to -1} \frac{1 + \sqrt[3]{x}}{1 + \sqrt[5]{x}} =$$
1.
$$\frac{5}{3}$$
2.
$$\frac{3}{5}$$
3.
$$\frac{-5}{3}$$
4.
$$\frac{-3}{5}$$
Solution:
$$\lim_{x \to -1} \frac{1 + \sqrt[3]{x}}{1 + \sqrt[5]{x}} = \lim_{x \to -1} \frac{\frac{1}{3}x^{\frac{-2}{3}}}{\frac{1}{5}x^{\frac{-2}{5}}} = \frac{5}{3}$$
Answer is 2.

ICET - 2013

23.
$$\lim_{x \to 5} \frac{x^2 - 3x - 10}{x^2 - 7x + 10} =$$

1. $\frac{7}{3}$
2.0
3. $\frac{-3}{5}$
4. Does not exist
Solution:
$$\lim_{x \to 5} \frac{x^2 - 3x - 10}{x^2 - 7x + 10} = \lim_{x \to 5} \frac{2x - 3}{2x - 7} = \frac{10 - 3}{10 - 7} = \frac{7}{3}$$
. So the answer is 1.

ICET - 2014

24.
$$\lim_{x \to 0} \frac{\tan x}{x^0} =$$

1. $\frac{180}{\pi}$ 2. $\frac{\pi}{180}$ 3. 1 4. -1
Solution: $\lim_{x \to 0}$ $=\lim_{x \to 0} \frac{\tan x}{x \cdot 1^0} = =\frac{1}{1^0} \cdot \lim_{x \to 0} \frac{\tan x}{x} = \frac{1}{1^0} = \frac{180}{\pi}$ Answer is 1.

Telangana ICET - 2015

25.
$$\lim_{x \to \frac{\pi}{2}} \frac{1 - \sin^3 x}{\cos^2 x} =$$

1. $\frac{3}{2}$ 2. 1 3. $\frac{2}{3}$ 4. -1
Solution:
$$\lim_{x \to \frac{\pi}{2}} \frac{1 - \sin^3 x}{\cos^2 x} = \lim_{x \to \frac{\pi}{2}} \frac{0 - 3\sin^2 x \cos x}{-2\cos x \sin x} = \frac{3}{2}$$
 Answer is 1.

$$26. \lim_{x \to 3} \frac{x-3}{\sqrt{x-2} - \sqrt{4-x}} = 1.0$$

$$1.0$$

$$2.1$$

$$3.2$$

$$4.4$$
Solution:
$$\lim_{x \to 3} \frac{x-3}{\sqrt{x-2} - \sqrt{4-x}} = \lim_{x \to 3} \frac{(x-3)[\sqrt{x-2} + \sqrt{4-x}]}{[\sqrt{x-2} - \sqrt{4-x}][\sqrt{x-2} + \sqrt{4-x}]} = 1$$

$$= \lim_{x \to 3} \frac{(x-3)[\sqrt{x-2} + \sqrt{4-x}]}{x-2-4+x} = \lim_{x \to 3} \frac{(x-3)[\sqrt{x-2} + \sqrt{4-x}]}{2(x-3)} = 1$$

$$= \lim_{x \to 3} \frac{[\sqrt{x-2} + \sqrt{4-x}]}{2} = \frac{1+1}{2} = 1$$
Answer is 3.

DIFFERENTIATION

- 1. Let f be a function defined in a neighbourhood of 'a'.
- 2. If $\lim_{x \to a} \frac{f(x) f(a)}{x a}$ (or) $\lim_{h \to a} \frac{f(a+h) f(a)}{h}$

exists and is finite then the function f(x) is said to be differentiable at x = a and the limit is denoted by f'(a). Here f'(a) is called the derivative or differential coefficient of f(x) at x = a.

f is said to be a differentiable function if it is differentiable at each point of its domain.

3. If y = f(x) is a function which is differentiable at each point in the domain of f; then the function

$$f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$
 also denoted by $\frac{df}{dx}$ is called derivative of $f(x)$ with respect to x.

5. $Lf'(c) = Rf'(c) \Leftrightarrow f$ is differentiable at $c \in (a,b)$.

List of derivatives of some standard functions.

| S.No. | Function $y = f(x)$ | Derivative $y' = f'(x)$ |
|-------|---------------------|--|
| 1. | k (constant) | 0 |
| 2. | x | 1 |
| 3. | $x^n (n \in R)$ | nx^{n-1} |
| 4. | $\sin x$ | $\cos x$ |
| 5. | $\cos x$ | $-\sin x$ |
| 6. | tan x | $\sec^2 x$ |
| 7. | $\cot x$ | $-\cos^2 x$ |
| 8. | sec x | $\sec x \tan x$ |
| 9. | cosec x | -cosec $x \cot x$ |
| 10. | $\sin^{-1}x$ | $\frac{1}{\sqrt{1-x^2}}$ |
| 11. | $\cos^{-1}x$ | $\frac{-1}{\sqrt{1-x^2}}$ |
| 12. | $\tan^{-1}x$ | $\frac{1}{1+x^2}$ |
| 13. | $\cot^{-1}x$ | $\frac{-1}{1+x^2}$ |
| 14. | sec ⁻¹ x | $\frac{1}{\mid x \mid \sqrt{x^2 - 1}}$ |

| | | 1 |
|-----|--------------------------------|--|
| 15. | $\csc^{-1}x$ | $\frac{-1}{ x \sqrt{x^2-1}}$ |
| 16. | e^{x} | e^x |
| 17. | $a^{x}, a > 0$ | $a^x \log a$ |
| 18. | $ x \ (x \neq 0)$ | $\frac{ x }{x}$ |
| 19. | $\log x $ | $\frac{1}{x}$ |
| 20. | $x^x, x > 0$ | $x^{x}(1+\log x)$ |
| 21. | $\sin hx$ | $\cos hx$ |
| 22. | $\cos hx$ | $\sin hx$ |
| 23. | tan <i>hx</i> | sec h^2x |
| 24. | $\cot hx$ | -cosec h^2x |
| 25. | sec hx | -sec hx tan hx |
| 26. | cosec hx | -cosec $h^2x \cot hx$ |
| 27. | $\sin h^{-1}x$ | $\frac{1}{\sqrt{1+x^2}}$ |
| 28. | $\cos h^{-1}x$ | $\frac{1}{\sqrt{x^2-1}}, \ x > 1$ |
| 29. | $\tan h^{-1}x$ | $\frac{1}{1-x^2}$ in (-1, 1) |
| 30. | $\cot h^{-1}x$ | $\frac{1}{1-x^2}$ in <i>R</i> - [-1, 1] |
| 31. | sec $h^{-1}x$ | $\frac{-1}{ x \sqrt{1-x^2}} x < 1, x \neq 0$ |
| 32. | $\operatorname{cosec} h^{-1}x$ | $\frac{-1}{ x \sqrt{x^2+1}} \text{ for } x \neq 0$ |

If u(x) and v(x) are two functions, differentiable in the common domain, then

1.
$$\frac{d}{dx}(uv) = u\frac{dv}{dx} + v\frac{du}{dx}.$$

2.
$$\frac{d}{dx}\left(\frac{u}{v}\right) = \frac{v\frac{du}{dx} - u\frac{dv}{dx}}{v^2} \text{ if } v(x) \neq 0 \forall x$$

Chain Rule: If *f* is a function differentiable at *x* and *g* is a function differentiable at f(x), then $g \circ f$ is also differentiable at *x* and

$$(g \circ f)'(x) = g'(f(x))f'(x)$$
 or $\frac{dg}{dx} = \frac{dg}{df} \cdot \frac{df}{dx}$.
PROBLEMS

1. $\frac{d}{dr}(\log_x 10) =$ 2. $\frac{-\log 10}{x(\log x)^2}$ 3. $\frac{-\log 10}{(\log x)^2}$ 4. $\frac{x}{\log 10}$ 1. 0 Solution: $\frac{d}{dx}(\log_x 10) = \frac{d}{dx}\left(\frac{\log 10}{\log x}\right) = \frac{-\log 10}{x(\log x)^2}$. So the answer is 2. 2. If $f(x) = \frac{1}{\sqrt{x}}$ then f'(x) at x = 4 is 1. $\frac{-1}{16}$ 2. $\frac{-1}{8}$ 3. $\frac{-1}{4}$ 4. $\frac{1}{8}$ Solution: $f(x) = \frac{1}{\sqrt{x}} = \frac{1}{x^2} \Rightarrow f'(x) = \frac{-1}{2}$. $x^{-\frac{1}{2}-1} = \frac{-x^{-\frac{3}{2}}}{2}$. So f'(x) at x = 4 is $\frac{-4^{-\frac{3}{2}}}{2} = \frac{-4^{-\frac{3}{2}}}{2}$. $\frac{-1}{16}$. So the answer is 1. 3. If $f(x) = 2^{\cot x}$, then f'(x) at $x = \frac{\pi}{4}$ is

 1. -2 log 2
 2. -4 log 2
 3. 2 log 2
 4. 4 log 2

 Solution: $f(x) = 2^{\cot x}$, then $f'(x) = 2^{\cot x} \log 2$. So f'(x) at $x = \frac{\pi}{4}$ is $2^{\cot \frac{\pi}{4}} \log 2 = 2 \log 2$. So the answer is 3. 4. If $x = \sqrt{2y + \sqrt{2y + \sqrt{2y + \dots \infty}}}$ then $\frac{dy}{dx} =$ 1. x + 1 2. x - 1 3. $x + \frac{1}{2}$ 4. $x - \frac{1}{2}$ Solution: $x = \sqrt{2y + \sqrt{2y + \sqrt{2y + \dots \infty}}} = \sqrt{2y + x}$. So $x = \sqrt{2y + x}$. Squaring both sides

CEDM

 $x^2 = 2y + x$. Differentiating with respect x we get $2x = \frac{2dy}{dx} + 1$. So $\frac{dy}{dx} = \frac{2x-1}{2} = x - \frac{1}{2}$. So the answer is 4. 5. The derivative of $\sin x$ with respect to $\tan x$ is 2. $\cos^2 x$ 3. $\cos^{3}x$ 1. $\cos x$ 4. $\cos^4 x$ **Solution:** Let $y = \sin x$. So $\frac{dy}{dx} = \cos x$. Let $z = \tan x$. $\frac{dz}{dx} = \sec^2 x$. So $\frac{dy}{dz} = \frac{\frac{z}{dx}}{\frac{dz}{dz}} = \frac{\cos x}{\sec^2 x} = \cos^3 x$. So the answer is 3. 6. If $y = \sqrt{x + \sqrt{x + \sqrt{x + x}}}$ then $\frac{dx}{dy} =$ 2. 1 - 2*y* 3. 2*y* - 1 4. *y* - 1 1. 1 - y**Solution:** $y = \sqrt{x + \sqrt{x + \sqrt{x + x}}}$ = $\sqrt{x + y}$. So $y = \sqrt{x + y}$. Squaring both sides we get $y^2 = x + y$. Differentiating with respect to y, we get $2y = \frac{dx}{dy} + 1$. So $\frac{dx}{dy} = 2y - 1$. So the answer is 3. 7. If $x = \sqrt{y + \sqrt{y + \sqrt{y + \dots}}}$ then $\frac{dy}{dx} =$ 1. x - 1 2. x + 1 3. 2x - 1 4. 2x + 1**Solution:** $x = \sqrt{y + \sqrt{y + \sqrt{y + \dots}}} = \sqrt{y + x}$. So $x = \sqrt{y + x}$. Squaring both sides we get $x^2 = y + x$. Differentiating with respect to x, we get $2x = \frac{dy}{dx} + 1$. So $\frac{dy}{dx} = 2x - 1$. So the answer is 3. 8. If $y = 4x^3 - 3x^2 + 2x - 1$, then $\frac{dy}{dx}$ at $x = \frac{1}{2}$ is 1. 0 3. 2. 2. 1 4. 3 Solution: $\frac{dy}{dx} = 12x^2 - 6x + 2$. So $\frac{dy}{dx}$ at $x = \frac{1}{2}$ is $12 \cdot \left(\frac{1}{2}\right)^2 - 6\left(\frac{1}{2}\right) + 2 = 2$. So the answer is 2. 9. If $x^2y = 1$, then $\frac{dy}{dx} =$

1.
$$-\frac{2}{x^3}$$
 2. $\frac{2}{x^3}$ 3. $\frac{1}{x^3}$ 4. $-\frac{1}{x^3}$

Solution: $x^2y = 1$. Differentiating we get $2xy + x^2 \frac{dy}{dx} = 0$.

So
$$\frac{dy}{dx} = \frac{2xy}{x^2} = -\frac{2y}{x} = -\frac{2}{x} \left(\frac{1}{x^2}\right) = -\frac{2}{x^3}$$
.

So the answer is 1.

ICET-2012

10. If $3x^2 + 2xy + y^2 = 6$, then $\left(\frac{dy}{dx}\right)_{(-1, 2)} =$ 1. -1 2. 1 3. -2 4. 2 **Solution:** We have $3x^2 + 2xy + y^2 = 6$

Differentiating with respect to x, we get $6x + 2x\frac{dy}{dx} + 2y + 2y\frac{dy}{dx} = 0. \Rightarrow \frac{dy}{dx} = \frac{-3x - y}{x + y}.$

So $\left(\frac{dy}{dx}\right)_{(-1,2)} = \frac{+3-2}{-1+2} = 1$ So the answer is 2.

11. The derivative of $\tan^{-1}(x^2+1)$ with respect to x at x = 2 is

1. $\frac{2}{13}$ 2. $\frac{3}{26}$ 3. $\frac{1}{13}$ 4. $\frac{1}{26}$

Solution: $\frac{d}{dx} \tan^{-1}(x^2 + 1) = \frac{1}{1 + (x^2 + 1)^2} \cdot 2x$

$$\left. \frac{d}{dx} \tan^{-1}(x^2 + 1) \right|_{x=2} = \frac{4}{1 + (5)^2} = \frac{2}{13}.$$
 So the answer is 1.

ICET-2011

12. If
$$y = 2^{\sec x}$$
, then $\left(\frac{dy}{dx}\right)_{x=0} =$
1. 0 2. $2 \ln 2$ 3. $\ln 2$ 4. $-2 \ln 2$
Solution: $\frac{dy}{dx} = \frac{d}{dx} 2^{\sec x} = (2^{\sec x} . \log \sec x)(\sec x \tan x)$
 $\left(\frac{dy}{dx}\right)_{x=0} = (2^{\sec 0} . \log \sec 0)(\sec 0 \tan 0) = (2^{1} . \log 1)(1.0) = 0$. So the answer is 1.

13. If
$$f(x) = \frac{x^2 + 1}{x^2 - 1}$$
, then $f'(2) =$
1. $\frac{8}{9}$ 2. $\frac{-8}{9}$ 3. $\frac{5}{3}$ 4. $\frac{-5}{3}$

Solution:
$$f'(x) = \frac{2x(x^2 - 1) - 2x(x^2 + 1)}{(x^2 - 1)^2} = \frac{-4x}{(x^2 - 1)^2}$$

$$f'(2) = \frac{-8}{9}$$
. So the answer is 2.

STATISTICS

Group of collection is called data. There are two types of data. One is ungrouped data and ther other is grouped data. The arrangement of raw data under various class intervalsl is called groupd data or classified data or tabulation.

- *Frequency Distribution table:* The table showing the class intervals along with the 1. corresponding class frequencies is known as 'Frequency distribution table'.
- 2. *Frequency*: The number of times an observation occurs in the given data is called frequency of observation.
- Cumulative frequency: It is the sum of the frequencies of that class and all the previous 3. classes of it
- 4. Length of the class: The difference between the upper and lower boundaries is called 'Length of the class'
- *Range:* The difference between upper and least values of the data. 5.
- *Mid value* : The average of lower and upper limit is called 'mid value' of a class interval. 6.
- 7. The following are measure of central tendency values: a) Arithmetic Mean (A.M); b) Geometric Mean (G.M); c) Harmonic Mean (H.M)d) Median; e) Mode

A.M. (or) Mean : A.M. (or) Mean for ungrouped data = $\frac{\text{sum of the items}}{\text{Number of items}}$ a.

If $x_1, x_2, ..., x_n$ are the mid values and $f_1, f_2, ..., f_n$ are frequencies of a grouped data then A.M

$$=\frac{\sum f_i x_i}{\sum f_i}$$

Geometric Mean (G.M): G.M of a set of 'n' observations is the nth root of their product. b. G.M. = $(x_1 x_2 \dots x_n)^{1/n}$

If any observation is zero, then G.M. becomes zero.

If any observation is negative, then G.M = imaginary

c. Harmonic Mean (H.M): H.M is a set of 'n' observations is the reciprocal of the A.M., the

reciprocals of given values. H.M= $\frac{n}{\sum \frac{1}{r}}$

Measures of central tendency or inadequate to give us complete idea of the entire distribution.

Median: For ungrouped data, if 'n' is odd, $\frac{(n+1)^{th}}{2}$ observation is the Median and if 'n' is d. ever, then the average of the two middle observations is the Median. For grouped data,

$$Median = L + \frac{\frac{N}{2} - m}{f} \times c$$

L = Lower boundary of the Median class; here,

N = Sum of the frequencies.

m = The cumulative frequency before the median class.

f = The frequency of the median class.

c = The length of class.

e. *Mode*: The observation which occurs most frequently in an ungrouped data is called mode.

Mode of a grouped data = $L + \frac{\Delta_1}{\Delta_1 + \Delta_2} \times C$

here L = Lower boundary of the modal class

 $\Delta_1 = \mathbf{f} - \mathbf{f}_1; \ \Delta_2 = \mathbf{f} - \mathbf{f}_2$

f = frequency of modal class;

 $f_1 \& f_2$ are the frequencies before and after the modal class;

c = Length of the class.

The relation between Mean, Mode, Median :

Mean - Mode = 3(Mean - Median) (or) Mode = 3 Median - 2 Mean

- 8. *Measure of dispersion*: a) Range, b) Quartile Deviation (Q.D), c) Mean Deviation (M.D), d) Standard Deviation (S.D), e) Variance.
- a. *Range* : Greatest value Least value
- **b.** *Quartile Deviation (Q.D)*: The value below which 25% scores will lie is called the first quartile, Q_1

The value below which 75% scores will lie is called the 3rd quartile, Q_3

$$Q_1 = l_1 + \frac{\frac{N}{4} - m_1}{f_1} \times c; Q_3 = l_3 + \frac{\frac{3N}{4} - m_3}{f_3} \times c \text{ and } Q.D = \frac{Q_3 - Q_1}{2}$$

where $l_1 \& l_3$ are the lower boundaries of the respective Quartiles; $m_1 \& m_3$ are the cumulative frequencies to the class above the Quartile class;

 $f_1 \& f_3$ are frequencies of the respective Quartile classes.

c. *Mean Deviation (M.D):* The average absolute values of the deviations of the measured from central values (Mean, Median, Mode) is called M.D.

for ungrouped data, M.D. =
$$\sum_{i=1}^{N} \frac{|x_i - M|}{N}$$

 $x_i = i^{\text{th}}$ value in given data
M = Central value
N = Number of values
 $\sum |f(x_i - M)| \sum \sum_{i=1}^{N} |f(x_i - M)| \sum_{i=1}^{N} |f$

for grouped data, M.D. =
$$\sum_{i=1}^{n} \frac{|f(x_i - M)|}{\sum f} = \frac{\sum |fd|}{\sum f}$$

x. = Mid value of C.I.

 $M = Central value d = (x_i - M)$

d. Standard Deviation (S.D.): S.D. = $\sqrt{\frac{\sum_{i=1}^{n} (x_i - \overline{x})^2}{N}}$

here $x_i = i^{\text{th}}$ observation $\overline{x} = \text{Mean}$

N = Total number of observation

For a symmetric distribution the relationship among Q.D. and S.D. and M.D

Q.D. =
$$\frac{2}{3}$$
 S.D.; M.D. = $\frac{4}{5}$ S.D. and Q.D. = $\frac{5}{6}$ M.D.

e. Variance (σ^2) : The mean of the squares of deviations of teh values from their A.M. is

called variance. Variance $(\sigma^2) = \sum_{i=1}^{n} \frac{(x_i - \overline{x})}{N}$

9. Rank-correlation: It is used to find teh relationship between two variables.

10. Spearman's rank-correlation (
$$\rho$$
) = 1 - $\frac{6\sum d^2}{n(n^2-1)}$

here n = number of items; d = difference in ranks

The value of ρ lies between -1 and 1

11. The condition for perfect positive correlation
$$\rho = 1$$
, and for perfect negative correlation $\rho = -1$

- 12. For complete absence of correlation, $\rho = 0$. If $|\rho| < 0.2$, the relationship is neglisible. If $0.2 < |\rho| < 0.4$, the relationship is light. If $0.4 |\rho| < 0.7$, the relationship is substantal. If $0.7 < |\rho| < 1$, the relationship is very high.
- **13.** Coefficient of Quartile deviation = $\frac{Q_3 Q_1}{Q_3 + Q_1}$

14. Coefficient of Mean deviation =
$$\frac{\text{M.D}}{\text{Average}}$$
 (15) Coefficient fo variation = $\frac{\sigma}{\overline{x}} \times 100$.

16. Correlation: If the change in one variable effects the change in other variable then two variables are said to be correlated.

Correlation coefficient of numerical measure of linear relationship between x and y and is

defined as

$$\gamma_{(x,y)} = \frac{Cor(x,y)}{\sigma_x \sigma_y}$$
 or simply ' γ

Where
$$\operatorname{Cor}(x, y) = \frac{1}{n} \sum x_1 y_1 - \overline{xy}$$
 or $\frac{1}{n} \sum (x_1 - \overline{x})(y_1 - \overline{y})$

$$\sigma_x^2 = \frac{1}{n} \sum (x_1 - \bar{x})^2; \quad \sigma_y^2 = \frac{1}{n} \sum (y_1 - \bar{y})^2 \quad -1 \le n \le 1. \quad 0 \le n^2 \le 1$$

CEDM

Statistical Ability:

- The median of the following data is 8, 4, 7, 1, 1, 5, 4, 3, 9, 2, 8, 6, 7
 4
 7
 5
 6
 Solution: Ascending order 1, 1, 2, 3, 4, 4, 5, 6, 7, 7, 8, 8, 9
 Here n = 13. So median = the value in the 7th place = 5. Hence answer is 3.
- 2. The arithmetic mean of 1^2 , 2^2 , 3^2 ,..., 15^2 is

1.
$$\frac{248}{3}$$
 2. $\frac{248}{15}$ 3. $\frac{496}{15}$ 4. $\frac{246}{3}$
Solution: A.M. = $\frac{1^2 + 2^2 + ... + 15^2}{15} = \frac{1}{15} \times \frac{15 \times 16 \times 31}{6} = \frac{248}{3}$. Hence the answer is 1.
(Note: $1^2 + 2^2 + ... + n^2 = \frac{n(n+1)(2n+1)}{6}$, here $n = 15$.)
3. The standard deviation of 105, 110, 115, 120, 125, 130, 135, is
1. 20 2. 40 3. 30 4. 10
Solution: Shifting the origin is to 100 i.e., less 100 from each iterm.
Then we get 5, 10, 15, 20, 25, 30, 35. A.M. = $\overline{x} = \frac{5 + 10 + 15 + 20 + 25 + 30 + 35}{7} = \frac{140}{7} = 20$
S.D. = $\sqrt{\frac{\sum(x - \overline{x})^2}{N}} = \sqrt{\frac{(5 - 20)^2 + (10 - 20)^2 + (15 - 20)^2 + (20 - 20)^2 + ... + (35 - 20)^2}{7}} = \sqrt{\frac{225 + 100 + 25 + 0 + 25 + 100 + 225}{7}} = \sqrt{\frac{700}{7}} = \sqrt{100} = 10$. Hence answer is 4.
4. If the median and mode of 10 observations are 12 and 16 respectively, then the mean of the data is
1. 14 2. 15 3. 10 4. 11

Solution: Mode = 3 median - 2 mean \Rightarrow 16 = 3(12) - 2 mean \Rightarrow 2 mean = 36 - 16 = 20 \Rightarrow mean = 10. Hence answer is 3.

5. If the arithmetic means of two data having 24 and 16 observations are 10 and 15 respectively, then the arithmetic mean of the combined data is

1. 12.5
2. 12
3. 20
4. 13
Solution:
$$\frac{x_1 + x_2 + ... + x_{24}}{24} = 10 \Rightarrow x_1 + x_2 + ... + x_{24} = 240$$

 $\frac{y_1 + y_2 + ... + y_{16}}{16} = 15 \Rightarrow y_1 + y_2 + ... + y_{16} = 240.$
So $\frac{x_1 + x_2 + ... + x_{24} + y_1 + y_2 + ... + y_{16}}{40} = \frac{240 + 240}{40} = \frac{480}{40} = 12.$ Hence answer is 2.

- 6. The median of the first twenty positive integers is 1. 10 2. 10.5 3. 11 4. 9.5 Solution: Here n = 20 is even, so median = $\frac{10+11}{2} = \frac{21}{2} = 10.5$. Hence answer is 2.
- 7. The A.M. of 5 observations is 4.4 and the variance is 8.24. If 3 of the observations are 1, 2 and 6, then the other two are
 - 1. 8, 5 2. 4, 9 3. 7, 6 4. 2, 11 Solution: Variance $(\sigma^2) = \sum_{i=1}^n \frac{(x_i - \overline{x})}{N}$. Here $\overline{x} = 4.4$, N = 5. So $\frac{(1 - 4.4)^2 + (2 - 4.4)^2 + (6 - 4.4)^2 + (a - 4.4)^2 + (b - 4.4)^2}{5} = 8.24$ $\Rightarrow 3.4^2 + 2.4^2 + 1.6^2 + (a - 4.4)^2 + (b - 4.4)^2 = 41.20$. $\Rightarrow (a - 4.4)^2 + (b - 4.4)^2 = 41.20 - 19.88 = 21.32$ Using the answers we find a = 4, b = 9. Hence answer is 2.
- 8. The standard deviation of x + 1, x + 2, x + 3, x + 4, x + 8, x + 7 and x + 9, where x is not equal to zero is,

1.
$$\sqrt{\frac{29}{6}}$$
 2. $\sqrt{\frac{58}{6}}$ 3. $\sqrt{\frac{58x}{6}}$ 4. $\frac{58x}{6}$

Solution: A.M. =
$$\overline{x} = \frac{x+1+x+2+x+3+x+8+x+7+x+9}{6} = \frac{6x+30}{6} = x+5$$

S.D. =
$$\sqrt{\frac{\Sigma(x-\overline{x})^2}{N}} = \sqrt{(-4)^2 + (-3)^2 + (-2)^2 + 3^2 + 2^2 + 4^2}$$

= $\sqrt{16+9+4+9+4+16} = \sqrt{\frac{58}{6}}$. Hence answer is 2.

- 9. The variance of the distribution $\{1, 3, 5\}$ is
 - 1. 8 2. $\frac{8}{3}$ 3. $\sqrt{\frac{8}{3}}$ 4. $\sqrt{8}$

Solution: Variance $(\sigma^2) = \sum_{i=1}^n \frac{(x_i - \overline{x})}{N}$. Here $\overline{x} = \text{mean} = \frac{1+3+5}{3} = 3$

So variance = $\frac{(1-3)^2 + (3-3)^2 + (5-3)^2}{3} = \frac{8}{3}$. Hence the answer is 2.

10. If *m* is the arithmetic mean of $x_1, x_2, ..., x_n$ then the arithmetic mean of $ax_1+b, ax_2+b, ..., ax_n+b$ is

1. m 2. m + b 3. am + b 4. am

Solution: A.M. = $m = \frac{x_1 + x_2 + ... + x_n}{n}$ A.M. = $\frac{ax_1 + b + ax_2 + b + ... + ax_n + b}{n}$ $=\frac{a(x_1+x_2+...+x_n)}{n}+\frac{nb}{n}=am+b.$ Hence answer is 3. 11. The arithmetic mean of the first 10 positive integers is 1. 5 2. 6 3. 5.4 4. 5.5 Solution: A.M. = $\frac{1+2+3+...+10}{10} = \frac{55}{10} = 5.5$. Hence answer is 4. 12. If σ is the standard deviation of a_1, a_2, \dots, a_n then the standard deviation of $k - a_1, k - a_2, \dots, k$ $-a_n$ is 2. $k - \sigma$ 3. σ 4. $k + \sigma$ 1. - σ Solution: Shifting of the origin doesn't effect standard deviation (or) standard deviation is translation in variant. Hence answer is 3. 13. If Q_k (k = 1, 2, 3, 4) is the kth quartile deviation of a distribution then the median of the distribution is 2. Q_2 3. Q_3 4. Q_4 1. Q₁ Answer is 2. 14. For the observations x_1, x_2, \dots, x_n the sum $\sum_{i=1}^n |x_i - c|$ is minimum if c is their 2. median 1. mean 3. mode 4. sum Answer is 2. 15. The mode of 3, 5, 2, 6, 5, 9, 5, 2, 8, 6 is 2. 5 1. 6 3. 3 4. 2 Solution: 5 is most repeated value. i.e. 3 times. So mode is 5. Hence answer is 2. 16. The arithmetic mean of 100 observations is found to be 50. Later it is noticed that two observations are taken as 42 and 4 instead of 142 and 44. The correct mean is 1. 51.4 2. 46.8 3. 41.4 4. 42.2 **Solution:** A.M. = $\frac{x_1 + x_2 + \dots + x_{98} + 42 + 4}{100} = 50$ $\frac{x_1 + x_2 + \dots + x_{98} + 142 + 44}{100} = \frac{x_1 + x_2 + \dots + x_{98} + 46}{100} + \frac{140}{100} = 50 + 1.4 = 51.4.$ Hence answer is 1. 17. The mean of the distribution given below is 10-20 *x* 0-10 20 - 30f3 5 2 1. 10 2. 18 3. 21 4. 23

Solution: Mean = $\frac{\sum fx_i}{\sum f} = \frac{(5 \times 2) + (15 \times 3) + (25 \times 5)}{2 + 3 + 5} = \frac{10 + 45 + 125}{10} = \frac{180}{10} = 18.$

Hence answer is 2. (Note: x_i is mid value of each class)

- 18. The mean and variance of the observations 6, 7, a, b, 10, 12, 13, are 9 and 9.25 respectively. Then the ordered pair (a, b) =
 - 1. (7,3) 2. (8,6) 3. (8,4) 4. (9,5) Solution: Mean = $\frac{6+7+a+b+10+12+12+13}{8} = 9$ $\Rightarrow 60 + a + b = 72 \Rightarrow a + b = 12$. So a = 8, b = 4. Hence answer is 3.
- 19. If the standard deviation of $x_1, x_2, ..., x_n$ is σ then the standard deviation of $y_1, y_2, ..., y_n$ where $y_j = 3x_j + 5$ for j = 1, 2, ..., n is 1. $\sqrt{3\sigma}$ 2. 3σ 3. $3\sigma + 5$ 4. $\sqrt{3\sigma} + 5$

Solution: S.D. of $x_1, x_2, ..., x_n$ is same as S.D. of $x_1 + k, x_2 + k, ..., x_n + k$ But S.D. of $kx_1, kx_2, ..., kx_n$ is k times to S.D. of $x_1, x_2, ..., x_n$. Hence answer is 2.

- 20. The mode of the observations: 19, 9, 8, 7, 6, 3, 7, 2, 7, 6, 9, 7, 8, 7 is 1. 9 2. 8 3. 7 4. 6 **Solution:** Mode is the value which was repeated more number of times. So 7 is the mode. **Hence answer is 3**.
- 21. The mean deviation of the observations 1, 3, 7, 14, 5 about their median is1. 32. 3.43. 44. 4.2

Solution: Ascending order 1, 3, 5, 7, 14. So median M = 5. Mean deviation = $\frac{1}{n} \sum |x - M|$.

$$= \frac{1}{5} [|1-5| + |3-5| + |5-5| + |7-5| + |14-5|] = \frac{1}{5} [4+2+0+2+9] = \frac{17}{5} = 3.4.$$

Hence answer is 2.

- 22. If *m* is the arithmetic mean of $a_1, a_2, ..., a_n$ then the arithmetic mean of $\alpha a_1 + \beta$, $\alpha a_2 + \beta$, ..., $\alpha a_n + \beta$ is
 - 1. m 2. $m+\beta$ 3. $\alpha m+\beta$ 4. αm

Solution: A.M =
$$\frac{\alpha a_1 + \beta + \alpha a_2 + \beta + \dots + \alpha a_n + \beta}{n} = \frac{\alpha (a_1 + a_2 + \dots + a_n)}{n} + \frac{n\beta}{n} = \alpha m + \beta$$
.

Hence answer is 3.

23. The median of 65, 42, 59, 70, 82, 25, 92, 49, 30 and 61 is
1. 59 2. 60 3. 61 4. 49
Solution: Ascending order = 25, 30, 42, 49, 59, 61, 65, 70, 82, 92.
Here
$$n = 10$$
 even. So median = $\frac{59+61}{2} = 60$. Hence answer is 2.

24. If the average of 1, 4, 9, *x*, 25, 36 and 49 is 20, then *x* =

1. 16 2. 18 3. 22 4. 15

Solution: Average $\frac{1+4+9+x+25+36+49}{7} = 20$

39 + x + 85 = 140. x = 140 - 85 - 39 = 16. Hence answer is 1.

25. If σ is the standard deviation of x_1, x_2, \dots, x_{100} and c is a constant, then the standard deviation of

 $x_1 + c, x_2 + c, ..., x_{100} + c$ is 1. $\sigma + c$ 2. $c\sigma$ 3. σ 4. $(\sigma c)^2$ **Solution:** Shifting of the origin doesn't effect standard deviation (or) standard deviation is translation in variant. **Hence answer is 3.**

26. The arithmetic mean of the prime numbers less than 10, is

 1. 4.5
 2. 4
 3. 3.6
 4. 4.25

 Solution: Prime numbers less than 10 are 2, 3, 5, 7.

So arithmetic mean = $\frac{2+3+5+7}{4} = \frac{17}{4} = 4.25$. Hence answer is 4.

- 27. If the median and mode of a distribution are respectively 24.375 and 24.125 then its mean is 1. 24.5 2. 24.25 3. 48.5 4. 24 Solution: Mode = 3 median - 2 mean \Rightarrow 24.125 = 3(24.375) - 2 mean. So mean = 24.5. Hence answer is 1.
- 28. The variance of the observations 6, 7, 5, 4 and 8 is
 - 1. $\sqrt{2}$ 2. $\sqrt{3}$ 3. 2 4. 3

Solution: Variance $(\sigma^2) = \sum_{i=1}^{n} \frac{(x_i - \overline{x})}{N}$. Here \overline{x} = Arithmetic mean = $\frac{6+7+5+4+8}{5} = \frac{30}{5} = 6$

So variance = $\frac{|6-6|^2 + |6-7|^2 + |5-6|^2 + |4-6|^2 + |8-6|^2}{5} = \frac{0+1+1+4+4}{5} = 2.$

Hence answer is 3.

29. The arithmetic mean of the numbers a, a + 2d, a + 4d, ..., a + 2nd, is

1.
$$a + nd$$
 2. $a + (n - 1)d$ 3. $a + (n + 1)d$ 4. $a + \frac{nd}{2}$

Solution: The given series is an arithmetic progression.

Sum of first *n* terms of A.P. = $s_n = \frac{(2n+1)}{2} [a + a + 2nd] = (2n+1) (a + nd)$

Arithmetic mean = $\frac{s_n}{2n+1} = \frac{(2n+1)(a+nd)}{2n+1} = a + nd$. Hence answer is1.

30. The arithmetic mean of the incomes of 100 workers in a factory is Rs.50 per day and the

arithmetic mean of the incomes of 75 workers of them is Rs.40 per day. Then the arithmetic mean of the incomes of the rest of the workers per day (in rupees) is 3. 70 1. 60 2. 50 4. 80 Solution: Sum of incomes of 100 workers = $100 \times 50 = \text{Rs}.5000$ Sum of incomes of 75 workers = $75 \times 40 = \text{Rs}.3000$ Sum of incomes of 25 workers = 5000 - 3000 = Rs.2000. So average income = $\frac{2000}{25}$ = 80. Hence answer is 4. 31. The mean deviation of the values 21, 23, 25, 28, 30, 32, 28, 38, 39, 46, 48 from the mean is 3. 7.8 2. 6.7 4. 8.7 1. 7.6 **Solution:** Shifting the origin to 20. The scores are 1, 3, 5, 8, 10, 12, 18, 19, 26, 28. Mean = M = $\frac{1+3+5+8+10+12+18+19+26+28}{10} = \frac{130}{10} = 13$ Mean deviation from mean $=\sum_{i=1}^{N} \frac{|x_i - M|}{N}$ $=\frac{|1-13|+|3-13|+|5-13|+|8-13|+|10-13|+|12-13|+...+|28-13|}{10}$ $=\frac{12+10+8+5+3+1+5+6+13+15}{10}=\frac{78}{10}=7.8.$ Hence answer is 3. 32. The coefficient of variation is 1. $\frac{M.D}{Mean} \times 100$ 2. $\frac{S.D}{Mean} \times 100$ 3. $\frac{S.D}{M.D} \times 100$ 4. $\frac{M.D}{S.D} \times 100$ Answer is 3. 33. The frequency of the inclusive type class 20-25 of the following data is 9, 10, 7, 20, 12, 21, 22, 14, 15, 18, 23, 19, 24, 27, 28, 25, 17, 18, 13, 12, 6, 7, 8, 9, 12 1. 5 2. 6 3. 7 4.3 Solution: Don't take 25, take 20. The values are 20, 21, 22, 23, 24. Hence answer is 1. 34. If the standard deviation of a_1, a_2, \dots, a_n is s, then, the standard deviation of $a_1 + b, a_2 + b, \dots, a_n + b$ 1S 2. *s* - *b* 1. s + b3. s 4. *sb* Solution: Shifting of origin doesn't effect the standard deviation. Hence answer is 3. 35. The mode of the distribution for which the arithmetic mean is 4.6 and median is 6.1, is 1. 18.3 2. 9.2 3. 9.1 4. 2.5 **Solution:** Mode = $3 \mod - 2 \mod = 3(6.1) - 2(4.6) = 18.3 - 9.2 = 9.1$. Hence answer is 3. 36. Coefficient of Skewness = $\frac{\text{Mode} - \text{Mean}}{\text{S.D}} \quad 2.\frac{\text{Mean} - \text{Mode}}{\text{S.D}} \quad 3. \quad \frac{\text{Mode} - \text{Mean}}{\text{Variance}} \quad 4. \quad \frac{\text{Mean} - \text{Mode}}{\text{Variance}}$ 1. -

Answer is 2.

37. In a distribution if 6, 4, 8, 3 occur with frequencies 4, 2, 5, 1 respectively, then airthmetic mean is

1. 6.25
2. 6.52
3. 6.30
4. 6.02
Solution: A.M. =
$$\frac{\sum fx}{\sum f} = \frac{6(4) + 4(2) + 8(5) + 3(1)}{4 + 2 + 5 + 1} = \frac{24 + 8 + 40 + 3}{12} = \frac{75}{12} = 6.25.$$

Hence answer is 1.
38. The standard deviation of -3, -2, -1, 0, 1, 2, 3 is
1. 2
2. 4
3. 6
4. 8
Solution: $\bar{x} = A.M. = \frac{(-3) + (-2) + (-1) + (0) + 1 + 2 + 3}{7} = 0$
S
 $=\sqrt{\frac{\sum(x - \bar{x})^2}{N}} = \sqrt{\frac{(-3 - 0)^2 + (-2 - 0)^2 + (-1 - 0)^2 + (0 - 0)^2 + (1 - 0)^2 + (2 - 0)^2 + (3 - 0)^2}{7}}$

$$=\sqrt{\frac{9+4+1+0+1+4+9}{7}} = \sqrt{\frac{28}{7}} = \sqrt{4} = 2.$$
 Hence answer is 1.

- 39. If a, g, h are respectively A.M, G.M and H.M of a data then 1. $a \ge g \ge h$ 2. $a \ge g \le h$ 3. $a \le g \ge h$ 4. $a \le g \le h$ Solution: A.M = $\frac{a+b}{2}$, G.M = \sqrt{ab} , H.M = $\frac{2ab}{a+b}$. Hence answer is 1.
- 40. The quartile deviation of 20, 15, 18, 24, 22, 30, 40 is 1. 24 2. 18 3. 12 4. 6 Solution: Ascending order 15, 18, 20, 22, 24, 30, 40. $Q_1 = \text{value in the } \frac{1}{4}(7+1) \text{ position} = 18.$ $Q_3 = \text{value in the } \frac{3}{4}(7+1) \text{ position} = 30$ $Q.D = \frac{Q_3 - Q_1}{2} = \frac{30 - 18}{2} = \frac{12}{2} = 6.$ Hence answer is 4. 41. The geometric mean of 2, 2², 2³, 2⁴, 2⁵, 2⁶, 2⁷ is 1. 2 2. 4 3. 8 4.16 Solution: G.M = $(2^{1+2+3+4+5+6+7})^{1/7} = (2^{28})^{1/7} = 2^4 = 16.$ Hence answer is 4.
- 42. The arithmetic mean of 1³, 2³, 3³,..., 19³ is

 1. 36,100
 2. 1900
 3. 100
 4. 10

Solution: A.M = $\frac{1^3 + 2^3 + ... + 19^3}{19} = \frac{19^2(19+1)^2}{19(4)} = 1900$ Hence the answer is 2. (Note: $1^3 + 2^3 + 3^3 + ... + n^3 = \frac{n^2(n+1)^2}{4}$) 43. The mid value of class 33 - 54 is 1. 43.5 2. 43 3. 21 4. 10.5 Solution: Mid value = $\frac{33+54}{2} = \frac{87}{2} = 43.5$ Hence answer is 1.

ICET-2012

44. If σ is the standard deviation of the observations x_1, x_2, \dots, x_n then the standard deviation of $5x_1 + 7, 5x_2 + 7, \dots, 5x_n + 7$ is

1. $5\sigma+7$ 2. $\sqrt{25\sigma^2+7}$ 3. 5σ 4. $5\sigma+\sqrt{7}$ **Solution:** S.D. of $x_1, x_2, ..., x_n$ is same as S.D. of $x_1+k, x_2+k, ..., x_n+k$ But S.D. of $kx_1, kx_2, ..., kx_n$ is k times to S.D. of $x_1, x_2, ..., x_n$. **Answer is 3.**

45. The variance of the numbers 87, 88, 89,...,98 is

1.
$$\sqrt{\frac{143}{12}}$$
 2. $\sqrt{\frac{843}{12}}$ 3. $\frac{143}{12}$ 4. $\frac{843}{12}$

Solution: Variance $(\sigma^2) = \sum_{i=1}^{n} \frac{(x_i - \overline{x})}{N}$. Ascending order 87,88,89,90,91,<u>92,93</u>,94,95,96,97,98

Here
$$\overline{x}$$
 = Arithmetic mean = $\frac{92+93}{2}$ = 92.5, N=12

So variance =
$$\frac{|92.5 - 87|^2 + |92.5 - 88|^2 + |92.5 - 89|^2 + |92.5 - 90|^2 + ... + |92.5 - 98|^2}{12}$$

$$=\frac{2[|5.5|^2+|4.5|^2+|3.5|^2+|2.5|^2+|1.5|^2+|0.5|^2]}{12}=\frac{143}{12}.$$
 Answer is 3.

46. The mode of the frequency distribution given below is

47. The geometric mean of the observations 2, 4, 16, 32 is

1. 42. 63. 84. 10Solution: Geometric Mean (GM): G.M of a set of 'n' observations is the nth root of their product.

G.M. = $(x_1 x_2 \dots x_n)^{1/n}$. G.M. = $(2 \times 4 \times 16 \times 32)^{1/4} = (2 \times 2^2 \times 2^4 \times 2^5)^{1/4} = (2^{12})^{1/4} = (2^3) = 8$. Answer is 3.

 48. The median of the observations 7, 8, 7, 9, 7, 14, 15, 6, 8, 14, 9, 17, 15, 16 is

 1. 7
 2. 8
 3. 8.5
 4. 9

 Solution: Ascending order 6,7,7,7,8,8,9,9,14,14,15,15,16,17.

n = 14. So median =
$$\frac{9+9}{2} = 9$$
. Answer is 4.

49. If the mean and mode of a data are 45 and 51 respectively then the median of the data is 1. 46 2. 47 3. 48 4. 49 **Solution:** Mode = 3 median - 2 mean \Rightarrow 51 = 3(median) - 2x45 \Rightarrow 3 median = 51 + 90 = 141 \Rightarrow median = 47. Hence answer is 2.

 50. The quartile deviation of the observations 80, 48, 60, 92, 50, 35, 70 is

 1. 10
 2. 12
 3. 14
 4. 16

 Solution: Ascending order 35, 48, 50, 60, 70, 80, 92

Q₁ = value in the
$$\frac{1}{4}(7+1)$$
 position = 48.
Q₃ = value in the $\frac{3}{4}(7+1)$ position = 80

Q.D =
$$\frac{Q_3 - Q_1}{2} = \frac{80 - 48}{2} = \frac{32}{2} = 16$$
. Hence answer is 4.

ICET-2011

- 51. If the Mode and Mean of a data are 44 and 38 respectively, then the Median of the data is 1. 39 2. 40 3. 42 4. 43 Solution: Mode = 3 median - 2 mean \Rightarrow 44 = 3(median) - 2x38 \Rightarrow 3 median = 44 + 76 = 120 \Rightarrow median = 40. Hence answer is 2.
- 52. The Median of the observations 108, 343, 721, 39, 74, 192, 48, 10, 123 is

 1. 108
 2. 123
 3. 74
 4. 721

Solution: Ascending order 10, 39, 48, 74, 108, 123, 192, 343, 721.

- n=9. So median is value in $\frac{9+1}{2} = 5$ th position is 108. Answer is 1.
- 53. The arithmetic mean of the first 71 natural numbers is

1. 72 2. 71 3. 36 4. 35.5 Solution:A.M= $\frac{1+2+3+4+...+70+71}{71} = \frac{71(71+1)}{2}\frac{1}{71} = \frac{72}{2} = 36$. Answer is 3.

54. The variance of the observations 73, 74, 75,...,84, 85 is

1. 17 2.
$$\sqrt{14}$$
 3. $\sqrt{17}$ 4. 14

Variance $(\sigma^2) = \sum_{i=1}^n \frac{(x_i - \overline{x})}{N}$. Solution: Ascending order 73,74,75,76,77,78,79,80,81,82,83,84,85

Here \overline{x} = Arithmetic mean = 79, N=13

So variance =
$$\frac{|73 - 79|^2 + |74 - 79|^2 + |75 - 79|^2 + \dots + |84 - 79|^2 + |85 - 79|^2}{13} = \frac{2[|6|^2 + |5|^2 + |4|^2 + |3|^2 + |2|^2 + |1|^2 + |0|^2]}{12} = \frac{2}{12} \frac{(6)(6+1)(12+1)}{(6-1)(12+1)} = 14$$
. Answer

6

55. For two positive real numbers, arithmetic mean and geometric mean are 13 and 12 respectively, then these two numbers are

1. 12.5, 13.5 2. 12, 14 3. 8, 18 4. 16, 10 **Solution:** For any two numbers *a* and *b*, A.M= $\frac{a+b}{2} = \frac{8+18}{2} = 13$;

G.M= $\sqrt{ab} = \sqrt{8 \times 18} = \sqrt{144} = 12.$ Answer is 3.

13

ICET-2013 [5 questions were given]

| 50. The mode of | the following distributi | ON IS | | |
|---|---|-------------------------------------|--------------------------|------------------------------------|
| 10,13,16,13 | ,19,24,13,9,24,13,26 | is | | |
| 1. 26 | 2. 17 | 3. 13 | 4. 9 | Answer is 2. |
| 57. If the standa | rd deviation of a variab | ble x is 12, then the | variance of the | variable $2x + 17$ is |
| 1. 24 | 2. 288 | 3. 576 | 4. 41 | Answer 1 or 3 |
| 58. The mean of | 6 observations is calcula | ated as 24 and later it | was noted that or | ne of the observations |
| is wrongly t | aken as 24 instead of -2 | 4, then the correct r | mean is | |
| 1. 40 | 2. 32 | 3. 24 | 4. 16 | Answer is 4. |
| 59. The median | of 15 observations is 3 | 32. Each of the obse | ervations greater | than the median are |
| increased by | y 8 and each of the obse | ervations less than | median are decre | eased by 6. Then the |
| median of th | ne new data is | | | |
| 1. 46 | 2. 18 | 3. 32 | 4. 40 | Answer is 4. |
| 60.If the standar | rd deviation of the n na | tural numbers is <i>t</i> , th | hen $12t^2 + 1 =$ | |
| 1. $n^2 - 1$ | 2. n^2 | 3. $n^2 + 1$ | 4. $n^2 + 2$ | Answer is 2. |
| | [6 question | s were given] | | |
| ICE I-2014 | L - 1 | | | |
| ICE 1-2014
61. For a given | data, if the mean is 60 a | and the mode is 66, | then the Median | of the data is |
| 1. 63 | data, if the mean is 60 a
2. 64 | and the mode is 66, 1
3. 60 | then the Median
4. 62 | of the data is |
| 1CE 1-2014
61. For a given
1. 63
Solution: N | data, if the mean is $60 a$
2. 64
10de = 3 median - 2 me | and the mode is 66,
3. 60 | then the Median
4. 62 | of the data is Answer is 4. |
| 1CE 1-2014
61. For a given
1. 63
Solution: N
62. The mode o | data, if the mean is $60 a$
2. 64
Aode = 3 median - 2 me
f the following data is | and the mode is 66,
3. 60
ean | then the Median
4. 62 | of the data is Answer is 4. |

| | 1. 11 | 2. 12 | 3. 13 | 4. 14 | Answer is 3. |
|---------------------------------|--|---|--|--|---|
| 63. | The mean of the $1 n - 1$ | first n odd natural n
2 n + 1 | umbers is $3 n + 2$ | 4 n | Answer is A |
| 64. | The variance of th | e first n even natura | al numbers is | 7. 11 | Answer 15 4. |
| | 1. $\frac{n^2-2}{3}$ | 2. $\frac{n^2-1}{6}$ | 3. $\frac{n^2-1}{12}$ | 4. $\frac{n^2+1}{12}$ | |
| Sol | ution: Variance(| $\sigma^2) = \sum_{i=1}^n \frac{(x_i - \overline{x})}{N}.$ | | | Answer is 3. |
| 65. | The mean of the d | istribution given be | low is | | |
| | <i>x</i> 10- | -20 20 - 30 30 | -40 40 - 50 | | |
| | Frequency : | 5 10 | 7 8 | | |
| | 1. 30 | 2. 31 | 3. 32 | 4. 33 | Answer is 4. |
| 66 | . If σ is the stands | ard deviation of the $0 + 2 + 1$ | x_1, x_2 | x_2, \dots, x_n then the sta | andard deviation of |
| | $9 + 3x_1, 9 + 3x_2,$ | $, 9 + 3x_n$ 1s | | | |
| | 1. $3\sigma - 3$ | 2. $\sqrt{9\sigma^2+3}$ | 3. 3σ | 4. $3\sigma + 9$ | |
| | Solution: S.D. of But S.D. of kx_1 , kx_2 | f x_1, x_2, \dots, x_n is san
kx_2, \dots, kx_n is k tim | the as S.D. of $x_1 + x_2$
les to S.D. of x_1, x_2 | $k, x_2 + k,, x_n + k$
$x_2,, x_n$. Answ | ver is 3. |
| | | | | | |
| Tel | angana ICET-20 | 15 [6 questions | were given] | | |
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the inequality
3. $ r \le 1$ | Answer:
4. – 2 < <i>r</i> < 2 | 3 |
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the inequality
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can of the distribution
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f 1 4 9 1
2 4 0 | were given]
the inequality
3. $ r \le 1$
on given below is
4 5 6 7
6 25 36 49
2 5 | Answer: $4 2 < r < 2$ | 3 |
| Tel
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The correlation co
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The arithmetic me
1. 3.8 | 15 [6 questions
befficient <i>r</i> satisfies
2. $ r < 1$
can of the distribution
$x \ 1 \ 2 \ 3 \ 4$
$f \ 1 \ 4 \ 9 \ 1$
2. 4.9 | were given]
the inequality
3. $ r \le 1$
on given below is
4 5 6 7
6 25 36 49
3. 5 | Answer:
4. – 2 < <i>r</i> < 2
4. 5.6 | 3 |
| Tel
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The correlation co
1. $ r > 1$
The arithmetic me
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Solution: A.M = | 15 [6 questions
befficient <i>r</i> satisfies
2. $ r < 1$
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<i>x</i> 1 2 3 4
<i>f</i> 1 4 9 1
2. 4.9
(1)(1) + (2)(4) + (3) | were given]
is the inequality
3. $ r \le 1$
on given below is
4 5 6 7
6 25 36 49
3. 5
)(9) + (4)(16) + (5)
+ 4 + 9 + 16 + 25 + 16 | Answer:
4 2 < r < 2
4. 5.6
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18,20,22,24,26,2
Answer | 3
(7)(49)
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Answer is 4.
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is 4. |

Solution: The standard deviation of first n natural numbers is $\sqrt{\frac{n^2 - 1}{12}}$. Here n = 25. Thus

$$\sqrt{\frac{n^2 - 1}{12}} = \sqrt{\frac{25^2 - 1}{12}} = \sqrt{\frac{625 - 1}{12}} = \sqrt{\frac{624}{12}} = \sqrt{52} = 2\sqrt{13}$$
 Answer is 2.

71. For $n \ge 1$, let $a_n = k$, where k is the remainder when n is divided by 5. Then the mode of the observations $a_1, a_3, a_8, a_{12}, a_{13}, a_{17}, a_{23}$ is

 1. 1
 2. 2
 3. 3
 4. 4

 Solution: The remainders are 1, 3, 3, 2, 3, 2, 3. Thus mode is 3.
 Answer is 3.

72. If σ is the variance of the observations x_1, x_2, \dots, x_n then $9\sigma^2$ is the variance of

1. $4 - 3x_1, 4 - 3x_2, 4 - 3x_3, \dots, 4 - 3x_n$ 3. $4 - 9x_1, 4 - 9x_2, 4 - 9x_3, \dots, 4 - 9x_n$ 4. $4 + 81x_1, 4 + 81x_2, 4 + 81x_3, \dots, 4 + 81x_n$ Answer is 1.
Probability

Random Experiment: An experiment in which all possible outcomes are known and the exact output cannot be predicted in advance, is called a random experiment. Example, tossing a fair coin, drawing a a card from a pack of well-shuffled cards.

Sample space: The set of all possible outcomes of an experiment is called a sample space. **Definition of probability:** The probability of an event A is defined as the favourable number of

cases of A, by the total number of cases. Thus, $P(A) = \frac{n(A)}{n(S)}$.

Results on probability:

- 1. P(S) = 1
- $2. \quad 0 \le P(\mathbf{a}) \le 1$
- 3. $P(\phi) = 0$
- 4. $P(\overline{A}) = 1 P(A)$
- 5. For any two events A and B, we have $P(A \cup B) = P(A) + P(B) P(A \cap B)$

$$6. \quad {}^{n}C_{r} = \frac{n!}{(n-r)!} \times r!$$

7.
$${}^{n}C_{n} = {}^{n}C_{0} = 1$$

8.
$${}^{n}C_{1} = {}^{n}C_{n-1} = n$$

9.
$${}^nP_r = \frac{n!}{(n-r)!}$$

Mutually Exclusive Events: If two or more events have no point in common (i.e.) if they cannot occur simultaneously, the events are said to be mutually exclusive.

Note: If A and B are mutually exclusive events then $P(A \cup B) = P(A) + P(B)$.

Independent Events: Two events are said to be independent if the occurrence or non-occurrence of one event does not influence the occurrence or non-occurrence of the other event.

Dependent Events: It implies that occurrence of one event affects the occurrence of the other event.

1. When 3 unbiased coins are tossed, the probability of getting exactly one head is

1.
$$\frac{1}{3}$$
 2. $\frac{3}{8}$ 3. $\frac{1}{8}$ 4. $\frac{1}{2}$

Solution: Total outcomes = 8. They are HHH, HHT, HTH, THH, THH, THT, HTT, TTT.

The probability of getting exactly one head is $\frac{3}{8}$. Hence the answer is 2.

2. If two dice are thrown simultneously, the probability of getting even numbers on both the dice is

1.
$$\frac{3}{36}$$
 2. $\frac{4}{36}$ 3. $\frac{9}{36}$ 3. $\frac{18}{36}$
Solution: Total outcomes = $6^2 = 36$
Favourable outcomes = 9. (they are (2, 2), (2, 4), (4, 2), (2, 6), (4, 4), (4, 6), (6, 2), (6, 4), (6, 6))
So, the required probability = $\frac{9}{36}$. Hence the answer is 3.

3. When two dice are thrown together, the probability that the sum obtained on them is 7, is

1. $\frac{5}{36}$ 2. $\frac{1}{6}$ 3. $\frac{5}{6}$ 4. $\frac{31}{36}$ **Solution:** Total outcomes = 6² = 36, they are (1, 1), (1, 2), (1, 3), (1, 4), (1, 5), (<u>1, 6</u>); (2, 1), (2, 2), (2, 3), (2, 4), (<u>2, 5</u>), (2, 6); (3, 1), (3, 2), (3, 3), (<u>3, 4</u>), (3, 5), (3, 6); (4, 1), (4, 2), (<u>4, 3</u>), (4, 4), (4, 5), (4, 6); (5, 1), (<u>5, 2</u>), (5, 3), (5, 4), (5, 5), (5, 6); (<u>6, 1</u>), (6, 2), (6, 3), (6, 4), (6, 5), (6, 6).

The probability that the sum obtained on them is $7 = \frac{6}{36} = \frac{1}{6}$. Hence the answer is 1.

4. The probability that a number chosen at random from the set {1, 2, 3,....,90} is divisible by 4 or 6 is

1.
$$\frac{31}{90}$$
 2. $\frac{37}{90}$ 3. $\frac{1}{3}$ 4. $\frac{1}{12}$

Solution: Total number of outcomes = 90.

To get no money the possible outcomes = 30.

multiples of 4= 4, 8, 12, 16, 20, 24, 28, 32, 36, 40, 44, 48, 52, 56, 60, 64, 68, 72, 76, 80, 84, 88

multiples of 6 = 6, 12, 18, 24, 30, 36, 42, 48, 54, 60, 66, 72, 78, 84, 90 Number divisible by 4 or 6 = 4, 6, 8, 12, 16, 18, 20, 24, 28, 30, 32, 36, 40, 42, 44, 48, 52, 54, 56, 60, 64, 66, 68, 72, 76, 78, 80, 84, 88, 90

So, required probability = $\frac{30}{90} = \frac{1}{3}$. Hence the answer is 3.

5. If a leap year is selected at random, the probability that there will be 53 Thursdays in that year is

1.
$$\frac{1}{4}$$
 2. $\frac{2}{7}$ 3. $\frac{5}{7}$ 4. $\frac{6}{7}$

Solution: In a leap year, there are 366 days. 366 days = 52 weeks and 2 days.

The remaining two days can be (1) Sunday, Monday (2) Monday, Tuesday (3) Tuesday, Wednesday (4) Wednesday, <u>Thursday</u> (5) <u>Thursday</u>, Friday (6) Friday, Saturday (7) Satusday, Sunday.

Total number of cases = 7 and favourable number of cases = 2.

So required probability = $\frac{2}{7}$. Hence the answer is 2.

6. Five coins are tossed at a time. Then the probability of obtaining at least one tail is

1.
$$\frac{31}{32}$$
 2. $\frac{1}{32}$ 3. $\frac{1}{5}$ 4. $\frac{5}{32}$

Solution: Total number outcomes $= 2^5 = 32$.

The favourable case is getting at least one tail (i.e.) 1, 2, 3, 4 or 5 tails or head shouldn't occur in all the five coins simultaneously. So favourable number of cases = 31.

So required probability = $\frac{31}{32}$. Hence the answer is 1.

7. If 4 digit number is formed at random using the digits 1, 3, 5, 7, 9 without repetition, then the probability that it is divisible by 5 is

1.
$$\frac{4}{5}$$
 2. $\frac{3}{5}$ 3. $\frac{1}{5}$ 4. $\frac{2}{3}$

Solution: Without repetitions the 4 digit numbers formed by using 1, 3, 5, 7 and 9 is 5!. The number formed by using the digits 1, 3, 5, 7 and 9 which is divisible by 5 is 4!. (last digit is fixed by 5).

So required probability = $\frac{4!}{5!} = \frac{1}{5}$. Hence the answer is 3.

8. When two dice are rolled, what is the probability that the sum of the numbers appeared on them is 11?

1.
$$\frac{1}{6}$$
 2. $\frac{1}{18}$ 3. $\frac{1}{9}$ 4. 1

Solution: Total number of outcomes $= 6^2 = 36$. Sum of the numbers appeared on them to be 11 is (5, 6); (6, 5) = 2.

So, required probability = $\frac{2}{36} = \frac{1}{18}$. Hence the answer is 2.

9. The probability of drawing a red card from a deck of playing cards, is

1. $\frac{2}{13}$ 2. $\frac{1}{13}$ 3. $\frac{1}{4}$ 4. $\frac{1}{2}$ Solution: Total number of card in a deck = 52. Number of red cards = 26.

So, required probability = $\frac{26}{52} = \frac{1}{2}$. Hence the answer is 4.

- 10. A number *n* is selected at random from the set $\{1, 2, 3, ..., 50\}$. The probability than *n* is a prime is
 - 1. 0.1 2. 0.2 3. 0.3 4. 0.7

 Solution: Total number of outcomes = 50.

The number of primes up to 50 = 15 (they are 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47)

1

So, required probability = $\frac{15}{50} = \frac{3}{10} = 0.3$. Hence the answer is 3.

11. The probability of getting a composite number when a 6-faced unbiased die is tossed, is

1.
$$\frac{1}{4}$$
 2. $\frac{1}{3}$ 3. $\frac{1}{2}$ 4.

Solution: Total number of outcomes = 6.

Number of getting outcome as a composite number = 2. (they are 4, 6)

So, required probability = $\frac{2}{6} = \frac{1}{3}$. Hence the answer is 2.

12. A person gets Rs.10 of a head turns up and loses Rs. 5if a tail turns up in tossing an unbiased coin. If three unbiased coins are tossed simultanously the probability getting no money is

| 3 | 2 1 | 2 1 | 5 |
|------------------|------------------|------------------|------------------|
| 1. $\frac{-}{8}$ | $2. \frac{-}{4}$ | $3. \frac{1}{5}$ | 4. $\frac{-}{8}$ |

Solution: Total number of outcomes $= 2^3 = 8$.

To get no money the possible outcomes = 3. (they are HTT, THT, TTH)

So, required probability = $\frac{3}{8}$. Hence the answer is 1.

13. Two unbiased dice are thrown simultaneously. The probability of getting the sum divisible by 3 is

1.
$$\frac{11}{36}$$
 2. $\frac{12}{36}$ 3. $\frac{13}{36}$ 4. $\frac{17}{36}$

Solution: Total number of outcomes = $6^2 = 36$.

The possible number of outcomes that their sum divisible by 3 = 12. (they are (1, 2); (1, 5); (2, 1); (2, 4); (3, 3); (3, 6); (4, 2); (4, 5); (5, 1); (5, 4); (6, 3); (6, 6).

So, required probability = $\frac{12}{36}$. Hence the answer is 2.

14. Let E be the set of all integers with 1 in their units place. The probability that a number n chosen from $\{2, 3, 4, ..., 50\}$ is an element of E is

1. $\frac{5}{49}$ 2. $\frac{4}{49}$ 3. $\frac{3}{49}$ 4. $\frac{2}{49}$

Solution: Total number of chances = 49.

Number of favourable cases = 4. (they are 11, 21, 31, 41)

So, required probability = $\frac{4}{49}$. Hence the answer is 2.

15. A number *n* is chosen at random from $\{1, 2, ..., 10\}$. The probability than *n* satisfies the

equation (x - 3) (x - 6) (x - 7) (x - 11) = 0 is 1. $\frac{2}{5}$ 2. $\frac{3}{5}$ 3. $\frac{3}{10}$ 4. $\frac{7}{10}$ **Solution:** Total number of chances = 10. Number of favourable cases = 3. (they are 3, 6, 7) So, required probability = $\frac{3}{10}$. Hence the answer is 3. 16. A person gets as many rupees as the number he gets when an unbiased 6-faced die is thrown. If two such dice are thrown the probability of getting Rs.10 is 2. $\frac{5}{12}$ 3. $\frac{5}{36}$ 4. $\frac{9}{36}$ 1. $\frac{1}{12}$ **Solution:** Total number of chances $= 6^2 = 36$. Number of favourable cases = 3. (they are (4, 6); (5, 5); (6, 4)) So, required probability = $\frac{3}{36} = \frac{1}{12}$. Hence the answer is 1. 17. If three unbiased coins are tossed simultaneously then the probability of getting exactly two heads is 1. $\frac{1}{8}$ 2. $\frac{2}{8}$ 3. $\frac{3}{8}$ 4. $\frac{4}{8}$ **Solution:** Total number of chances $= 2^3 = 8$. Number of favourable cases = 3. (they are HHT, HTH, THH) So, required probability = $\frac{3}{8}$. Hence the answer is 3. 18. If a dice is thrown, then the probability of getting an even number or a number greater than 3, is 2. $\frac{2}{3}$ 3. $\frac{1}{3}$ 4. $\frac{1}{6}$ 1. $\frac{1}{2}$ **Solution:** Total number of chances = 6. Number of favourable cases = 4. (they are 2, 4, 5, 6) So, required probability = $\frac{4}{6} = \frac{2}{3}$. Hence the answer is 2. 19. A bag contains 3 red balls, 4 white balls and 7 black balls. The probability of drawing a red or a black ball is

1. $\frac{4}{7}$ 2. $\frac{1}{7}$ 3. $\frac{5}{7}$ 4. $\frac{3}{7}$

Solution: Total number of balls in bag = 14.

The probability of drawing a red or a black ball $=\frac{10_{c_1}}{14_{c_1}}=\frac{10}{14}=\frac{5}{7}$. Hence the answer is 3.

- 20. If two dice are thrown simultaneously, then the probability of having 6 on one die and any number other than 6 on other die, is
 - 1. $\frac{1}{6}$ 2. $\frac{5}{6}$ 3. $\frac{5}{36}$ 4. $\frac{31}{36}$ **Solution:** Total number of chances = $6^2 = 36$. Number of favourable cases = 5. (they are (6, 1); (6, 2); (6, 3); (6, 4); (6, 5)) So, required probability = $\frac{5}{36}$. Hence the answer is 3.
- 21. A and B independent events. The probability that both A and B occur is $\frac{1}{6}$ and the probability

that neither of them occurs is $\frac{1}{3}$. Then the probability of occurance of A is

1.
$$\frac{5}{6}$$
 2. $\frac{1}{2}$ 3. $\frac{1}{12}$ 4. $\frac{1}{18}$

Solution: A, B are independent events.

$$P(A \cap B) = P(A) P(B) = \frac{1}{6} \text{ and } P(\overline{A} \cap \overline{B}) = P(\overline{A})P(\overline{B}) = [1 - P(A)] [1 - P(B)] = \frac{1}{3}.$$

Solving these, we get $P(A) = \frac{1}{3}$ or $\frac{1}{2}$. Hence the answer is 2.

22. 8 coins are tossed simultaneously. The probability of getting atleast six heads is

1.
$$\frac{39}{256}$$
 2. $\frac{29}{256}$ 3. $\frac{31}{256}$ 4. $\frac{37}{256}$

Solution: Total number of chances $= 2^8 = 256$.

Number of favourable cases = $8_{c_6} + 8_{c_7} + 8_{c_8} = 28 + 8 + 1 = 37$.

So, required probability = $\frac{37}{256}$. Hence the answer is 4.

23. Three six faced dice are thrown together. The probability that exactly two of the three numbers are equal is

1.
$$\frac{126}{216}$$
 2. $\frac{90}{216}$ 3. $\frac{120}{216}$ 4. $\frac{96}{216}$
Solution: Total number of chances = $6^3 = 216$.

Number of favourable cases = 90.

So, required probability = $\frac{90}{216}$. Hence the answer is 2.

24. If two balls are drawn from a bag containing 2 white, 4 red and 6 black balls, the chance for both of them to be red is

1.
$$\frac{1}{11}$$
 2. $\frac{2}{11}$ 3. $\frac{3}{11}$ 4. $\frac{4}{11}$

Solution: If E is the event of drawing two red balls, then

$$n(E) = {}^{4}C_{2} = 6; n(S) = {}^{12}C_{2} = 66; P(E) = \frac{6}{66} = \frac{1}{11}.$$
 Hence the answer is 1.

25. 3 mongoes and 3 apples are kept in a box. If two fruits are chosen at random, the probability that one is a mango and the other is an apple is

1.
$$\frac{2}{6}$$
 2. $\frac{2}{5}$ 3. $\frac{3}{5}$ 4. $\frac{3}{6}$

Solution: $n(E) = {}^{3}C_{1} \times {}^{3}C_{1} = 3 \times 3 = 9; \ n(S) = {}^{6}C_{2} = 15; \ P(E) = \frac{n(E)}{n(S)} = \frac{9}{15} = \frac{3}{5}.$

Hence the answer is 3.

ICET-2011

26. If two dice are thrown, then the probability that the sum of the two numbers obtained is a prime number is

1.
$$\frac{7}{12}$$
 2. $\frac{5}{12}$ 3. $\frac{1}{4}$ 4. $\frac{3}{4}$ Answer:2

- 27. If a letter is selected at random from the first 15 letters of the English alphabet, then the probability that it is a consonant is
 - 1. $\frac{4}{15}$ 2. $\frac{11}{15}$ 3. $\frac{1}{3}$ 4. $\frac{2}{3}$ Answer:2

28. If E, F are two events in a random experiment such that $P(E) = \frac{1}{2}$, $P(F) = \frac{1}{3}$ and

$$P(E \cap F) = \frac{1}{12} \text{ then } P(E \cup F) =$$
1. $\frac{1}{4}$ 2. $\frac{3}{4}$ 3. $\frac{5}{6}$ 4. $\frac{7}{12}$ Answer:2

29. If a number is selected at random from the first 120 natural numbers, then the probability that it is divisible by 6 or 8 is

1.
$$\frac{1}{24}$$
 2. $\frac{1}{5}$ 3. $\frac{1}{4}$ 4. $\frac{1}{30}$ Answer:3

30. If a leap year is selected at random, then the probability that there will be 53 Sundays in that

year is

1.
$$\frac{1}{7}$$
 2. $\frac{6}{7}$ 3. $\frac{2}{7}$ 4. $\frac{5}{7}$ Answer:3

ICET-2012

- 31. If two unbiased six-faced dice are thrown simultaneously then the probability that the sum is 8 with at least one die showing a prime number is
 - 1. $\frac{1}{9}$ 2. $\frac{1}{8}$ 3. $\frac{1}{7}$ 4. $\frac{1}{6}$ Answer:1

32. If *A* and *B* are events of a random experiment with $P(A) = \frac{3}{8}$, $P(B) = \frac{1}{3}$ and

$$P(A \cap B) = \frac{1}{4} \text{ then } (\overline{A} \cap \overline{B}) =$$

1. $\frac{5}{12}$ 2. $\frac{11}{24}$ 3. $\frac{13}{24}$ 4. $\frac{17}{24}$ Answer:3

33. A group has 12 men and 4 women. If three were selected at random from the group then the probability that they are all men is

1.
$$\frac{1}{4}$$
 2. $\frac{11}{28}$ 3. $\frac{5}{24}$ 4. $\frac{9}{48}$ Answer:2

ICET-2013

34. When 2 unbiased dice are thrown, then probability that they show up different numbers is

1.
$$\frac{1}{6}$$
 2. $\frac{11}{36}$ 3. $\frac{5}{6}$ 4. $\frac{25}{36}$ Answer:3

35. In a bivariate distribution X_i , Y_i , i = 1,2,3,4,5,6,7,8, if d_i is the deviation between the ranks of

- X_i and Y_i and $\sum_{i=1}^{8} d_i^2 = 21$, then the coefficient of rank correlation between X_i and Y_i is
- 1. 0.252. 0.503. 0.654. 0.75 Answer:436. If 5 boys and 4 girls sit in a row at random, then the probability that boys and girls sit alternately
 - is

1.
$$\frac{1}{63}$$
 2. $\frac{1}{126}$ 3. $\frac{1}{120}$ 4. $\frac{1}{60}$ Answer:2

37.If a leap year is selected at random, then the probability that there will be 52 Sundays in that year is

1.
$$\frac{1}{7}$$
 2. $\frac{6}{7}$ 3. $\frac{2}{7}$ 4. $\frac{5}{7}$ Answer:4

38. If 3 coins are tossed, then the probability of getting atleast 2 heads is

1.
$$\frac{1}{2}$$
 2. $\frac{1}{8}$ 3. $\frac{1}{4}$ 4. $\frac{3}{8}$ Answer:1

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- 39. Two fair dice are rolled. The probability that the sum of the numbers on the faces shown is 8 is
 - 1. $\frac{5}{36}$ 2. $\frac{1}{6}$ 3. $\frac{7}{36}$ 4. $\frac{1}{9}$ Answer:2
- 40. A number is selected at random form the first 80 natural numbers. The probability that it is divisible by 4 or 6 is

1.
$$\frac{23}{80}$$
 2. $\frac{29}{80}$ 3. $\frac{27}{80}$ 4. $\frac{33}{80}$ Answer:3

- 41. The probability that either of the events A and B to happen is 0.6 and the probability that both of them to happen is 0.2, then P(A') + P(B') =
 - 1. 0.4
 2. 0.75
 3. 0.8
 4. 1.2Answer:2
- 42. Suppose f(x) = (x-2)(x-5)(x-7). If a number α is chosen from {1,3,4,5,6,7,8,9,10}

randomly, the probability that it satisfies the equation $f(\alpha) = 0$, is

1.
$$\frac{1}{3}$$
 2. $\frac{2}{5}$ 3. $\frac{3}{7}$ 4. $\frac{2}{9}$ Answer:1

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43. A ball is drawm at random from a bag containing 5 green, 6 black and 7 white balls, all of identical size. The probability that the chosen ball is either green or black is

1.
$$\frac{6}{70}$$
 2. $\frac{13}{18}$ 3. $\frac{2}{3}$ 4. $\frac{11}{18}$ Answer:4

44. Three numbers are choosen at random from the set { 1, 2, 3, 4, 5, 6, 7, 8}. The probability that they are consecutive numbers is

1.
$$\frac{9}{28}$$
 2. $\frac{7}{28}$ 3. $\frac{5}{28}$ 4. $\frac{3}{28}$ Answer:4

45. The probability that a number *n* is chosen at random from $\{1, 2, 3, 4, ..., 14\}$ is a prime number solution of the equation f(x)=0, where $f(x)=(x-2)(x^2-9)(x-6)(x-8)$ is

1.
$$\frac{5}{14}$$
 2. $\frac{3}{14}$ 3. $\frac{2}{14}$ 4. $\frac{1}{14}$

Solution: Total number of chances = 14.

Number of favourable cases = 2. (they are 2, 3)

So, required probability = $\frac{2}{14}$. Hence the answer is 3.

46. If A and B are events of a random experiment with $P(A) = \alpha$, $P(B) = \beta$ and $P(A \cap B) = \gamma$

then
$$P(\overline{A} \cap \overline{B}) =$$

 $1.1 + \alpha - \beta + \gamma \qquad 2. \quad 1 + \alpha + \beta + \gamma \quad 3. \quad 1 - \alpha - \beta + \gamma \quad 4. \quad 1 + \alpha + \beta - \gamma \qquad \text{Answer:3}$ Solution: $P(\overline{A} \cap \overline{B}) = P(\overline{A \cup B}) = 1 - P(A \cup B) = 1 - [P(A) + P(B) - P(A \cap B)] = 1 - \alpha - \beta + \gamma$

Section C COMMUNICATION ABILITY

Introduction: Competence in English Language is very essential for every student, especially professional students to excel in their field of interests.

1. <u>Parts of Speech</u> Practice Test

I. Identify the parts of speech of the underlined words.

| 1. | The rivers flow <u>dur</u>
a) Conjunction | ing the rainy season.
b) Verb | c) Preposition | d) Adjective |
|-----|---|---|-------------------------------|----------------|
| 2. | I have <u>been</u> learning
a) Adjective | g English in Global E
b) Verb | English Academy.
c) Adverb | d) Conjunction |
| 3. | Radhika said she <u>wa</u>
a) Verb | <u>ould</u> join him.
b) Interjection | c) Preposition | d) Adverb |
| 4. | I have <u>nine</u> hundred
a) Adverb | l rupees in my purse.
b) Preposition | c) Verb | d) Adjective |
| 5. | It was so nice <u>of</u> yo
a) Conjunction | u to remember my bi
b) Adjective | irthday.
c) Preposition | d) Verb |
| 6. | <u>Unless</u> you work ha
a) Preposition | rd, you can't speak I
b) Adverb | English.
c) Conjunction | d) Verb |
| 7. | The Song is <u>Sweet</u> .
a) Verb | b) Interjection | c) Adverb | d) Adjective |
| 8. | He is a <u>very</u> honest
a) Verb | man <u>.</u>
b) Adverb | c) Adjective | d) Noun |
| 9. | <u>Nobody</u> knew the p
a) Noun | roblem.
b) Adverb | c) Verb | d) Pronoun |
| 10. | What a terrible <u>nuis</u>
a) Adjective | ance this TV is!
b) Noun | c) Interjection | d) Verb |
| 11. | <u>Though</u> fire is a goo
a) Conjunction | od servant, it is a bad
b) Preposition | master.
c) Verb | d) Adverb |
| 12. | The sun rose and th | e fog disappeared. | | |

| | a) Preposition | b) Adjective | c) Conjunction | d) Pronoun |
|-----|--|--|--|---------------------------|
| 13. | We have come <u>here</u>
a) Preposition | for English Coachir
b) Adverb | ng.
c) Conjunction | d) Adjective |
| 14. | <u>How</u> is everybody t
a) Conjuction | here?
b) Interjection | c) Adverb | d) Verb |
| 15. | I was <u>ashamed</u> of ha
a) Verb | aving lied to my mot
b) Adverb | her.
c) Pronoun | d) Adjective |
| 16. | He was anxious to \underline{a}
a) Adverb | atone for his thought | lessness.
c) Verb | d) Noun |
| 17. | The 1970s saw the tal Adjective | first <u>backlash</u> against
b) Noun | t the emerging wome | n's movement.
d) Verb |
| 18. | The demonetization | has made many sma
b) Adjective | all companies go <u>ban</u> | <u>krupt</u> .
d) Noun |
| 19. | Who did the <u>caterin</u> | g? | c) Verh | d) Adverb |
| 20. | The detective was v | vatching him <u>closely</u> | waiting for a reply. | d) Pronoun |
| 21. | I was sitting <u>to</u> the l | eft of the manager. | e) Conjunction | d) A dyorb |
| 22. | Acting on an anony | mous <u>tip-off</u> , police | raided the house. | d) Adverb |
| | a) Noun | b) conjunction | c) Pronoun | d) Verb |
| 23. | In the cold dawn lig
a) Verb | ht the fort looked <u>sta</u>
b) Adjective | a <u>rk</u> and forbidding.
c) Adverb | d) Noun |
| 24. | He is <u>reputed</u> to be
a) Adverb | extremely wealthy.
b) Verb | c) Adjective | d) Preposition |
| 25. | They died trying to a) Conjunction | <u>rescue</u> their children
b) Preposition | from the blaze.
c) Adjective | d) Verb |
| 26. | I understand the <u>del</u>
a) Adjective | <u>pilitating</u> effect of ec
b) Verb | onomic decline.
c) Noun | d) Adverb |
| | | | | |

| 27. | a) Verb | b) Adjective | c) Noun | d) Adverb |
|----------------|--------------------------------------|--------------------------------------|---|---|
| 28. | He always tries to | keep abreast of the | e latest developments | in computing. |
| | a) Noun | b) Adverb | c) Verb | d) Adjective |
| 29. | The building look | ed an <u>absolute</u> sha | nbles. | |
| | a) Noun | b) Verb | c) Adjective | d) Adverb |
| 30. | They waited in a s | tate of <u>feverish</u> and | xiety for their friends | to come home. |
| | a) Adjective | b) Noun | c) Interjection | d) Verb |
| 31. | He <u>seldom</u> reacts | newspapers. | | |
| | a) Verb | b) Adjective | c) Verb | d) Adverb |
| 32. | The man <u>zoomed</u> | past on his bike. | | |
| | a) Preposition | b) Verb | c) Adverb | d) Noun |
| 33. | The leaders were <u>l</u> | <u>pombarded</u> with qu | estions from the press | S. |
| | a) Adjective | b) Adverb | c) Preposition | d) Verb |
| 34. | The nurses are alv | vays <u>courteous</u> and | helpful. | 1))] |
| | a) Adverb | b) Verb | c) Adjective | d) Noun |
| 35. | I didn't see anyon | e <u>during</u> the holida | ys. | d) Vark |
| | a) Freposition | b) Conjunction | c) Adjective | u) velo |
| 36. | I saw him <u>as</u> I was | s getting off the bu | s. | d) Verb |
| | | | c) conjunction | |
| 37. | His pockets are <u>bu</u>
a) Noun | <u>llging</u> with some p
b) Verb | apers. | d) Adjective |
| 38. | He was claiming of | compensation for u | nfair dismissal. | a) Majoonvo |
| | a) Adjective | b) Verb | c) Adverb | d) Noun |
| 39. | The bird flew awa | y <u>through</u> the wind | low. | 1) * 7 - 1 |
| 40 | a) Conjunction | b) Adjective | c) Preposition | d) Verb |
| 40. | a) Noun | b) Adjective | c) Preposition | d) Verb |
| | | K | EY | |
| 1. C | 2. B 3. A | 4. D 5. C | 6. C 7. D 8 | 8. B 9. D 10. B |
| 11. A | 12. C 13. B | 14. C 15. D | 16. C 17. B | 18. B 19. A 20. C $20.$ A |
| 21. B
31. D | 32. B 33. D | 24. C 25. D
34. C 35. A | 20. A = 27. Z = 20. A = 27. B = 27. | 20. Б 29. С 30. А
38. D 39. С 40 R |
| 5 I. D | 52. D 55. D | 5 C 55.11 | JUIC JIID . | |

2. VERBS (Kinds & Usage)

- i) <u>Forms of 'be' are</u>: am, are, was, were, be, and 'is'.
- ii) <u>Linking verbs</u>: appear, became, feel, come, look, remain, seem, sound, stay, stand, read, get, go, grow, fall, run, turn.
- iii) <u>Transitive verbs</u>: Verbs used when something is carried across / passed:
 Eg.: He throws the ball. Boss rings the bell.
- iv) <u>Intransitive verbs</u>: Verbs used where nothing is passed on, there is no transition. The ball moves. The bell rings.
- v) <u>Regular and Irregular verbs</u>: Verbs in English have five forms, i) base form ii) past tense form iii) past participle form/third form iv) third person singular v) -ing form

Regular verbs: If the past tense form of a verb and the third form can be predicted from its base form, it is called a *regular verb*. They are formed by adding -d or -ed to the base form.

Eg:

| call | called | called |
|----------|-------------|------------|
| like | liked | liked |
| try | tried | tried |
| act | acted | acted |
| dance | danced | danced |
| fool | fooled | fooled |
| joke | joked | joked |
| list | listed | listed |
| mail | mailed | mailed |
| nail | nailed | nailed |
| occupy | occupied | occupied |
| park | parked | parked |
| question | questioned | questioned |
| rate | rated | rated |
| show | showed | showed |
| tamper | tampered | tampered |
| utter | uttered | uttered |
| vex | vexed (up) | vexed(up) |
| wave | waved (at) | waved(at) |
| xerox | xeroxed | xeroxed |
| yawn | yawned | yawned |
| zero | zeroed (on) | zeroed(on) |
| | | |

Irregular verbs: here the other forms of the base form cannot be predicted. Since there is no regularity in forming the other forms, hence the name 'irregular verbs'

| infinitive | past simple | past participle | infinitive | past simple | past participle |
|------------|-------------|-----------------|------------|-------------|-----------------|
| be | was/were | been | let | let | let |
| beat | beat | beaten | lie | lay | lain |
| become | became | become | light | lit | lit |
| begin | began | begun | lose | lost | lost |
| bite | bit | bitten | make | made | made |
| blow | blew | blown | mean | meant | meant |
| break | broke | broken | meet | met | met |
| bring | brought | brought | pay | paid | paid |
| build | built | built | put | put | put |
| buy | bought | bought | read | read | read |
| catch | caught | caught | ride | rode | ridden |
| choose | chose | chosen | ring | rang | rung |
| come | came | come | rise | rose | risen |
| cost | cost | cost | run | ran | run |
| cut | cut | cut | say | said | said |
| do | did | done | see | saw | seen |
| draw | drew | drawn | sell | sold | sold |
| drink | drank | drunk | send | sent | sent |
| drive | drove | driven | shine | shone | shone |
| eat | ate | eaten | shoot | shot | shot |
| fall | fell | fallen | show | showed | shown |
| feel | felt | felt | shut | shut | shut |
| fight | fought | fought | sing | sang | sung |
| find | found | found | sit | sat | sat |
| fly | flew | flown | sleep | slept | slept |
| forget | forgot | forgotten | speak | spoke | spoken |
| get | got | got | spend | spent | spent |
| give | gave | given | stand | stood | stood |
| go | went | gone | steal | stole | stolen |
| grow | grew | grown | swim | swam | swum |
| hang | hung | hung | take | took | taken |
| have | had | had | teach | taught | taught |
| hear | heard | hidden | tell | told | told |
| hide | hid | hidden | tell | told | told |
| hit | hit | hit | think | thought | thought |
| hold | held | held | throw | threw | thrown |
| hurt | hurt | hurt | understand | understood | understood |
| keep | kept | kept | wake | woke | woken |
| know | knew | known | wear | wore | worn |
| leave | left | left | win | won | won |
| lend | lent | lent | write | wrote | written |

LIST OF IRREGULAR VERBS

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CEDM

vi) **Helping verbs:** The verbs that help to form not only negatives and questions but also to express a wide variety of meanings. They are *can, could, will, would, shall, should, may, might* and *must.*

MODALS AND THEIR MEANINGS

| Can | : | ability / permission / request / possibility |
|----------|-------|--|
| Could | : | ability / request / possibility |
| Shall | : | futurity / willingness / intention |
| Should | : | obligation / advisability / necessity / expectation |
| Will | : | willingness / intention / prediction / insistence / requests in question |
| Would | : | willingness / habitual action in the past / probability / wishes |
| May | : | permission / possibility /wishes / purpose / |
| Might | : | permission / possibility |
| Must | : | necessity / prohibition / compulsion / obligation / certainty /probability |
| Others | | |
| Must | : | 'have to', 'have got to', 'got to' |
| used to | : | would in the past
eg: when i was in delhi, i used to / would go to red fort every day for |
| going to | : | will / shall |
| Need | : | be necessary / want / require / ask |
| | 1 * 7 | 1 1 D '4' 1X 7 1 |

vii) <u>Phrasal Verbs and Prepositional Verbs</u>:

Phrasal Verbs: The combination of verbs and prepositions is called 'phrasal verb'. Also called 'two part verbs', and 'composite verbs'.

List of some Phrasal Verbs: back up, (someone), break off (relation), bring about (a change), bring up (children), draw up (a plan), fill out (a form), find out (a secret), turn off (the light).

Prepositional verbs: Prepositions used after a verb may not actually be a part of the verb but are required after the verb and before the noun. Eg., call on (means visit)

Whereas 'call up' is a phrasal verb which means summon.

List of some prepositional verbs: Allow for (delays) Approve of (an action) Apply for (a job) Attend to (the matter) Comment on (something) Congratulate (someone) on (some achievement) Live on (small pay) Object to (something) Refer to (a thesaurus)

Phrasal - Prepositional verbs:

Combination of phrasal verbs and prepositional verbs.

Eg., come up with (an idea) Drop out of(a game) Do away with (superstitions) Look down on/upon Look up to Look forward to

Break:

Break away: go away/give up bad habit Break down: fail/collapse Break in: interrupt/enter by force Break off: separate, cancel Break up: end of a term Break through: overcome

call:

Call at: visit Call back: summon to return Call for: order/demand Call in: consult Call off: cancel Call off: cancel Call on: visit a person Call over: read a list Call up: telephone

get

Get along: to be compatible/make progress Get away: escape Get back: return Get down to: deal seriously with Get into: enter Get off: escape punishment Get on: progress, agree Getting on: growing older (he is getting on for thirty) Approach (it is getting on for evening) Get out: escape from Get over: recover from/ overcome an obstacle Get through: succeed in doing something Get together: meet together

go:

Go about: move from place to place/pass from person to person Go after: pursue/hunt/try to win/obtain Go against: oppose Go ahead: proceed Go by: pass/form an opinion Go down: decrease in price Go in for: enter for/ have as a hobby Go off: leave for Go through: examine/suffer Go up: increase Go up to: approach Go with: match

- Eg: The *cause of the* quarrel is.....
- Eg.: You have the *choice of* doing either MCA or MBA
- Eg.: Good communication skills gives an *impression of* a good human being
- Eg.: Their soft skills made a deep impression on the management.(and it referred them for an appraisal)
- Eg.: One should have a strong *faith* in self
- Eg.: We should have utmost *interest in* the work we choose.
- Eg.: They made a progress in the most challenging and a difficult project
- Eg.: It gives us a great *satisfaction in* helping the helpless.
- Eg.: We all must put an *end to* unnecessary avocations.
- Eg.: Some who get success without much difficulty, they are an *exception to* us

3. PREPOSITIONS

Prepositions: are words placed before a noun/noun phrase/pronoun. It shows a link between the noun/noun phrase/pronoun.

- <u>**Prepositions of place:**</u> at, away from, above, across, all over, between, by, behind, below, beneath, inside, in front of, on top of, out of, on(to), through, throughout, under, underneath, within, etc.
- <u>**Prepositions of time:**</u> at, after, before, between, by, in, on, since, till, until, upto, etc.
- Some prepositions are also used as adverbs without following a noun / noun phrase / pronoun. Adverbs receive stress.

List of such prepositional phrases.

Aboard, about, above, across, along, alongside, apart, around, before, behind, below, beneath, besides, between, beyond, by, down, in, inside, near, notwithstanding, off, on, opposite, over, outside, past, round, since, through, throughout, to, under, underneath, up, within, without.

Points to be followed in using prepositions:

- 1. *At:* relates to a small extent of time; *in:* relates to a wider extent.
 - Eg.: We will start at three o clock tomorrow. They usually meet in Shamshabad Airport.
- 2. They went *into* the restaurant.
- 3. *Onto:* onto expresses movement and direction. Eg.: The man j umped <u>onto</u> the cat.
- 4. *Towards:* These days youngsters are moving <u>towards</u> politics.
- Around: indicates closure proximity.
 Eg.: My Professor travelled <u>around</u> the world.
- 6. *About:* indicates a distributed activity.Eg.: He has travelled <u>about</u> ten countries.
- *Among:* is used when the reference is to more than two individuals/groups
 Eg.: The land was distributed equally <u>among</u> the sons and daughters.
 Note: *amongst* is a literary variant of 'among.'
- 8. *Between:* is used when the reference is to two /individuals/groups Eg.: The land was distributed <u>between</u> the son and the daughter.

- 9. Besides I beside: Eg.: The old man doesn't have any other property beside(s) this plot.
- 10. *under* and *in*:
- Eg.: <u>Under</u> that much of pressure ,nothing more can be achieved. In such circumstances, nothing more can be done.

Two-word prepositions:

Ahead of, alongside of, because of, inclusive of, exclusive of, instead of, irrespective of, out of, regardless of, short of, according to, as to, contrary to, counter to, due to, next to, owing to, prior to, relative to, subject to, subsequent to, thanks to, up to along with, as for, apart from, away from, up till, from among, from behind, as against, up against, in between.

Three/four –word prepositions:

- i) By means of By virtue of By way of
- ii) with respect to with reference to
- iii) at the cost of at the instance of at the risk of
- iv) with the exception of with the intention of
- v) for fear of for lack of
- vi) for the benefit of for the purpose of for the sake of
- vii) on account of on behalf of
- viii) on top of

Fill in the blanks with appropriate prepositions:

- 1. He travelled sixteen miles four hours. 2. She rushed _____ my room and dropped the floor. 3. This painting is the creation a famous artist. 4. She was born _____ a small village India affluent parents. 5. I must start_____ dawn _____reach _____ time. 6. The couple have been missing _____ two months. 7. _____ rice, they had lentils. 8. Come and sit_____ me. 9. He was killed the wild animal. 10. _____ to a car, he has five bikes. 11. The work was done_____ haste. 12. The river flows_____ the bridge. 13. I have known him a long time. 14. He has not yet fully recovered his illness. 15. I am sorry _____ have kept you waiting. 16. You might spill _____ the milk. Answers:
- 17. I am obliged _____ you ____ your help.
- 18. He abstains ______ smoking.
- 19. His colleagues disagreed <u>him</u> <u>the proposal.</u>
- 20. I prefer tea _____ coffee.
- 21. The judge was convinced the evidence presented the lawyer.
- 22. Who is better _____ the two?
- 23. She insisted _____ going ahead _____ the preparations.
- 24. I acceded _____ her requests.
- 25. I prefer reading books ______ watching television.
- 26. I hope you succeed ______ getting what you want.
- 27. She decided _____ give up sports so that she could concentrate _____ her studies.
- 28. I filled the tank, unfortunately I filled it the wrong kind _____ petrol.
- 29. As I was coming out ______ the room, I collided ______ somebody I knew.
- 30. Some words are difficult _________ translate ________ one language _______ another.

| 1. In | 11. In | 21. With, by |
|-----------------|--------------|-------------------|
| 2. To, on | 12. Under | 22. Of |
| 3. Of | 13. For | 23. On, with |
| 4. In, of, to | 14. From | 24. To |
| 5. At, to, on | 15. To | 25. То |
| 6. For | 16. Over | 26. In |
| 7. With | 17. To, for | 27. To, on |
| 8. With | 18. From | 28. But, with, of |
| 9. By | 19. With, on | 29. Of, with |
| 10. In addition | 20. To | 30. To, from, to |
| | | |

Exercise

I. Fill in the blanks with appropriate prepositions.

- 1. Resentment brewing students
- 2. He was nominated multiple times Prize in literature but never won.
- 3. The river flows the bridge.
- 4. Don't cry spilt milk.
- 5. What are you looking?
- 6. I will write a letter the incident.
- 7. She has been like this June.
- 8. I found this paper the dustbin.
- 9. Get me something thin.
- 10. I am tired this work.
- 11. She is angry..... me.
- 12. You have to apply the judge for pardon.
- 13. He never boast his merits.
- 14. Her conduct does not admit Any excuses.
- 15. When the child is empowered by the parents, the child transforms a responsible citizen.
- 16. He has so far interacted with over 40,000 school children the past one year.
- 17. Indian civilization heritage is built universal spirit.
- 18. Our nation is endowed natural resources.
- 19. He was born a middle class family in Mumbai.
- 20. She is confident winning.
- 21. Write your number the top of the page.
- 22. Welcome our country.
- 23. He got the car and drove away.
- 24. Some people were taken Hospital after the accident.
- 25. Are you disappointed your exam results.

II. Fill in the blanks with appropriate Prepositions.

| 1. He moved the United States t | | | s to study computer sciences. | |
|---------------------------------|-------------------------------|-------------------------|-------------------------------|---------|
| | a) at | b) about | c) to | d) in |
| 2. | This day reminds m
a) with | e My very firs
b) of | st day at Microsoft.
c) to | d) on |
| 3. | She resigned hersels
a) to | f Failure.
b) on | c) at | d) with |

| 4. | Do not prevent him
a) at | working.
b) for | c) from | d) on |
|-----|-----------------------------|-------------------------------|-----------------------|---------------|
| 5. | They repented | Having been idle | ð. | |
| | a) for | b) to | c) from | d) of |
| 6. | In our early history | , our mission was | the PC on every d | esk and home. |
| | a) into | b) about | c) to | d) at |
| 7. | There is a passage . | the two build | ding. | |
| | a) between | b) into | c) in | d) with |
| 8. | I will return a | ı fornight. | | |
| | a) for | b) at | c) in | d) within |
| 9. | She studied French | The age of ten | 1. | |
| | a) in | b) since | c) from | d) between |
| 10. | This is in answer | your scolding n | ne about my transgres | ssion. |
| | a) for | b) at | c) on | d) to |
| 11. | his talk. it | seems, studies were | an ancillary subject. | |
| | a) at | b) from | c) about | d) since |
| 12. | She is very good | English | | |
| 12. | a) in | b) at | c) for | d) into |
| 13 | The table is the | e corner of the room | | |
| 15. | a) at | b) on | c) in | d) into |
| 14 | Ha's your had | Chamistary | | |
| 14. | a) in | b) on | c) for | d) at |
| 1.5 | ,
 | , | , | , |
| 15. | He is suffering | . severe depression.
b) at | c) in | d) for |
| | | 0) ut | c) III | u) 101 |
| 16. | Quickly glance | the contents and | d the headings and su | btopics. |
| | a) Into | b) at | c) for | d) onto |
| 17. | The poor of the wor | rld cannot be helped | mass productio | on. |
| | a) at | b) with | c) by | d) 1n |
| 18. | He became ill | eating undercooked | meat. | |
| | a) through | b) at | c) by | d) on |

| 19. | I will arrange a mee | eting some time | . the week. | |
|-----|----------------------------------|-----------------------------------|-----------------------------------|---------------|
| | a) on | b) in | c) through | d) during |
| 20. | I have been living v
a) since | vith my relatives
b) for | a few days.
c) in | d) around |
| 21. | Do you play any ot | her sports foo | tball? | ,
,
, |
| | a) with | b) beside | c) besides | d) during |
| 22. | I smiled the a) at | joy of only having to
b) on | wait one more day.
c) with | d) in |
| 23. | This is a matter
a) with | little interest to me
b) about | e.
c) of | d) for |
| 24. | This rule is not app
a) for | licable the pre
b) to | esent case.
c) at | d) in |
| 25. | He filed a suit
a) against | . his relative.
b) from | c) on | d) at |
| 26. | I haven't eaten
a) from | Wednesday.
b) on | c) through | d) since |
| 27. | Once they were
a) beside | the border, they k
b) from | new they would be so
c) across | afe.
d) in |
| 28. | We enjoyed the pea
a) through | uce and quiet as we w
b) under | valked the fores c) in | t.
d) into |
| 29. | A lot of mist hung
a) in | the fields.
b) over | c) through | d) above |
| 30. | You shouldn't oper
a) besides | h your presents
b) beside | your birthday.
c) until | d) during |

III. Insert appropriate prepositions in the places left blank.

Jupiter's Great Red Spot, the solar system's most famous storm, is almost one-and-a-half times wider than the earth and penetrates 300 km The gas giant's atmosphere, data collected by NASA's Juno spacecraft. Other revelations the mission include that Jupiter has two previously uncharted radiation zones. One the most basic questions Jupiter's Great Spot is: how deep are the roots?" said Scott Bolton, Juno's principal investigator The South West Research Institute the US. Juno's Microwave Radiometer has the unique capability Peer deep Jupiter's clouds. It is proving be an excellent instrument Help us get the bottom what makes the Great Red Spot so great. Jupiter's Great Red Spot is a giant oval crimson-colored clouds Jupiter's southern hemisphere that race counter-clockwise The oval's perimeter winds speed greater than any storm the earth.

Keys

| I. | |
|--|------------------------------------|
| 1.among 2. for 3. under 4. over 5. at 6 | about 7. since |
| 8. behind 9. like 10. of 11. with 12. to 1 | 3. of 14. of |
| 15. into 16. during 17. on 18. with 19. into 2 | 20. of 21. at |
| 22. to 23. into 24. to 25. with | |
| II. | |
| 1. C 2. B 3. A 4. C 5. D 6. B 7. A 8. | D 9. C 10. D |
| 11. B 12. B 13. C 14. D 15. A 16. B 17. C 18. | A 19. D 20. B |
| 21. C 22. A 23. C 24. B 25. A 26. D 27. C 28. | A 29. B 30. C |
| III. | |
| 1. about 2. into 3. according to 4. from 5 | 6. about |
| 7. from 8. in 9. to 10. below 11. to 1 | 2. to 13. to |
| 14. of 15. of 16. in 17. around 18. with 1 | 9. on |

4. ARTICLES

Articles are adjectives

Indefinite Articles: *a, an* (indefinite) and *the* (definite / specific) Their usage depends upon the spoken form (not the written form)

- *a:* is used before a word, beginning with a consonant sound (and is pronounced as first sound in the word above)
 - Eg: a man, a member of parliament
- *a:* before a word beginning with consonant sound
 - Eg: a university a European a useful thing a year a yard a yellow shirt a young man a one-eyed (y sound)
- *a:* is also used in these cases too! Wherever there is a *y* sound, *a* is used before such word.

Eg: a .young fellow, a ^outh, a .year, a y_ellow paper etc.

- *an:* <u>is used before a word beginning with a vowel sound</u> Eg: an <u>apple</u> a day keeps ... an <u>orange</u> a day ... an <u>umbrella</u> etc
- *an:* before a vowel sound
 - Eg: an \underline{a} rm an \underline{a} fternoon an \underline{e} vening an \underline{o} ffice an \underline{o} range an \underline{o} nion an \underline{u} mbrella an h \underline{o} ur an \underline{E} nglishman

Note: When *h* is pronounced

- <u>A</u> <u>h</u>otel
- <u>A</u> <u>h</u>orse
- <u>A</u> <u>h</u>uman being

When *h* is silent <u>An h</u>our <u>An h</u>onestman <u>An h</u>onour

Definite article: the: is used to specify and to identify.

- It is used before a noun after it is introduced.
 Eg.: We have a shop in a large building. *The* building belongs to an M.L.A.
- It is used to denote a person, place or thing.
 Eg.: *The* manager of Bank of Baroda is from our colony.
- 3. It is used before an adjective in the superlative degree. Eg.: He is *the* most intelligent in the batch.
- 4. It is used to indicate uniqueness. Eg.: *The* sun rises in the east.

Exercise

- 1. In hour.
- 2. She is ____ MP.
- 3. _____ afternoon
- 4. He is ____ honestman!
- 5. She always carries _____ umbrella.
- 6. She goes for _____ evening walk.
- 7. This is _____ university course.
- 8. She is ____ European I suppose.
- 9. I learn 500 words in _____ year.
- 10. This is _____ unit of BHEL.
- 11. _____ young fellow was seen outside.
- 12. He is _____ one-eyed person
- 13. My father gave me_____ one rupee note.

Exercise

I. Fill in the blanks with appropriate articles.

- 1.two judge Special Bench was hearing a batch of petitions.
- 2. Peacock is a majestic bird.
- 3. He is best batsman of the team.
- 4. He is colleague of mine.
- 5. I really need cup of tea.
- 6. English has become International language.
- 7. Bangalore is Beautiful city.
- 8. There is a cold wind blowing from east.
- 9. We thank our customers for trust and support.
- 10. He reiterated issues he has raised on the campaign trail.
- 11. Have you filed complaint?
- 12. We found dead animal easily.
- 13. The expedition was welcome change from our daily routine.
- 14. He was driving the car at 90 Km hour.
- 15. Mumbai is very expensive city.
- 16. Hindi is easy language.
- 17. August is eights month of year.
- 18. Maldives is island.
- 19. He is best player.
- 20. She came after hour.

II. Fill in the blanks with appropriate articles wherever necessary.

The world's newest island formed duringvolcanic eruption in remote pacific three years ago. It may offer clues to how life potentially developed on Mars. Island of Hunga Tonga rose from seabed about 65Km northwest of Tongan capital in late 2014 or early 2015. Scientists initially expected the island was created when vast qualities of rock and dense ash spewed from earth's crust to wash away within few months. But NASA said it had proved more resilient than expected, possibly because warm sea water combined with ash during Volcanic explosion to create concrete like substance known as "tuff". Jim Garvin, chief scientist at NASA's

Goddard Space Flight Center, said it was rare chance to study life cycle of newly created island. Examining how life gained foothold on Tongan island could help scientists pinpoint where to look for evidence of life on Mars. NASA's studies on island were presented at meeting of American Geographical Union in New Orleans.

III. Use the correct article wherever necessary.

| 1. | India faces tough challenge on farm issues. | | | | | | | | |
|-----|--|--------------------|------------------------|---------------|--|--|--|--|--|
| | a) an | b) the | c) a | d) no article | | | | | |
| 2. | Which is nearest station from here? | | | | | | | | |
| | a) a | b) an | c) no article | d) the | | | | | |
| 3. | My watch is hour late. | | | | | | | | |
| | a) an | b) a | c) the | d) no article | | | | | |
| 4. | Read second | chapter carefully. | | | | | | | |
| | a) a | b) the | c) an | d) no article | | | | | |
| 5. | He was icon o | of the 1980s. | | | | | | | |
| | a) a | b) the | c) an | d) no article | | | | | |
| 6. | Who wants ice cream? | | | | | | | | |
| | a) a | b) an | c) the | d) no article | | | | | |
| 7. | She hasn't faintest idea how to manage people. | | | | | | | | |
| | a) a | b) an | c) the | d) no article | | | | | |
| 8. | This is room we stayed in last year. | | | | | | | | |
| | a) an | b) the | c) a | d) no article | | | | | |
| 9. | evening at | home watching TV | is not my idea of a go | od time. | | | | | |
| | a) the | b) a | c) an | d) no article | | | | | |
| 10. | The identification o | as a long and | difficult task. | | | | | | |
| | a) the | b) an | c) a | d) no article | | | | | |
| 11. | She is too much of | idealist for th | nis government. | | | | | | |
| | a) an | b) a | c) the | d) no article | | | | | |
| | | | | | | | | | |

| 12. | In ideal world there would be no corruption and poverty. | | | | | | | |
|----------------------|--|---|--------------------------------|-------------------------------------|--|--|--|--|
| | a) the | b) an | c) a | d) no article | | | | |
| 13. | She retired early o
a) a | n grounds of i
b) an | ll health.
c) the | d) no article | | | | |
| 14. | He knew that | girls used to imitat | te him and laugh at h | him behind his back. | | | | |
| | a) a | b) an | c) the | d) no article | | | | |
| 15. | It was imr | pertinent question. | | | | | | |
| | a) the | b) a | c) an | d) no article | | | | |
| 16. | children | were a great consolat | ion to her when her | husband died. | | | | |
| | a) a | b) the | c) an | d) no article | | | | |
| 17. | The event was | conspicuous suc | ccess. | | | | | |
| | a) the | b) a | c) an | d) no article | | | | |
| 18. | It was lux | ury if you had | TV in those days. | | | | | |
| | a) a, a | b) a, the | c) the, a | d) no article | | | | |
| 19. | They were standin | ng in middle of | room. | | | | | |
| | a) the, the | b) the, an | c) a, the | d) no article | | | | |
| 20. | Everybody knows the country. | that migrate | birds bring new vir | uses when they fly into | | | | |
| | a) a | b) an | c) the | d) no article | | | | |
| | | | | | | | | |
| Keys | | | | | | | | |
| I. | | | | | | | | |
| 1. a
11. a | 2. the 3. the 4 | 4. a 5. a 6. an
14. an 15. a 16 an | 1 7. a 8. | the 9. the 10. the an 19. the 20 an | | | | |
| 11. a | 12. the 13. a | | 17. me, me 10. | an 19. the 20. an | | | | |
| II.
1. a | 2. the 3 the | 4. the 5 the 6 | . the 7. a 8 | the 9. a 10 the | | | | |
| 11. a | 12. the 13. a | 14. a 15. the 16 | 6. the 17. a 18. | the | | | | |

III. 1. с

11. **a**

3. **a** 13. **d** 4. **b** 14. **c**

2. **d**

12. **b**

6. **b** 16. **b** 7. c 17. b

5. c 15. c 10. **d** 20. **d**

9. c 19. a

8. **b**

18. **a**

5. QUESTION TAGS

Exercise

I. Choose the correct answer.

| 1. | Mr Dhanraj opened
a) did he | the shop,
b) is he | ?
c) didn't he | d) does he | | | | |
|----------|----------------------------------|-----------------------|-------------------|-----------------|--|--|--|--|
| 2. | Will you help me, . | ? | ,
, 1 | 1 2 | | | | |
| | a) won't you | b) will you | c) do you | d) can't you | | | | |
| 3. | It's not raining,
a) isn't it | ?
b) hasn't it | c) has it | d) is it | | | | |
| 4. | He was a great warrior,? | | | | | | | |
| | a) is he | b) wasn't he | c) didn't he | d) did he | | | | |
| 5. | We are not yet read | y to call him in, | ? | | | | | |
| | a) isn't he | b) aren't we | c) are we | d) won't we | | | | |
| 6. | Please turn off the 7 | ΓV? | | | | | | |
| | a) do you | b) will you | c) can't your | d) don't you | | | | |
| 7. | You are a good sportsman ? | | | | | | | |
| , . | a) don't you | b) won't you | c) aren't your | d) will you | | | | |
| 8. | Bring me a cup of t | ea? | | | | | | |
| 0. | a) will you | b) won't you | c) can't your | d) aren't you | | | | |
| 9 | They have secured | first division | 9 | | | | | |
| <i>.</i> | a) hasn't they | b) are they | c) aren't they | d) haven't they | | | | |
| 10 | He was in the mark | et vesterdav | 9 | | | | | |
| 10. | a) isn't he | b) wasn't he | c) is he | d) was he | | | | |
| 11 | She can't sing well | 9 | | | | | | |
| | a) has she | b) won't she | c) can she | d) isn't she | | | | |
| 12 | Nothing had hanne | ned ? | | | | | | |
| 12. | a) did it | b) wasn't it | c) didn't it | d) isn't it | | | | |
| 13 | They used to go to | the ovm ? | | | | | | |
| 1.5. | a) did they | b) weren't they | c) were they | d) didn't they | | | | |
| | | | | | | | | |

| 14. | Everbody is searching for the book? | | | | | | | | |
|-----|-------------------------------------|-------------------------|--------------------|----------------|--|--|--|--|--|
| | a) aren't they | b) do they | c) isn't everybody | d) is everbody | | | | | |
| 15. | Please, stop this nonsense,? | | | | | | | | |
| | a) don't you | b) won't you | c) will you | d) can you | | | | | |
| 16. | I'm standing in q | I'm standing in queue,? | | | | | | | |
| | a) aren't I | b) am I | c) amn't I | d) don't I | | | | | |
| 17. | You mother cooks well,? | | | | | | | | |
| | a) isn't she | b) won't she | c) can't she | d) doesn't she | | | | | |
| 18. | You have a diamond ring,? | | | | | | | | |
| | a) haven't you | b) have you | c) don't you | d) will you | | | | | |
| 19. | Let's do the work now,? | | | | | | | | |
| | a) shall we | b) should we | c) can we | d) won't we | | | | | |
| 20. | You haven't got a good dictionary,? | | | | | | | | |
| | a) do you | b) did you | c) aren't you | d) have you | | | | | |

Keys

| 1. C | 2. A | 3. D | 4. B | 5. C | 6. B | 7. C | 8. A | 9. D | 10. B |
|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| 11. C | 12. A | 13. D | 14. B | 15. C | 16. A | 17. D | 18. C | 19. A | 20. D |

<u>6. TYPES OF SENTENCES</u>

Exercise

- He is a teacher and he wants to serve his pupils.
 Change the above sentence into a complex sentence.
 a) He is a teacher so he wants to serve his pupils
 b) as he is a teacher, he wants to serve his pupils.
 c) He is a teacher so that he wants to serve his pupils.
 d) He wants to serve his pupils because he is a teacher.
- 2. He must work hard to make up for the lost time.
 Change the above sentence into compound sentence.
 a) He must work hard and make up for the lost time.
 b) He must work hard because he lost time.
 c) If he works hard he can make up his lost time.
 d) He has to work hard so that he can make for the lost time.
- 3. The moment which is lost is lost forever.

Change the above sentence into simple sentence.

a) A lost moment will never return.

- b) As the lost moment is lost, we should not think about it.
- c) A lost moment is lost forever.
- d) Everything is lost with a lost moment.
- 4. Is this the way to do it?

Change the above sentence into complex sentence.

- a) This not the way and don't do it. b) Don't do this as it is wrong.
- c) This is not the way because it should not be done.
- d) This is not the way how it should be done.
- 5. In the event of his being late, he will be punished.

Change the above sentence into compound sentence.

- a) If he is late, he will be punished.
- b) He must not be late, or he will be punished.
- c) He will be punished if he is late again.
- d) He will not be punished if he is not late.
- 6. She said that she was innocent.

Change the above sentence into simple sentence.

a) She declared her innocence.

b) As she is innocent she declared her innocence.

- c) She declared her innocence because she was very innocent.
- d) She was innocent and she declared her innocent.
- 7. Search his pockets and you will find the paper.

Change the above sentence into complex sentence.
a) Inspite searching his pockets, you did not find the paper.
b) If you search his pockets, you will find the paper.
c) Unless you search his pockets, you can't find the paper.
d) Search his pockets to find the paper.

- 8. The men who are wise do not talk much.
 Change the above sentence into simple sentence.
 a) They do not talk much because they are wise men.
 b) As they are wise men, they do not talk much.
 c) Wise men do not talk much.
 d) They are wise men and they do not talk much.
- 9. If you are honest, you will be respected by all. Change the above sentence into compound sentence.
 a) Be honest and you will be respected by all.
 b) You will be respected by all because of your honesty.
 c) Unless you are not you will not be respected by all.
 d) In case of honesty you will be respected by all.

10. She speaks like a girl of ten. Change the above sentence into complex sentence. a) She speaks as if she was a girl of ten. b) She speaks as if she was a girl of ten. c) She is speaking like a girl of ten. d) She speaks as if she were a girl of ten.

11. Taking a piece of paper she started writing on it. Change the above sentence into compound sentence. a) After taking a piece of paper, she started writing on it. b) She took a piece of paper and started writing on it. c) She started writing on it after taking a piece of paper. d) If the hedrest take

d) If she had not taken a piece of paper she would not have written on it.

12. Don't enter the room if you are not permitted. Change the above sentence into simple sentence.

- a) You can enter the room if you are permitted.
- b) In case you are permitted, you can enter the room.
- c) Don't enter the room without permission.
- d) Unless you are permitted you don't enter the room.

13. You win or your country will be put to disagree. Change the above sentence into complex sentence.

- a) You have to win because your country will be put to disagree.
- b) You didn't win so your country will be put to disagree.
- c) You have to win because of your country's honour.
- d) If you don't win, your country will be put to disagree.

KEYS

| 1. B | 2. A | 3. C | 4. D | 5. B | 6. A | 7. B | 8. C | 9. A | 10. D |
|--------------|--------------|--------------|-------------|-------------|------|-------------|------|------|--------------|
| 11. B | 12. C | 13. D | | | | | | | |

7. TENSES

Simple Present Tense: is used:

- To express a habitual action; as He takes milk every morning I get up every day at five O'clock My watch knows good time.
- To express general truth; as The sun rises in the east Honey is sweet Fortune favours the brave.
- 3. In exclamatory sentences beginning with here and there to express what is actually taking place in the present: as

Here comes the bus;

There she goes;

4. In vivid narrative, as substitute for the simple past; as

Suresh now <u>rushes forward</u> and deals a heavy blow to Praveen. Immediately the sultan <u>hurries</u> to his capital.

5. To indicate a future event that is part of a plan or arrangement, as, We go to Mumbai next week.

They leave for London by the next mail.

We sail for America next Saturday

When does the college reopens?

Make also the other uses of the Simple Present Tense.

- 1. It is used to introduce quotations; as, Keats says, "A thing of beauty is a joy forever."
- It is used, instead of the simple future tense, in clauses of time and of condition; as, I shall wait till you finish your lunch. If it rains we shall get wet.
- 3. As in broadcast commentaries on sporting events, the simple present is used, instead of the present continuous, to describe activities in progress where there is stress on the succession of happenings rather than on the duration.
- 4. The simple present is used, instead of the present continuous, with the type of verbs referred. We must say for example. T see an aero plane', not T am seeing an aeroplane.'

Present Continuous Tense: is used

1. For an action going on at the time of speaking; as,

Kusuma is singing (now)

The boys are playing hockey.

- 2. For a temporary action which may not be actually happening at the time of speaking; as, Eg: He is learning Piano (these days)
- 3. For an action that is planned or arranged to take place in the near future; as,

I am going to the cinema to night.

My uncle is arriving tomorrow.

It has been pointed out before that the simple present is used for a habitual action. However, when the reference is to particularly a advice or warning - we use present continuous with an <u>adverb</u> like always, <u>continually</u>, <u>constantly</u>.

My dog is very silly; he is always running out into the road.

The following verbs, on account of their meaning, are not normally used in the continuous form:

- 1) Verbs of perception, eg.: see, hear, smell, notice, recognize.
- 2) Verbs of appearing, eg: appear, lock, seem
- 3) Verbs of emotion, eg.: want, wish, desire, feel, like love, hate, hope, refuse, prefer
- 4) Verbs of thinking, eg.: think, suppose, believe, agree, consider, trust, remember, forget, know, understand, imagine, mean, mind.
- 5) Have (=possess), own, possess, belong to, contain, consist of be (except when used in passive)

These verbs are used in the simple present. They may, however, be used in the continuous tenses with a change of meaning, as,

I am thinking of ^considering the idea of) going to America.

Mr. Arun Kumar is minding (=looking after) the baby while his wife is out shopping.

Present Perfect Tense: is used

1) To indicate completed activities in the immediate past; as

Ranadheer has just gone out,

It has just struck ten.

2) To express past actions whose time is not given and not definite; as

Have you read 'Gulliver's Travels'?

I have never known him to be angry?

Mr. Hari has been to Japan.

3) To describe past events when we think more of their effect in the present than of the action itself; as,

Prasad has eaten all the biscuits *(i.e.,* there aren't any left for you)

I have cut my finger (and it is bleeding now)

I have finished my work (=now I am free)

4) To denote an action beginning at some time in the past and continuing up to the present moment; as,

I have known him for a long time.

Firdous has been ill since last week.

We have lived here for ten years.

We haven't seen Padma for several months.

The following adverbs (or adverb phrases) can be used with the present perfect: just, often, never, ever (in questions only), so far, till now, yet (in negative and questions) already, since, phrases, for-phrases, today, this week, this month, etc.

* Note that the present perfect is never used with adverbs of past time. We should not say, for example, "He has gone to Calcutta yesterday". In such cases the simple past should be used (he went to Calcutta yesterday.)

Present Perfect Continuous Tense: : is used for an action which began at some time in the past and is still continuing; as,

Dilip has been sleeping for five hours (and is still sleeping).

They have been building the bridge for several months.

They have been playing since four o'clock.

This tense is sometimes used for an action already finished. In such cases the continuity of the activity is emphasized as an explanation of something.

'Why are your clothes so wet?' - T have been watering the garden.

Simple Past Tense:

The simple past is used to indicate an action completed in the past. It often occurs with adverbs or adverb phrases of past time.

The steamer sailed, yesterday.

I received his letter a week ago.
Nalini left school last year.

Sometimes this tense is used without an adverb of time. In such cases the time may be either implied or indicated by the context.

I learnt Hindi in Nagpur.

I didn't sleep well (*i.e.* last night)

Babar defeated Rana Sanga at Kanwaha.

The Simple past is also used for past habits; as,

Jaswanth studied many hours everyday.

Durga always carried an umbrella.

Past Continuous Tense:

The past continuous is used to denote an action going on at some time in the past. The time of the action may or may not be indicated.

We were listening to the radio all evening.

It was getting darker.

The light went out while Anudeep was reading.

When I saw Sandeep, he was playing chess.

This tense is also used, with always, continually etc. for persistent habits in the past.

Rohit was always grumbling.

Past Perfect Tense:

The past perfect describes an action completed before a certain moment in the past;

as,

I met him in New Delhi in 1970. I had seen him last five years before.

If two actions happened in the past, it may be necessary to show which action happened earlier than the other. The past perfect is mainly used in such situations. The simple past is used in one clause and the past perfect in the other; as,

When I reached the station the train had started (so I couldn't got into the train)

I had done my exercise when Hari came to see me.

Durga had written the letter before Kusuma arrived.

I had left the class before English Teacher arrived.

Past Perfect Continuous Tense:

The past perfect continuous is used for an action that began before a certain point in the past and continued up to that time; as,

At that time, he had been writing a novel for two months.

When Mr. Mandeep came to the school in 1965, Mr. Anand had already been teaching there for five years.

Simple Future Tense:

The simple future is used for an action that has still to take place; as, I shall see him tomorrow. Tomorrow will be Sunday.

Note that the simple future tense is used. When the future is coloured with intention, the going to + finite construction is preferred, eg., 'He is going to build a new house'.

Future Continuous Tense:

The <u>future continuous</u> represents an action as going on at some time in future time;

as,

I shall be reading the paper then.

When I got home, my children will be playing.

This tense also used for future events that are planned; as,

I'll be staying here till Sunday.

Rakesh will be meeting us next week.

Future Perfect tense:

The future perfect is used to indicate the completion of an action by a certain future time; as,

I shall have written my exercise by that time.

Before you go to see him, Kheezar will have left the place.

Future Perfect Continuous Tense:

The future perfect continuous indicates an action represented as being in progress over a period of time that will end in the future; as,

By next July we shall have been living here for four years.

When he gets his degree, Bharath will have been studying at Oxford for four years.

Exercise

| 1. | The earth | round the sun. | (move, moves moved) | |
|-----|-----------------|------------------------------|-----------------------|--|
| 2. | My friends_ | the Prime Minis | (see, have seen, saw) | |
| 3. | Ι | _him only one letter up to r | IOW. | (sent, have sent, shall send) |
| 4. | I shall teleph | one you when he | back. | (comes, will come, came) |
| 5. | It started to r | ain while we te | ennis. | |
| | | | (are playin | g, were playing, had played) |
| 6. | Can I have so | ome milk before I | to bed? | (go, am going, shall go) |
| 7. | Не | asleep while he was driv | ving. | (falls, fell, has fallen) |
| 8. | I'm sure I | him at the party l | ast night. | (saw, have seen, had seen) |
| 9. | Anayatul | a milk in this tow | n. | (have, has, is having) |
| 10. | Suresh Yada | v here for the l | ast five years. | |
| | | | (worked, is | working, has been working) |
| 11. | Venu Gopal | thanked me for what I | · | |
| | | | (have done, | , had done, have been doing) |
| 12. | Ι | _a strange noise. | (hear, am | hearing, have been hearing) |
| 13. | Ι | _him for long time. | (kn | ow, have know, am knowing) |
| 14. | We | English for five years, | (study, am s | tudying, have been studying) |
| 15. | Don't disturb | me. I my hom | ne work. | (do, did, am doing) |
| 16. | Vamshi Kris | hna to be a doc | ctor. | (wants, wanting, is wanting) |
| 17. | Ι | _for next birthday. | | (am, shall be, have been) |
| 18. | If you | at once you will arriv | ve by 6 o'clock | x, (start, started, will star) |
| 19. | Srikanth | out five minutes ag | go. | (has gone, had gone, went) |
| 20. | When he live | ed in Hyderabad, he | to the cir | nema once a week.
(goes, went, was going) |
| Ι. | Choose the c | correct verb forms from the | ose in bracket | s. |
| 1. | Bees | Honey. (are making/m | ake) | |
| 2. | Where | kiran come from? (does | /do) | |
| 3. | She | a car. (has/have) | | |
| 4. | It | continuously since 7 o | o' clock.(is be | ing raining/has been raining) |
| 5. | See how the | bird in the sky. | (is flying/fly) | |

- 6. He when the telephone rang. (has been sleeping/was sleeping)
- 7. They thanked me for what I (do/did)
- 8. A car in the morning. (has hit/hit)
- 9. On Friday afternoon, I lunch with my friend. (had/was having)
- 10. When I went to the shop, the shop Down. (was closed down/had closed down)
- 11. Tomorrow by this time I exam. (shall write/shall be writing)
- 12. They about it in near future. (will be knowing/will know)
- 13. The doctor arrived after the patient (died/had died)
- 14. I in 1998. (had been married/was married)
- 15. Who discovered the force of gravitation? (has discovered/discovered)
- 16. You won't pass until you hard. (work/will work)
- 17. I to college every day by bus. (go/am going)
- 18. She jumped off the train while it (ran/was running)
- 19. They will wait for you until you (reach/reached)
- 20. He is shortly a new branch. (will open/opening)
- 21. Each June we To Dubai for a holiday. (will go/go)
- 22. He 15 films and I think his latest is the best. (had made/has made)
- 23. When I was a child the violin. (I was playing/I palyed)
- 24. Sorry we're late, we the wrong turning. (took/had taken)
- 25. I won't be able to meet you next week, I in Mumbai for a few days. (will stay/will be staying)
- 26. Next month I kiran for 10 years. (will have known/will have been knowing)
- 27. He all the doors and windows before he goes to bed. (shuts/will always shut)
- 28. Science many major advances this century. (made/had made)
- 29. Just as I into the bath the fire alarm went off. (had got/was getting)
- 30. They living in Hyderabad for twenty years. (have been/are)

Choose the correct sentence.

| 31. | a) He finished his work when I met him.b) He was finishing his work when I met him.c) He had finished his work when I met him.d) When I met him, he was finishing his work. | | | | | | | |
|-----|--|--|--|--|--|--|--|--|
| 32. | a) Examinations have been held next m b) Examinations will be held next month c) Examinations had been held next month d) Examinations are being held next month | ionth.
th.
onth
onth | | | | | | |
| 33. | a) I understood what you sayc) I had understood what you say | b) I am understand what are you saying.d) I understood what you say | | | | | | |
| 34. | a) The fair was over five days agoc) The fair was being over five days ago | b) The fair had been over five days agoo d) The fair will be over five days ago | | | | | | |
| 35. | a) I will meet you when she come backb) I will meet you when she comes backc) When she comes back I will be meetd) I will meet you when she came back | k
ing you | | | | | | |
| 36. | a) He thanked me for what I have doneb) For what I have done, he thanked mec) He thanked me for what I has done fd) He thanked me for what I had done f | for him
e
for him
for him | | | | | | |
| 37. | a) She went out ten minutes agoc) Ten minutes ago she had gone out | b) She had gone out ten minutes agod) She will go out ten minutes ago | | | | | | |
| 38. | a) If you started at once, you will reachb) You will reach on time if you startedc) If you start at once, you will reach ord) If you had started at once, you will reach | on time
l at once
n time
each on time | | | | | | |
| 39. | a) I am sure I met him at the station yesb) I am sure I had met him at the stationc) I am sure I will have met him at the sd) I am sure I was being met him at the | sterday
n yesterday
station yesterday
station yesterday | | | | | | |
| 40. | a) He did a lot of work todayb) He has done a lot of work todayc) A lot of work had been done todayd) A lot of work are being done today | | | | | | | |
| 41. | a) My brother will have arrived tomorrow morning | | | | | | | |

| | b) My brother shall have arrived tomorc) Tomorrow morning, my brother willd) My brother arrives tomorrow morning | row morning
arrive
ng | | | | | | |
|-----|--|--|--|--|--|--|--|--|
| 42. | a) He was reaching the station after the train was leftb) He reaches the station after the train had leftc) He reached the station after the train had leftd) He had reached the station before the train left | | | | | | | |
| 43. | a) I'm beginning to realize how difficult it is to be a teacherb) I had began to realize how difficult at is to be a teacherc) I shall begin to realize how difficult it is to be a teacherd) How difficult it is to be a teacher, I had began to realize | | | | | | | |
| 44. | a) Nothing like this was happened beforeb) Nothing like this have happened beforec) Nothing like this has happened befored) Nothing was like this is happened before | | | | | | | |
| 45. | a) Since 2000 I have lived in a small house near the stationb) Since 2000 I lived in a small house near the stationc) Since 2000 I am living in a small house near the stationd) Since 2000 I was living in a small house near the station | | | | | | | |
| 46. | a) Were you ever visited in a cave?c) Have you ever been in cave? | b) Have you ever been in a cave?d) Had you ever went in a cave? | | | | | | |
| 47. | a) I'm reading an interesting novel at thb) I have read an interesting novel at thc) I was reading an interesting novel atd) I will read an interesting novel at the | ne moment
e movement
the moment
e moment | | | | | | |
| 48. | a) What do this word mean?c) What does this word means? | b) What does this word meant?d) What does this word mean? | | | | | | |
| 49. | a) They look after patients for the hospb) They will looked after the patients irc) They look after patients in hospitalsd) They are looked after the patients in | itals
hospitals
the hospitals | | | | | | |
| 50. | a) It doesn't rain very much in summerb) It doesn't rains very much in summerc) It's doesn't rain very much in summerd) It's don't rain very much in figures | er | | | | | | |

- 51. a) We are having a nice room in the hotel
 b) We have a nice room in the hotel
 c) We were having a nice room in the hotel
 d) We will be having a nice room in the hotel
 52. a) I see the director tomorrow morning
 b) Tomorrow morning, I see the direction
 c) I have been seeing the director tomorrow morning
 d) I'm seeing the director tomorrow morning
 53. a) We are having lunch when Sara arrived
 b) When Sara arrived, we were had lunch
 c) When Sara arrived, we were having lunch
 d) We had lunch when Sara arrived
- 54. a) The children loves having Maryam stay with usb) The childrens love having Maryam stay with usc) The children love having Maryam stay with usd) The children love having Maryam stay with us
- a) When did you arrive in Hyderabad?b) When did you arrive at Hyderabad?c) When did you arrived at Hyderabad?d) When did you arrived in Hyderabad?

Keys

| 1. make | | 2. does | 3. ha | S | 4. ha | 4. has been raining | | | | |
|--------------|--------------|--------------|--------------|--------------|--------------|---------------------|--------------|--------------|--------------|--|
| 5. is flyin | ng | 6. was s | leeping | 7. di | d | 8. hi | t | | | |
| 9. had | | 10. had | closed do | wn 11. s | hall be w | riting12.v | vill know | | | |
| 13. had d | lied | 14. was | married | 15. d | liscovered | d 16.w | vork | | | |
| 17. go | | 18. was | running | 19. r | each | 20.0 | pening | | | |
| 21. go | | 22. has 1 | nade | 23. I | played | 24.to | ook | | | |
| 25. will l | be staying | g26. will | have kno | wn 27. s | huts | 28. ł | 28. has made | | | |
| 29. was § | getting | 30. have | been | | | | | | | |
| | | | | | | | | | | |
| 31. C | 32. B | 33. D | 34. A | 35. B | 36. D | 37. A | 38. C | 39. A | 40. B | |
| 41. D | 42. C | 43. A | 44. C | 45. A | 46. B | 47. A | 48. D | 49. C | 50. A | |
| 51. B | 52. D | 53. C | 54. D | 55. A | | | | | | |
| | | | | | | | | | | |

8. DEGREES OF COMPARISON

Exercise

- Change the following into comparative degree.
 "Very few cities of India are as big as Mumbai."

 a) No other city is as big as Mumbai in India
 b) Mumbai is one of the biggest cities in India
 c) Mumbai is bigger than many other cities in India
 d) Mumbai is bigger than any other cities in India
- 2. Change the following into superlative degree.
 "No other playwright is so great as Kalidasa in Sanskrit."
 a) Very few playwright, are as great as Kalidasa in Sanskrit
 b) Kalidasa is the greatest playwright in Sanskrit
 c) Kalidasa is greater than any other playwright in Sanskrit
 d) In Sanskrit Kalidasa in greater than many other playwrights
- 3. Change the following into positive degree.
 "Ali is one of the cleverest boys in the class."
 a) Ali is cleverer than any other boy in the class
 b) No other boy is so clever as Ali in the class
 c) Ali is cleverer than many other boys in the class
 d) Very few boys in the class are as clever as Ali
- 4. Change the following into comparative degree.
 "No other student in the class writes so fast as Arjun."
 a) Arjun writes faster than many other students in the class
 b) Arjun's writing is the fastest of all students in the class
 c) Arjun writes faster than any other student in the class
 d) Very few students writes faster than Arjun.
- 5. Change the following into superlative degree.
 "Aurangzeb was greater than many other Indian Kings."
 a) No other Indian King is so great as Aurangzeb.
 b) Very few Indian Kings were as great as Aurangzeb
 c) Aurangzeb is greater than any other Indian Kings
 d) Aurangzeb was one of the greatest of Indian Kings
- 6. Change the following into positive degree."Radhika is one of the most brilliant girls in the class."a) Very few girls in the class are as brilliant as Radhikab) Radhika is more brilliant than most other girls in the class
 - c) No other girl in the class are as brilliant as Radhika
 - d) Radhika is more brilliant than any other girl in the class

- 7. Change the following into comparative degree.
 "No other man was so strong as Dara Singh in his youth."
 a) Dara Singh was stronger than many other men in his youth
 b) Dara Singh was stronger than any other in his youth
 c) Very few men were as strong as Dara Singh in their youth
 d) Dara Singh was strongest man in his youth
- Change the following into superlative degree.
 "This market is more fashionable than any other market in the town."

 a) No other market is so fashionable as this market in the town
 b) This market is more fashionable than many other markets in the town
 c) Very few markets are as fashionable as this market in the town
 d) This is the most fashionable market in the town

 9. Change the following into positive degree.
 - "Bilal was the tallest of all the student in his class."
 - a) Bilal was taller than any other student in his class
 - b) Bilal was taller than many other students in his class
 - c) No other student was as tall as Bilal in his class
 - d) Very few students in the class were as tall as Bilal

Keys

1. C 2. B 3. D 4. C 5. D 6. A 7. B 8. D 9. C

9. DIRECT AND INDIRECT SPEECH

| Reported Speech: Direct and Indirect speech | | | | | | | | |
|---|-------------------------------------|--------------------|---|--|--|--|--|--|
| There are four catego | There are four categories: They are | | | | | | | |
| (i) No modificati | on of tense / person | | | | | | | |
| (ii) Modification | of person | | | | | | | |
| (iii)Modification | of verb / person / ad | lverbial | | | | | | |
| (iv)Modification of structure / pattern in questions / commands / requests / greetings. | | | | | | | | |
| Direct: What p | people actually say. | | | | | | | |
| Indirect: When | what someone said | is reported. | | | | | | |
| Case (i): No mo | odification of tense / | person: | I | | | | | |
| Direct | | | Indirect | | | | | |
| Quadeer says, | "Swamy has passed | d." | Quadeer says Swamy has passed | | | | | |
| Case (ii): | | | | | | | | |
| She says, " <u>I ar</u> | <u>n</u> fine today." | She says <u>sl</u> | <u>he is</u> fine today. | | | | | |
| He says, " <u>I</u> wa | as fine yesterday." | He says <u>he</u> | says <u>he</u> was fine yesterday. | | | | | |
| The pronouns | are changed as | | | | | | | |
| I, me, my | \rightarrow he, | him, his, sł | ie, her | | | | | |
| We, us our | \rightarrow they | y, them, the | ir | | | | | |
| You, your | \rightarrow I, m | ne, my; we, | us, our | | | | | |
| Case (iii): Modif | ication <u>verb / persor</u> | n and adver | bial indirect | | | | | |
| Direct | | Indir | rect | | | | | |
| Balu said, T a | m fine today." | Balu | Balu said he was fine that day | | | | | |
| Beena said, "I | was fine yesterday. | " Been | Beena said she had been fine the day before | | | | | |
| She said, "My | journey would beg | in". She s | She said her journey would begin | | | | | |

The following changes takes place <u>in tenses</u>:

Present \rightarrow past

Present perfect \rightarrow past perfect

| Simple past | \rightarrow | past perfect |
|-------------------|---------------|-----------------------------------|
| Past perfect | \rightarrow | past perfect |
| <u>In modals:</u> | | |
| can, shall, wil | ll, may, | must> could, should, would, might |
| In adverbials: | | |
| here | \rightarrow | there |
| now | \rightarrow | then |
| next week | \rightarrow | the following week |
| yesterday | \rightarrow | the day before |
| tomorrow | \rightarrow | the next day |
| ago | \rightarrow | before ^ |
| | | |

Case (iv): Modification <u>structure / pattern</u> in questions, commands

| Direct | Indirect |
|--|--|
| She asked, "What is the time." | She asked what the time was. |
| Shyam asked, "Are the boys here?" | Shyam asked whether the boys were there |
| Sir asked, "Where <u>were</u> you?"
Can you see me tomorrow?" he asked me | Sir asked where I had been.
He asked me whether I <u>could</u> see him the <u>next day.</u> |
| 'Hello! How are you?" she said. | She greeted me and asked me how I was. |
| I said, "Go home". | I asked him to go home. |
| | I told him to go home. |

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Say is used to introduce direct quotation.

Eg.: He said he was going to Sania's match.

Tell is used rarely with direct quotation, *(tell* has an indirect object expressed)

Eg.: tell (someone) something.

| tell (|) about something |
|--------|-----------------------------|
| tell (|) where / when / what / who |
| tell (|) how something happened |
| tell (|) why something happened |
| tell (|) to do something |
| tell (|) that |

Commands:

......toldtoaskedtoorderedto

Requests:asked......to

Questions:asked whether / if...... **Statements:**

.....said

.....told

Some reporting verbs:

| admit | complain | inform | report |
|----------|----------|----------|----------|
| agree | confess | insist | say |
| allege | combine | maintain | suggest |
| announce | declare | mention | swear |
| argue | deny | notify | threaten |
| ask | disagree | persuade | warn |
| assure | explain | predict | wonder |
| boost | hint | promise | |
| claim | indicate | remind | |

Exercise

Directions: In each of the following questions, a sentence has been given in Direct Speech. Out of four alternatives suggested, select the one which best expresses the same sentence in Indirect Speech.

1. He said, "I cannot help you at present because I am myself in difficulty":

- (A) He said that I cannot help you at present because I am myself in difficulty.
- (B) He said that he could not help you at present because he was himself in difficulty.
- (C) He told that he could not help you at present because he was himself in difficulty.
- (D) He asked that he could not help you at present because he was himself in difficulty.

2. He says, "I don't want to play any more":

- (A) He says that he doesn't want to play any more.
- (B) He says that I don't want to play any more.
- (C) He says that I didn't want to play any more.
- (D) He says that he didn't want to play any more.

3. Kazim said. "We shall go to see the Taj in the moonlit night":

- (A) Kazim said that we shall go to see the Taj in the moonlit night.
- (B) Kazim told that we shall go to see the Taj in the moonlit noght.
- (C) Kazim told that we should go to see the Taj in the moonlit night.
- (D) Kazim said that they should go to see the Taj in the moonlit night.

4. The teacher said, "The Earth moves round the Sun":

- (A) The teacher said that the Earth moves round the Sun.
- (B) The teacher asked that the Earth moves round the Sun.
- (C) The teacher told that the Earth moved round the Sun.
- (D) The teacher told that the Earth has moved round the Sun.

5. Rajan said, "The matter shall be decided here and now":

- (A) Rajan said that the matter should be decided there and then.
- (B) Rajan said that the matter shall be decided here and now.
- (C) Rajan said that the matter should be decided here and now.
- (D) Rajan said that the matter shall be decided there and then,

6. He said, "I saw her the day before yesterday":

- (A) He said that he had seen her two days before.
- (B) He said that I saw her the day before yesterday.
- (C) He said that he saw her the day before yesterday.
- (D) He said that he had seen her the day before yesterday.

7. Richard said, "Where does she live ?":

- (A) Richard said that where does she live
- (B) Richard asked that where does she live
- (C) Richard asked where she lived
- (D) Richard asked where did she live

8. He said, "Will you be there tomorrow?":

- (A) He asked if she would be there the next day
- (B) He asked if she would be there tomorrow
- (C) He asked whether she would be there tomorrow
- (D) He asked that would you be there the next day

9. She said, "When shall I know the result of the Test?":

- (A) She said that when she would know the result of the test
- (B) She told when she would know the result of the test
- (C) She asked that when she would know the result of the test
- **(D)** She asked when she would know the result of the test

10. Rashid said, "Are these mangoes sweet?":

- (A) Rashid told that these mangoes were sweet
- (B) Rashid told if these mangoes were sweet
- (C) Rashid asked if those mangoes were sweet
- (D) Rashid asked if these mangoes were sweet

11. He said, "How can I help in these circumstances?":

- (A) He told that how could I help in these circumstances
- (B) He asked how he could help in those circumstances
- (C) He asked how he could help in these circumstances
- (D) He told how he could help in those circumstances

12. He said to Suresh, "Why did you enter my house without taking my permission ?":

- (A) He told Suresh why you had entered my house without taking my permission
- (B) He asked Suresh why you had entered my house without taking my permission
- (C) He asked Suresh that why you had entered my house without taking my permission
- (D) He asked Suresh why he had entered his house without taking his permission

13. Manohar said, "What have been searching for all these hours":

- (A) Manohar told that what you had been searching for all these hours
- (B) Manohar said that what you had been searching for all these hours
- (C) Manohar asked what I had been searching for all those hours
- (D) Manohar asked what I have been searching for all these hours

14. "Don't swim out too far, boys," I said:

- (A) I warned the boys not to swim too far
- (B) I said the boys not to swim too far
- (C) I proposed the boys not to swim too far
- (D) I asked the boys not to swim too far

15. My father said to me, "Speak the truth and be noble":

- (A) My father said to me to speak the truth and be noble
- (B) My father forbade me to speak the truth and be noble
- (C) My father ordered to me to speak the truth and be noble
- (D) My father advised me to speak the truth and be noble

16. He said, "Let us go for the morning walk":

- (A) He proposed us to go for the morning walk
- (B) He ordered us to go for the morning walk
- (C) He proposed that they should go for the morning walk
- (D) He ordered that they should go for the morning walk

17. Raju said, "Alas! I am ruined":

- (A) Raju said that I am ruined
- (B) Raju cried with grief that I am ruined

- (C) Raju cried with grief that he was ruined
- (D) Raju said with grief that he was ruined

18. My mother said, "May Heaven bless you!":

- (A) My mother said that Heaven might bless you
- (B) My mother wished that Heaven may bless you
- (C) My mother wished that Heaven might bless him
- (D) My mother told that Heaven might bless him

19. He said, "What a dreadful idea !":

- (A) He exclaimed that what a dreadful idea
- (B) He exclaimed that it was a dreadful idea
- (C) He exclaimed that it is a dreadful idea
- (D) He exclaimed it was a dreadful idea

20. The Captain said, "Let us play a friendly match":

- (A) The Captain told us to play a friendly match
- (B) The captain asked us to play a friendly match
- (C) The captain proposed us to play a friendly match
- (D) The Captain proposed that we should play a friendly match

KEY

| 1.B | 2. A | 3.D | 4. A | 5. A | 6.A | 7. C | 8. A | 9.D | 10.C |
|------|-------------|------------|-------------|-------------|------|-------------|--------------|------|-------------|
| 11.B | 12.d | 13.c | 14.A | 15.D | 16.C | 17.C | 18. C | 19.B | 20.D |

Exercise

- Change the following into indirect speech.
 "Can I take your book?" he asked.
 a) He said to me that he can take my book
 b) He told me that I had taken his book
 c) He asked if he could take my book
 d) He requested me to take my book
- 2. Change the following into direct speech.
 "He asked me what I was doing."
 a) He said to me, "What were you doing."
 b) "What have you been doing?" he asked me
 c) He said to me, "what did you do?"
 d) He said to me, "What are you doing?"
- 3. Change the following into indirect speech.
 She said to him, "Bravo! You have done well."
 a) She applauded him, saying that he had done well.
 b) She told him that he did well
 c) She confused him, saying that he did well
 d) She told him that has done well

- 4. Change the following into direct speech. "He asked me whether I was a fool." a) He said to me, "were you a fool?" b) He said to me, "Are you a fool?" c) He said to me, "Have you been a fool?" d) He said to me, "Are you not a fool?" 5. Change the following into indirect speech. "God is everywhere," Said child Prahlada. a) Child Prahlada said that God was everywhere b) Child Prahlada enquired whether God is everywhere c) Child Prahlada said that God is everwhere d) Child Prahlada said that God will be everywhere 6. Change the following into direct speech. "He said that I had to see his brother the following week." a) He said to me, "You have seen my brother this week." b) He said to me, "Did you see my brother this week?" c) He said, "I have to see you brother next week." d) He said, "You have to see my brother next week." 7. Change the following into indirect speech. "You are cute." Zainab said to me. a) Zainab asked me whether I was cute b) Zainab told me (that) I was cute c) Zainab said to me that I am cute d) Zainab told me (that) you were cute 8. Change the following into direct speech. "She observed that it was a horrible scene." a) She said, "What a horrible scene!" b) She said, "It is being a horrible scene." c) "It will be a horrible scene." She said. d) "Is it a horrible scene?" She said. 9. Change the following into indirect speech. "She said, "Who is your friend?" a) She asked me who my friend was. b) She asked me who my friend is. c) She asked me who was my friend. d) She asked me who is my friend 10. Change the following into direct speech. "He inquired who those people would be ready for lunch." a) He inquired, "Are these people ready for lunch?" b) He asked me "Are people ready for lunch?" c) He asked me "When were these people ready for lunch?" d) "When will these people ready for lunch?" he inquired.
- 11. Change the following into indirect speech."She said, "Please give me a glass of water."

- a) She asked me to give a glass of water
- b) She requested to give her a glass of water
- c) She inquired if I could give her a glass of water.
- d) She asked me if I could give her a glass of water.
- 12. Change the following into direct speech.
 "He announced that they had selected Adil as their leader."
 a) He said, "We will select Adil as our leader."
 b) He announced: "We have selected Adil as our leader."
 c) He said, "We had selected Adil as our leader.
 - d) He announced: "We select Adil as our leader."
- 13. Change the following into indirect speech."She said, I shall definitely help you."a) She said that she would definitely help meb) She said that she should definitely help mec) She said that she will help med) She said that she has to help me.
- 14. Change the following into direct speech.
 - "Kiran told me that I was not learning English seriously."
 - a) Kiran asked me, "you were not learning English seriously."
 - b) Kiran said to me, "Were you learning English seriously?"
 - c) Kiran said to me, "Have you been learning English seriously?"
 - d) Kiran said to me, "You are not learning English seriously."
- 15. Change the following into indirect speech.
 - "I said to him, "Did you go to college yesterday?"
 - a) I asked him whether he went to college the previous day.
 - b) I asked him whether he would go to college yesterday.
 - c) I asked him whether he had gone to college the previous day.
 - d) I asked him whether he has gone to college the previous day

Keys

| 1. | С | 2. 1 | D | 3. | Α | 4. | B | 5. | С | 6. | D | 7. | В | 8. | Α | 9. | Α | 10. D |
|-----|---|-------|---|-----|---|-----|---|-----|---|----|---|----|---|----|---|----|---|--------------|
| 11. | B | 12. l | B | 13. | Α | 14. | D | 15. | С | | | | | | | | | |

10. ACTIVE AND PASSIVE VOICE

Actives: Performs an action

- **Passives:** (1) not active
 - (2) it doesn't perform an action
 - (3) the agent is not mentioned as it is either unknown or is too obvious
 - (4) It is not a necessary piece of information.

| Present & Past | Active | Passive |
|-----------------|-----------------------------------|------------------------------------|
| Simple present | I repair batteries | Batteries are repaired |
| | Sandhya prepares slides | The slides are prepared Sandhya. |
| | No one invites me to the parties | I am never invited to the parties |
| | How do they prepare laddoos? | How laddoos are prepared? |
| Simple past | Someone stole my cell phone! | My cell phone was stolen. |
| | She hid my slides somewhere | My slide was hidden by her. |
| | When did they build this | When was this building built? |
| | building? | |
| Present | The government is building an | The airport is being built |
| continuous | airport | |
| | Narne's are making plots near | Some plots are being made by |
| | Uppal | Name's near Uppal. |
| Past continuous | When I cam here last year, the | When I came here last year, |
| | were supplying material | material was being supplied |
| Present perfect | We have prepared material. | The material has been prepared. |
| | She has prepared sweets. | Sweets have been prepared by her. |
| | I have recorded your suggestion | Your suggestions have been |
| | | recorded. |
| | But I have not passed them to | Your suggestions have not been |
| | Sir. | passed to Sir |
| Past Perfect | You said someone had stolen | You said your clip had been stolen |
| | your clip | |
| Other cases | Ramesh would repair the OHP | The OHP would be repaired by |
| | | Ramesh |
| | I hope you would invite me to | I hope I would be invited to the |
| | the party | party |
| | You can't spoil my car | My car can't be spoilt |
| | You should not store sweets | Sweets should not be stored |
| | I am planning to change my | My vehicle is going to be changed |
| | vehicle | |
| | She has to warn him | He has to be warned |
| | We had to take the intelligent to | The intelligent man had to be |
| | the psychiatrist | taken to the Psychiatrist. |

Exercise

Directions: A sentence has been given in Active/Passive Voice. Out of the four alternatives suggested below, select the one which best express the same sense in Passive/Active Voices.

1. You surprise me:

- (A) I am to be surprised.
- (B) You are surprised
- (C) I am surprised by you
- (D) He is surprised

2. The boys killed the snake with a stick:

(A) The snake was killed by the boys with a stick.

- (B) A stick was killed by the boys with a stick.
- (C) A snake with a stick was killed by the boys.
- (D) A snake is killed by the boys with a stick.

3. He was obliged to resign :

- (A) He was make to resign
- (B) To resign was his obligation
- (C) Circumstances obliged him to resign
- (D) Resignation obliged him

4. Why did you not agree to my proposal ?

- (A) Why was my proposal not agreed to ?
- (B) Why was my proposal not agreed by you ?
- (C) Why my proposal was not agreed to by you ?
- (D) Why was my proposal not agreed to by you ?

5. Do you understand what I mean ?

- (A) What I mean is that understood by you?
- (B) Was what I mean understood by you ?
- (C) Is what I mean understood by you ?
- (D) What I mean is understood by you ?

6. Whom does he look for ?

- (A) Whom he is looked after for ?
- (B) Who is looked after for him?
- (C) Who is looked for by him?
- (D) Whom he is looked after by ?

7. People speak English all over the world:

- (A) English is spoken all over the world.
- (B) English was spoken all over the world.
- (C) English was spoken by people.
- (D) English is spoken by people.

8. Who gave you permission to enter ?

- (A)By whom were you given permission to enter?
- (B) By whom was you given permission to enter ?
- (C) By whom you were given permission to enter?
- (D) By whom were given you permission to enter ?

9. The reporter was interviewing the political leaders:

- (A) The political leaders were being interviewed by the reporter.
- (B) The political leaders was being interviewed by the reporter.
- (C) The political leaders are being interviewed by the reporters.
- (D) The political leaders is being interviewed by the reporter.

10. You should follow all the instructions carefully :

- (A) All the instructions are carefully followed by us.
- (B) All the instructions were carefully followed by us.
- (C) All the instructions should be carefully followed by you.
- (D) All the instructions can be carefully followed by us.

11. We waste much time on trifles :

- (A) Much time was wasted on trifles.
- (B) Much time will be wasted on trifles.
- (C) Much time is wasted by us on trifles.
- (D) Much time is wasted on trifles.

12. The boy has rung the bell :

- (A) The bell has been rung by the boy.
- (B) The bell was being rung by the boy.
- (C) The bell was rung by the boy.
- (D) The bell has been being rung by the boy.

13. The telegraph wires have been cut :

- (A) Someone has been cut the telegraph wires.
- (B) No one has cut the telegraph wires.
- (C) The telegraph wires have cut someone.
- (D) Someone has cut the telegraph wires.

14. The people elected the Mayor :

- (A) Him was elected Mayor the people.
- (B) He was elected Mayor by the people.
- (C) Mayor is elected by the people.
- (D) He is elected by the people Mayor.

15. Don't laugh at me :

- (A) Let me be laughed at
- (B) Let be me not laughed at
- (C) I am laughed at
- (D) Let me be not laughed at

16. They pick the flowers fresh every morning :

- (A) The fresh flowers are picked every morning by them
- (B) The flowers are fresh and picked every morning by them
- (C) The flowers are picked fresh every morning by them
- (D) The picked flowers are fresh every morning by them

17. Has the price rise affected all the people ?

- (A) Have all the people been affected by the price rise ?
- (B) Are all the people being affected by the price rise?
- (C) Had all the people being affected by the price rise ?
- (D) Are all the people affected by the price rise ?

18. Cigarette smoking causes two million deaths annually in the industrial states :

- (A) Cigarette smoking has been causing two million deaths annually in the industrial states
- (B) Two million deaths are caused annually by cigarette smoking in the industrial states
- (C) Two million deaths are being caused by cigarette smoking annually in the industrial states
- (D) Two million deaths have been caused annually by cigarette smoking in the industrial states

19. Don't speak until someone speaks to you :

- (A) Don't speak until you are spoken to
- (B) Don't speak until someone is spoken to
- (C) Don't speak until you have been spoken to
- (D) Don't speak until someone has been spoken to

20. The principal kept the staff members waiting :

- (A) The staff members were kept waiting for the principal
- (B) The staff members were kept waiting by the principal
- (C) The staff members were waiting for the principal
- (D) The staff members were being kept waiting for the principal

KEY

| 1.C | 2.A | 3.C | 4.B | 5.D | 6.C | 7.A | 8.A | 9.A | 10.C |
|------|------|------|------|------|------|------|------|------|------|
| 11.C | 12.A | 13.D | 14.B | 15.D | 16.A | 17.A | 18.B | 19.B | 20.B |

Practice Test

| 1. | "With what were you pleased so much?" | 'The active form of this sentence is |
|-----|--|--|
| 2. | a) What pleases you so much?c) What pleased you so much?"Help the poor." The passive form of the | b) What had pleased you so much?d) By what were you pleased so much?is sentence is |
| | a) The poor had to be helped by youc) The poor were to be helped by you | b) The poor should be helpedd) The poor has to be helped |
| 3. | "I have been pleased with you honesty."
a) Your honesty have pleased me
c) Your honesty has been pleasing me | The active form of this sentenceb) Your honesty had pleased med) Your honesty has pleased me |
| 4. | Which is the passive form?
a) Let not the student be beaten
c) Let him bring the book | b) Love your mother tongued) He cannot carry this heavy bag |
| 5. | Which is the active form?
a) She was seen to jump the ditch
c) Your brother is known to me | b) There is no time to be wastedd) Does he love books? |
| 6. | Choose the correct passive form for "Ev
a) Everyone is known that he is a great s
b) He is known to be a great scholar
c) He is a great scholar to be known by a
d) A great scholar is known by everyone | eryone knows that he is a great scholar."
scholar
everyone |
| 7. | Choose the correct active form for "Too
a) Animals are not able to make tools
c) Animals cannot make tools | ls cannot be made by animals."
b) Animals are able to make tools
d) Animals had not made tools |
| 8. | Identify the passive form.
a) Who broke the glass?
c) He refused her admission | b) Have the door been shut?d) Has the door been shut? |
| 9. | Identify the active form.
a) One should keep one's promises
c) Promises must be kept | b) Promises should be keptd) Promises have to be kept |
| 10. | "Kites were being flown by some stuis | dents." The active form of this sentence |
| | a) Some students were flying kitesc) Some students have been flying kites | b) Some students are flying kitesd) Some students had been flying kites. |

- 11. "Why did your father give such a rude reply?" The passive form of this sentence is...
 - a) Why such a rude reply given by your father?
 - b) Why such a rude reply have been given by your father?
 - c) Why is such a rude reply given by your father?
 - d) Why was such a rude reply given by your father?
- 12. Identify the correct passive form.a) She was refused admissionb) She will have refused admissionc) She will be refusing admissiond) She refused admission by them
- 13. Identify the correct active form.
 a) It was not killed by him
 b) They are known to me
 c) We made them run away
 d) By whom have you been asked?

14. Identify the passive form.a) Have you shut the door?b) I was let goc) I forgave them their faultd) He let me go

- 15. Identify the incorrect passive form.a) Good human beings will be blessed by Godb) Let the order be givenc) Whom was he taught Urdu?d) Is Kiran helped by him?
- 16. Identify the incorrect active form.
 - a) Do not defend that man
 - b) He wants to recognized as a great scholar
 - c) We were disappointed at his behavior
 - d) Let her bring the dictionary now
- 17. "The balcony is being painted by Ahmed." The active form of this sentence is....
 - a) Ahmed is painting the balcony
 - b) Ahmed was painting the balcony
 - c) Ahmed had been painting the balcony
 - d) Ahmed has been painting the balcony
- 18. "Arjun gave her a dictionary." The passive form of this sentence is....
 - a) A dictionary is given to her by Arjun
 - b) She has been given a dictionary by Arjun
 - c) She was being given a dictionary by Arjun
 - d) A dictionary was given to her by Arjun
- 19. "Paint the doors." The passive form of this sentence is.....
 - a) Doors should be painted b) Let the d
 - c) Doors have to be painted
- b) Let the doors be painted
 - d) Doors are to be painted

| 20. | "No one has defeated her in chess so far." The passive form of this sentence isa) She had not been defeated by anyone in chess so farb) She was not defeated by any one in chess so farc) She was not being defeated by any one in chess so fard) She has not been defeated by anyone in chess so far | | | | | |
|-----|--|--|--|--|--|--|
| 21. | "He was not crowned king by them." Change into active voice. | | | | | |
| | a) They don't make him kingc) They did not crown him king | b) They don't crown him kingd) They don't consider him king | | | | |
| 22. | "You must understand that people will frown upon such a thing."Change into passive voice.a) Such a thing will be frowned upon by peopleb) Such a thing is being frowned upon by peoplec) To understand that such a thing is being frowned upon by peopled) It must be understood that such a thing will be frowned upon by people | | | | | |
| 23. | Identify the passive form
a) One should keep one's promises
b) A clause of compensation is included
c) No one has informed me about it | in the contract
d) Your manners have pleased me | | | | |
| 24. | "Feed the child." Change into passive voa) The child should be feededc) The child is being fed by her | bice
b) The child should be fed
d) The child must be feeded by you | | | | |
| 25. | "The house was covered in dirt." Change
a) Dirt covered the house
c) Dirt covers the house | e into active voice.
b) Dirt is covering the house
d) Dirt will cover the house | | | | |

Keys

| 1. C | 2. B | 3. D | 4. A | 5. D | 6. B | 7. C | 8. D | 9. A | 10. A |
|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| 11. D | 12. A | 13. C | 14. B | 15. C | 16. B | 17. A | 18. D | 19. B | 20. D |
| 21. C | 22. D | 23. B | 24. C | 25. A | | | | | |

11. CORRECTION OF SENTENCES (Rules & Example),

Correction of nouns: A noun is a naming word. It is the name of a person, thing, animal etc.

- <u>Rule 1</u>: there are some nouns which are used only in the plural form.
 - Eg.: Biceps doldrums earnings gymnastics outskirts shorts -spectacles scissors trousers
- Rule 2: some are always used in plural Eg.: cattle - police - people
- <u>Rule 3</u>: when the noun is plural, and ends in s; the possessive case is formed by adding apostrophe after s

Eg.: teachers' association engineers' association

<u>Rule 4</u>: when the noun is plural but does not end in s, the possessive case is formed by adding s

Eg.: fishermen's co-op societies Washermen's societies

<u>Rule 5</u>: the possessive case of a compound noun will be formed by adding s to the last word.

Eg.: mother - in -law's house Brother- in-law's house

Correct usage of pronouns: A pronoun is a word used in the place of a noun.

- <u>Rule l</u>:when two singular nouns are joined by 'and' and are preceded by 'each' or 'every' the pronoun must be in singular number.
 - Eg.: every boy and girl took <u>his or her</u> time.
- Rule 2:when a singular noun and a plural noun are combined by 'or'; 'either....or'; 'neither....nor', the singular noun comes first in the sentence and the pronoun must be in the plural.
 - Eg.: Either the principal or the lecturers failed in <u>their</u> duty in controlling the ragging in the college.

<u>Rule 3</u>: one is used for people in general

Eg.: One must try to do <u>one's</u> duty.

Correct use of adjectives:

<u>Rule 1</u>:Most adjectives form their comparatives by the addition of -r,-er and their superlative by the addition of -st,-est to the positive

| positive | comparative | superlative |
|----------|-----------------------------------|--|
| Great | greater | greatest |
| Brave | braver | bravest |
| | positive
Great
Brave | positivecomparativeGreatgreaterBravebraver |

<u>Rule 2</u>: some adjectives form their comparative by using the adverb 'more' with the positive and the superlative by using the adverb 'most' with the positive

| Eg.: positive | comparative | superlative | | |
|---------------|------------------|------------------|--|--|
| Beautiful | more beautiful | most beautiful | | |
| Interesting | more Interesting | most interesting | | |

Rule 3: superior, senior, junior, inferior, prefer etc are followed by 'to' and not 'than'

Eg.: I prefer coffee than tea(unacceptable) I prefer coffee to tea (acceptable)

| <u>Rule 4</u> : positive | comparative | superlative |
|--------------------------|-------------|-------------|
| Few | fewer | fewest |
| Little | less/lesser | least |

Correction of adverbs: An adverb is a word which modifies a verb,/adjective/adverb

<u>Rule l</u>:the word 'only' should be placed before the word it is intended to modify.

Eg.: Only he gave me the notes (he and nobody else) He only told me the truth (and nothing else) He solved only two problems (incorrect) He only solved two problems, (correct)

<u>Rule 5</u>: position of adverbs

He 'always' goes to office on foot. He 'often' visits Mumbai. He never smokes.

Correct use of the verb:

<u>Rule 1</u>: When two subjects are joined by 'and' the verb is plural.

- Eg.: My aunt and her son are in Hyderabad.
- <u>Rule 2</u>: If two different singular nouns express 'one idea' the verb should be in the singular form.
 - Eg.: Bread and jam <u>is g</u>ood for kids.

Rice and dal is his favourite lunch.

- <u>Rule 3</u>: If two singular subjects (combined by and) are preceded by 'each' or 'every' the verb should be in the singular.
 - Eg.: Every boy and girl <u>was</u> present in the class <u>yesterday</u>.

Correct use of prepositions:

<u>Rule 1</u>: A preposition is placed at the end of a sentence in the following ways Eg.:

- a) Here is the book that you are looking 'for'.
- b) This is the person whom I spoke 'about'.
- c) This is the person you spoke 'to'.
- d) What are you looking 'at'?
- e) Do you have a chair to sit 'on'?
- f) He is known all Hyderabad 'over'.

<u>Rule 2</u>: A preposition is used at the beginning of an interrogative sentence.

Eg.: 'In' which city you live ?

'To' whom are you referring ?

<u>Rule 3</u>: There are some words with prepositions which require gerunds after them.

| Eg.: | refrain from | abstain from fi | |
|------|--------------|-----------------|-------------------|
| | Addicted to | in | Disqualified from |
| | Expert in | from | tired of |
| | Capable of | of | Fond of |
| | Insist on | | |

<u>Rule 4</u>: In and within:

- a) 'in' refers to the end of a period of time usually in the future. Eg.: He will return in a month, (at the end of one month)
- b) 'within' means before the end of a period of time.Eg.: He will return within a month, (he may come after two weeks also)

Rule 5: In and into

- a) 'in 'indicates rest/motion inside anything.
 - Eg: he is walking in the garden. She is watching television in the hall He is in the kitchen.
- b) 'into' means motion towards the inside of ...
 - Eg.: He walked <u>into</u> the garden.
 - Thieves broke <u>into</u> the house of a police officer.

<u>Rule 6</u>: On is used (things at rest)

- i) He sat on a small stone.
- ii) On Saturday / on the 24 of April
- iii) He lives on his parents pension.

<u>Upon is used (things in motion) i)</u> The man sprang <u>upon</u> the tiger.

Rule 7: Beside and besides

Beside means 'by the side of

Eg.: My house is beside the snow world.

Besides means in addition to /moreover

Eg.: There are ten lecturers in the Department of English besides the Head of the Department.

Rule 8: Between and among

Between is used for two persons/things

Eg.: Parents distribute anything equally <u>between</u> the two children.

Among is used for more than two persons/things.

Eg.: The students were fighting among themselves for the material.

12. VOCABULARY (Idioms — One word substitutes — Synonyms — Antonyms)

Exercise 1 IMPORTANT ENGLISH IDIOMS

The following list presents a collection of important idioms employed most frequently in written and spoken English today. The list contains only pure idioms *i.e.* fixed expressions whose meanings are quite different from the literal sense of the words semi-idioms, phrasal verbs and proverbs are not included in the list.

| AtoZ | : | thoroughly and completely | | |
|---|---|---|--|--|
| ABC of | : | the basic facts or principles of | | |
| Acid test | : | a decisive test of ability, etc. | | |
| Add fuel to the flames | : | increase anger on any other | | |
| Alice in wonderland | : | very strange | | |
| All in all | : | on the whole | | |
| Apple of one's eye | : | greatly loved person | | |
| At loggerheads | : | quarrelling | | |
| At one's wit's end | : | very confused | | |
| At the eleventh hour | : | at the last possible moment | | |
| Be not cricket | : | not fair or correct | | |
| Beat about the bush | : | approach a matter in a roundabout way; speak indirectly | | |
| Bed of roses | : | an easy, luxurious life | | |
| Bell the cat | : | undertake the dangerous act in a course of action | | |
| Below the belt | : | unfair | | |
| Between the devil and the deep blue sea | : | between two equally serious evils or dangers | | |
| Bite off more than one can chew | : | undertake more than one is able to perform | | |
| | | | | |

| Black list | : | list of persons or organizations regarded as untrustworthy |
|---|---|--|
| Black sheep (of a family) | : | disreputable member |
| Bolt from the blue | : | sudden, unexpected misfortune |
| Bone of contention | : | a cause of quarrelling |
| Blow one's own trumpet | : | praise one's own abilities |
| Born with a silver spoon in one's mouth | : | have wealthy parents |
| Break the ice | : | put an end to formality by putting people at ease |
| Burn the candle at both ends | : | dangerously exhaust one's energies by overworking in two different directions. |
| Burn one's fingers | : | come to harm by rash meddling in an affair |
| Burn the midnight oil | : | work very late especially to study |
| By leaps and bounds | : | very quickly |
| Call a spade a spade | : | speak plainly and directly |
| Carrot and the stick | : | reward and punishment |
| Castles in the air | : | dreams or hopes that are unlikely to become reality |
| Change horses in midstream | : | change one's opinions in the middle of something. |
| Chip off the old block | : | a person who is very like one of his parents, especially his father |
| Cock and bull story | : | an incredible story |
| Close shave | : | danger just avoided |
| Cook up | : | prepare scheme to deceive |
| Cool as a cucumber | : | behave calmly in a dangerous situation. |
| Cry wolf | : | to give a false warning of danger |

| Cut corners | : | economize; take a short cut |
|---|---|---|
| Cut one's coat according to one's cloth | : | live within one's income |
| Dead wood | : | something that is no longer useful |
| Deliver the goods | : | achieve desired results |
| Dog in the manger | : | a person who stops others from doing or
enjoying something that he does not use
himself |
| Doubting Thomas | : | a person noted for his disbelief |
| Down and out | : | without a job or other means of support |
| Drag one's feet | : | act very slowly |
| Drop in the ocean | : | very small amount |
| Dutch treat | : | dinner or entertainment at which person pays for himself |
| Eat one's cake and have it | : | have the advantages of something without
the disadvantages that go with it |
| Eat one's words | : | take back a statement |
| Every Tom, Dick and Harry | : | everyone and anyone |
| Face the music | : | face difficulties arising from something one has done |
| Feather one's nest | : | to make profit in a dishonest way |
| Fiddle while Rome burns | : | behave frivolously in a situation which calls for concern |
| Fish in troubled waters | : | try to gain an advantage from a confused state of affairs |
| Fight tooth and nail | : | fight with great determination |
| Fish out of water | : | a person situated uncomfortably outside his usual environment |
| Fool's paradise | : | imaginary joy without reason |

| Fly a kite | : | spread stories, suggestions to find out opinions |
|----------------------------------|---|--|
| Flash in the pan | : | something that only lasts for a very short time |
| Free lance | : | person who acts independently |
| Get cold feet | : | become nervous |
| Gift of the gab | : | facility in speaking |
| Give the cold shoulder | : | ignore / shun |
| Give the green light | : | give permission |
| Give chapter and verse | : | cite and precise reference for a statement |
| Give the devil his due | : | do justice to a person one dislikes by admitting a point in his favour |
| Go through fire and water | : | endure extreme difficulties, danger |
| Grass roots | : | the basic level |
| Guinea pig | : | person used as a subject in medical or other experiments |
| Hand in glove with | : | in close relation with |
| Hard nut to crack | : | a difficult problem to solve |
| Hat trick | : | triple success |
| Have one's tongue in one's cheek | : | say one thing and mean another |
| Have a thick skin | : | be insensitive |
| Have the last laugh | : | be victorious at the end of an argument |
| Have at one's fingers ends | : | be thoroughly expert in a subject far superior |
| Head and shoulders above | : | work requiring great effort |
| Herculean task Hit the jackpot | : | to win a lot of money or to have great success |

| Hit below the belt | : | behave / fight unfairly |
|--|---|--|
| Hit the nail on the head | : | say the exact thing |
| Hold the fort | : | look after a business while the person who is unusually in charge is absent. |
| Hob son's choice | : | no choice at all |
| Hold out an olive branch | : | show that one is ready to make peace |
| Hold water | : | be reliable when tested |
| Hornet's nest | : | lot of trouble |
| Hot water (be in / bet into) | : | Trouble |
| In a nut shell | : | in a few words |
| In black and white | : | in writing |
| In cold storage | : | stored safely until needed |
| In the red | : | in debt |
| In the long run | : | Finally |
| In the soup | : | in trouble |
| In the doldrums | : | Depressed |
| Ins and outs | : | intricacies and complications |
| Ivory tower | : | cut off from realities of life |
| Jack of all trades | : | a person who has the ability to do different
kinds of work but none of it very well |
| Jaundiced eye | : | prejudiced outlook |
| Jekyll and Hyde | : | a person who shows two completely different natures |
| Jet set | : | rich and fashionable group of people interested only in enjoyment |
| Jump from the frying pan into the fire | : | in trying to escape from one difficulty find oneself in a worse one |

| Jump the queue | : | obtain something before one's proper turn is due |
|---|---|--|
| Keep abreast of | : | be up to date in knowledge |
| Keep at arm's length | : | not become too friendly |
| Keep one's fingers crossed | : | hope that nothing will go wrong |
| Kick the goose that lays the golden eggs | : | destroy the source of benefit |
| Kill two birds with one stone | : | with one action accomplish two different purposes |
| Know one's onions | : | be experienced |
| Labour of love | : | a job done with pleasure with no expectation of reward |
| Late for one's own funeral | : | always late |
| Laughing stock | : | a person who is regarded with scornful laughter |
| Law of the jungle | : | situation of violence or fierce competition in
which no civilized laws are observed |
| Lead by the nose | : | control completely |
| Leave no stone unturned | : | spare no effort |
| Lionize | : | treat as a celebrity |
| Lion's share | : | the largest part |
| Live from hand to mouth | : | live from day to day |
| Live wire | : | an active, lively person |
| Loaves and fishes | : | material benefits that are an inducement in a person's career |
| Lock the stable after the horses has bolted | : | take special care to avoid harm after a misfortune has already taken place |
| Lock, stock and barrel | : | Completely |

| Lose heart | : | become discouraged |
|---|---|--|
| Lose face | : | feel humiliated |
| Lotus eaters | : | lazy dreamy people |
| Maintain a low profile | : | be unassertive |
| Make a clean breast of | : | admit and confess fully |
| Make a clean sweep | : | to make complete victory / change |
| Make a mountain out a mole-hill | : | make a small problem seem like a large one |
| Make both ends meet | : | live with in one's income |
| Make short work of | : | deal with quickly |
| Meet one's Waterloo | : | to suffer a ruinous defeat |
| Miss the bus | : | lose an opportunity |
| Move heaven and earth | : | do everything possible |
| Much ado about nothing | : | make great fuss about a trifle |
| Neck and neck | : | in close competition |
| Neither fish, flesh nor good red haring | : | difficult to classify |
| Nuts and bolts | : | basic practical details |
| Nine teams out of ten | : | almost always |
| Nip in the bud | : | end in early stage |
| Nothing to write home about | : | a person or thing that is not at all special |
| Old school tie | : | system of preferring those who have been to
the same public schools |
| On the rocks | : | in danger of being ruined |
| On the spur of the moment | : | Suddenly |
| On top of the world | : | happy and healthy |
| On velvet | : | in a fortunate position |

| Once in a blue moon | : | very rarely |
|----------------------------------|---|---|
| Open book | : | nothing secret or mysterious |
| Out of the question | : | Impossible |
| Out of the blue | : | Unexpectedly |
| Out of turn | : | out of the correct order |
| Pain in the neck | : | an irritating person |
| Paper tiger | : | a person or that has the outer appearance of
being powerful but is in fact ineffective |
| Part of the furniture | : | a person who is taken for granted or ignored |
| Pass the buck | : | avoid blame or responsibility |
| Pay through the nose | : | pay for more than the value |
| Pie in the sky | : | better conditions of life |
| Play to the gallery | : | act in order to win popularity |
| Play fast and loose | : | deceive take advantage of |
| Play the game | : | behave in a fair manner |
| Plough a lovely furrow | : | work alone without friends or helpers |
| Poles apart | : | widely divided in opinion or characteristics |
| Pour oil on troubled waters | : | attempt to end a quarrel by gentle words |
| Pull some one's leg | : | make fun of a person in a friendly way |
| Pull the wool over someone's eye | : | deceive someone |
| Put all one's eggs in one basket | : | risk everything in one venture |
| Put the cart before the horse | : | do things in the wrong order |
| Put out the red carpet | : | give an officials / enthusiastic welcome |
| Put in the shade | : | Excel |
| Put in a good word for | : | to speak well of someone |

| Put a spoke in some one's wheel | : | prevent someone from carrying out his plans |
|-----------------------------------|---|--|
| Queer fish | : | a strange person |
| Rank and file | : | ordinary members |
| Red-letter day | : | a very important day |
| Red tape | : | too many formalities / regulations |
| Ride a tiger | : | take a dangerous course of action |
| Rubber stamp | : | a person who only makes official decisions made already by another |
| Scapegoat | : | some one blamed / punished for another's mistakes |
| Second thoughts | : | after reconsideration |
| See eye to eye | : | agree with completely |
| Separate the sheep from the goats | : | separate the good from the wicked |
| Set one's heart or something | : | desire strongly |
| Set one's house in order | : | arrange one's affairs properly |
| Set the world on fire | : | have great success by doing something new |
| Sit on the fence | : | not take sides |
| Ships that pass in the night | : | person who meet by chance and who are
unlikely ever to meet again |
| Sixth sense | : | special sensitivity |
| Sitting duck | : | someone who can easily be hit or attacked |
| Skeleton in the cupboard | : | shameful secret |
| Sow one's wild oats | : | enjoy oneself in a wild manner while young |
| Sour grapes | : | treat something as worthless because one is unable to get it |
| Sisyphean task | : | endless or fruitless task |
| Smell a rat | : | become suspicious |
|------------------------------------|---|---|
| Snake in the grass | : | hidden enemy |
| Something up one's sleeve | : | have a secret idea / plan |
| Spade work | : | hard work done at the beginning of an activity |
| Spread like wild fire | : | spread very quickly |
| Speak volume | : | to express a lot of meaning without speaking |
| Square peg in a round hole | : | someone or something that does not fit into a particular situation or position. |
| Stick out one's neck | : | take a risk |
| Stand head and shoulders above | : | to be much better than |
| Strike while the iron is hot | : | act at the most favourable moment |
| Step into someone's shoes | : | take over the duties of someone else |
| Stand on one's own two feet | : | become confident / independent |
| Storm in a tea cup | : | a lot of fuss over a trivial affair |
| Stone's throw | : | a short distance |
| Stand a chance | : | have the possibility |
| Steal the limelight | : | attract the most attention |
| Sugar the pill | : | make something unpleasant seem attractive |
| Take pot luck | : | take a chance |
| Take root | : | become established |
| Take a leaf out of a person's book | : | follow person's example |
| Take the bull by the horns | : | boldly facing and tackling a difficulty |
| Take the one's heels | : | run away |
| Take one's hat off | : | admire / respect |

| Teething troubles | : | Difficulties that arise during the early stage |
|-----------------------------------|---|---|
| Thorn in the flesh | : | continual annoyance |
| Through thick and thin | : | through good times and bad times |
| Throw up one's hands | : | give up hope |
| Throw cold water | : | Discourage |
| Throw one's weight about / around | : | to impress other people |
| Tighten one's belt | : | Economize |
| Time of one's life | : | a very enjoyable time |
| Talk shop | : | talk about one's work |
| Turn over a new leaf | : | make a new and better start |
| Turn a deaf ear | : | refuse to listen |
| Turn the tables | : | change a situation to one's advantage over one's away |
| Under a cloud | : | out of favour |
| Up in arms | : | protesting angrily |
| Up to one's ears | : | have too much work to do |
| Wash one's dirty linen in public | : | reveal or talk about one's hidden faults in public |
| Waste one's breath | : | speak uselessly |
| Wet blanket | : | one who by criticism discourages a person |
| Weather the storm | : | survive a crisis |
| White elephant | : | an expensive aid useless possession |
| With flying colors | : | very successfully |
| Wild goose chase | : | a hopeless enterprise |
| Wolf in sheep's clothing | : | a person who has evil intentions but who |
| Wool gathering | : | appears to be harmless |

| Worlds apart | : | day-dreaming |
|---------------------|---|-------------------|
| Writing on the wall | : | very different |
| | | warning of future |

Exercise 2 ONE WORD SUBSTITUTIONS

| Omnipresent | : | one who is present everywhere |
|----------------|---|--|
| Omnipotent | : | one who is all powerful |
| Omniscient | : | one who has all knowledge |
| Philanthropist | : | one who loves mankind |
| Misanthrope | : | one who hates mankind |
| Altruist | : | one who loves others selflessly |
| Optimist | : | one who thinks positively |
| Pessimist | : | one who thinks negatively |
| Atheist | : | one who does not believe in God/existence of god |
| Fastidious | : | one who is very selective in his taste/interests |
| Fanatic | : | excessive and mistaken enthusiasm in religious matters |
| Lexicographer | : | one who compiles a dictionary |
| Anthropologist | : | one who studies the evolution of mankind |
| Carnivorous | : | one who lives on flesh |
| Cannibal | : | one who feeds on human flesh |
| Insolvent | : | a person who is unable to pay his debts |
| Incorrigible | : | something that cannot be corrected. |
| Numismatics | : | the study of (currency) coins |
| Irrevocable | : | a decision which cannot be revoked |

| Infallible | : | one who is free from mistakes. |
|--------------|---|--|
| Teetotaller | : | one who abstains from alcohol |
| Indelible | : | that cannot be erased |
| Plagiarism | : | literary theft from the original book |
| Polyandry | : | the practice of marrying more than one wife/husband. |
| Polygamy | : | the practice of many marriages |
| Misogynist | : | one who hates women |
| Bibliophile | : | one who loves reading books |
| Stoic | : | one who is indifferent to pleasure and pain |
| Loquacious | : | one who talks continuously |
| Anarchist | : | one who destroys government law and order |
| Plutocracy | : | government by the rich |
| Bureaucracy | : | government by the officials |
| Iconoclast | : | one who breaks idols |
| Ambidextrous | : | one who can use either hand skilfully |
| Somnambulist | : | one who walks in sleep |
| Somniloquist | : | one who speaks on sleep |
| Emigrant | : | one who leaves his own country to live in another |
| Immigrant | : | one who comes to one country from another to settle there. |
| Alimony | : | allowance paid to wife after divorce |
| Misogamist | : | one who hates marriage |
| Panacea | : | remedy for all ailments |
| Cynosure | : | center of attraction |
| Sinecure | : | a job with high salary but little responsibility. |
| Connoisseur | : | a critical judge of any art |

| Polyglot | : | one who speaks many languages | | | |
|---------------|------------|---|--|--|--|
| Extempore | : | a speech made without any preparation | | | |
| Philatelist | : | one who collects postal stamps as a hobby | | | |
| Egoism | : | a belief that action result from selfishness | | | |
| Egotism | : | a practice of talking too much about one self | | | |
| Ornithology | : | study about birds | | | |
| Cartographer | : | one who draws maps | | | |
| Lapidist | : | one who cuts precious stones | | | |
| Calligraphist | : | one who has beautiful hand writing | | | |
| Omnivorous | : | one who eats everything | | | |
| Herbivorous | : | one who lives on herbs | | | |
| Blasphemy | : | the act of speaking disrespectfully about the sacred things | | | |
| Indefatigable | : | one who does not get tired easily | | | |
| red-tapism | : | too much of official formalities resulting in delay | | | |
| cacographist | : | one who is bad at spellings | | | |
| | Exercise 3 | | | | |

SYNONYMS

| : | one who believes in god |
|---|--|
| : | that can control the effects of poison |
| : | the state of being unmarried |
| : | that cannot be corrected |
| : | capable of catching fire |
| : | that cannot be conquered/defeated |
| : | one who is too careful fro details |
| : | which is outdated |
| | :
:
:
:
:
: |

| pseudonym | : | false / assumed name |
|---------------|---|---|
| soliloquy | : | one who talks to oneself |
| veteran | : | well experienced |
| omniscient | : | one who has all the knowledge |
| omnipotent | : | one who is all powerful |
| reticent | : | one who does not speak even though s/he is capable of |
| garrulous | : | one who talks continuously |
| candid | : | frank/outspoken |
| chaos | : | utter confusion |
| lucid | : | clear |
| frail | : | fragile/weak |
| enormous | : | huge/vast/immense/colossal/gigantic |
| extravagance | : | lavish |
| hallucination | : | illusion / dilution / mirage |
| appalling | : | horrible / dreadful / frightful |
| industrious | : | hard working |
| juvenile | : | youthful / immature / young / undeveloped |
| meek | : | mild / submissive / modest |
| mitigate | : | soften |
| humdrum | : | monotonous / unvaried / tiresome / tedious |
| outrage | : | insult / abuse |
| pathetic | : | pitiful / distressing / heartrending / sad |
| pious | : | religious / holy / reverential |
| placid | : | calm / serene |
| reliance | : | confidence / trust / credence |

| sarcastic | : | cynical / ironic |
|------------|---|--|
| scrupulous | : | strict / precise / careful / conscientious |
| strenulous | : | energetic / zealous / persevering |

Choose the word which is most closest in meaning from the four options given below:

| 1. | Vexed –
(A)Annoying | (B) Recurring | (C) Dangerous | (D) Complex | |
|-----|---|----------------------|---------------------------|---------------|--|
| 2. | Candid —
(A) Irritable | (B) Trickly | (C) Intriguing | (D) Guileless | |
| 3. | Acquiesce—
(A) Accept | (B) Agree | (B) Agree (C) Acerbate (I | | |
| 4. | Bleak —
(A) Impolite | (B) Inconsiderate | (C) Dismal | (D) Deformed | |
| 5. | Convoke —
(A) Exhort | (B) Convene | (C) Appeal | (D) Transfer | |
| 6. | Dereliction —(A)Blessing | (B) Curse | (C) Neglect | (D) Abandon | |
| 7. | Genesis—
(A)Learned | (B) Prenatal | (C) Common | (D) Beginning | |
| 8. | Fickle —(A)Festive | (B) False | (B) False (C) Furious | | |
| 9. | Culinary —
(A)Greasy | (B) Pertaining to Ki | tchen (C) Munical | (D) Food | |
| 10. | Incongruous —
(A)Disabled | (B) Negligible | (C) Inconsistent | (D) Penurious | |
| 11. | Malicious—
(A)Benevolent
Occasional | (B) Rancorous | (C) Virile | (D) | |
| 12. | Overthrow —(A) Watch | (B) Supervise | (C) Upset | (D) Oppose | |
| 13. | Precarious —
(A) Vulnerable | (B) Accurate | (C) Vilifying | (D) Careless | |

| 14. | Garnish —
(A)Paint | (B) Garner | (C) Adorn | (D) Abuse |
|-----|----------------------------------|-------------------|---------------------|---------------|
| 15. | Slander—
(A)Calumniate | (B) Vindicate | (C) Retaliate | (D) Moderate |
| 16. | Torment —
(A)Storm | (B) Ferment | (C) Agony | (D) Twinge |
| 17. | Erudite—
(A)Cognizant | (B) Well educated | (C) Studious | (D) Miserly |
| 18. | Caprice —(A) Whim | (B) Capacity | (C) Pride | (D) Greed |
| 19. | Wretched—
(A)Dirty | (B) Poor | (C) Difficult (D) U | Infortunate |
| 20. | Sodden —
(A)Grassy | (B) Soggy | (C) Serious | (D) Unhappy |
| 21. | Meandering —(A) Wandering | (B) Curved | (C) Cunning | (D) Lustful |
| 22. | Swamp —
(A)Surf | (B) Marsh | (C) Plain | (D) Clay |
| 23. | Impromptu —
(A)Offhand | (B) Unreal | (C) Effective (D) U | Inimportant |
| 24. | Rabble —(A)Noise | (B) Mob | (C) Roar | (D) Rubbish |
| 25. | Reticence—
(A)Deserve | (B) Receding | (C) Reserve | (D) Treachery |
| | | | | |

KEY

| 1.D | 2.D | 3.B | 4.C | 5.B | 6.C | 7.D | 8.D | 9.B | 10.C |
|------|------|------|------|------|------|------|------|------|------|
| 11.B | 12.C | 13.A | 14.C | 15.A | 16.C | 17.B | 18.A | 19.D | 20.B |
| 21.A | 22.B | 23.A | 24.B | 25.C | | | | | |

Exercise 4 ANTONYMS

Words opposite in meaning / having contrary meaning, highly useful in expressing briefly the opposite of a thought. They are also valuable in defining something.

| absurd | × | rational / sensible / judicious / sane |
|--------------|---|--|
| active | × | passive / indolent / idle |
| abundance | × | scarcity |
| adversity | × | prosperity / bliss |
| addicted | x | averse |
| admire | × | despise |
| alike | × | distinct |
| alleviate | x | aggravate / heighten |
| anger | × | forbearance / patience |
| ancestor | × | descendant |
| appetite | × | distaste |
| awkward | × | graceful / skilful |
| benevolent | × | malevolent |
| bleak | × | bright |
| indifference | × | care |
| boisterous | × | calm |
| candid | × | tricky / foxy / evasive |
| confess | × | deny / renounce |
| oblivious | × | conscious |
| cooperate | × | counteract / nullify |
| contrast | × | comparison |

| courtesy | × | rudeness |
|-------------|---|---|
| delightful | × | distressful |
| docile | × | ungovernable |
| endure | × | perish |
| fact | × | fiction |
| harmony | × | conflict |
| hypocrisy | × | frankness / candour |
| ignorant | × | informed |
| obscure | × | important |
| liberty | × | restraint |
| loyalty | × | disloyalty |
| belief | × | disbelief |
| meek | × | arrogant / proud / domineering / blustering |
| memory | × | forgetfulness / oblivoun |
| modest | × | immodest / concealed |
| native | × | foreign |
| anomalous | × | normal |
| optimist | × | pessimist |
| pleasure | × | displeasure |
| perfect | × | imperfect |
| transitory | × | permanent |
| prohibition | × | permission |
| persuade | × | dissuade |
| plentiful | × | scarce / meagre / scanty |

| boorish | × | polite |
|---------|---|--------------------|
| pride | × | humility / modesty |
| queer | × | common |
| savage | × | civilised |
| smile | × | frown |

Choose the word which is most nearly opposite in meaning from the four options given below.

| 1. | Victor –
(A) Vanquished | (B) Successor | (C) Inheritor | (D) Grace |
|-----|--------------------------------------|------------------|----------------|-------------------|
| 2. | Chronic –
(A)Acute | (B) Fleeting | (C) Irregular | (D) Temporary |
| 3. | Hostile —
(A)Feverish | (B) Friendly | (C) Unfriendly | (D) Belligerent |
| 4. | Joyous—
(A) Monotonous | (B) Gloomy | (C) Dreary | (D) Euphonic |
| 5. | Luminous —
(A)Dull | (B) Sneaking | (C) Bitter | (D) Pungent |
| 6. | Lackadaisical—
(A)Expressing time | (B) Monthly | (C) Ambitious | (D) Pusillanimous |
| 7. | Chaffing —(A) Serious | (B) Achieving | (C)Sneezing | (D) Expensive |
| 8. | Scold—
(A)Insinuate | (B) Disparage | (C) Upbraid | (D) Praise |
| 9. | Gregarious
(A) Antisocial | (B) Anticipatory | (C) Glorious | (D) Horrendous |
| 10. | Chimerical—
(A)Remarkable | (B) Powerful | (C) Realistic | (D) Ubderrated |
| 11. | Camaraderie
(A)Plunder | (B) Harmony | (C) Deviation | (D) Noise |
| 12. | Discreet— | | | |

| | (A)Crude | (B) Joking | (C) Grouped | (D) Antisocial |
|-----|-------------------------------------|------------------------|----------------|-----------------|
| 13. | Consonant —
(A)Dissonant | (B) Clear | (C) Simple | (D) Vague |
| | (A) Fastidious—A | bsurd
(D) Facetious | (B) Sloppy | (C) Indifferent |
| 14. | Obsequious —
(A)Bold | (B) Assiduous | (C) Precarious | (D) Restorative |
| 15. | Profusion —(A) Valiant | (B) Ordinance | (C) Scarcity | (D) Travesty |
| 16. | Alleviate—
(A)Worsen | (B) Endure | (C) Enlighten | (D) Humiliate |
| 17. | Ambiguous —
(A) Auxiliary | (B) Responsible | (C) Clear | (D) Salvageable |
| 18. | Baneful—
(A)Poisonous | (B) Non-poisonous | (C) Remorseful | (D) Thankful |
| 19. | Dastard —
(A)Coward | (B) Hero | (C) Idol | (D) Warmth |
| 20. | Exculpate—
(A)Accumulate | (B) Accuse | (C) Predict | (D) Prevail |
| 21. | Intermittent—
(A)Fleeting | (B) Heavy | (C) Fearless | (D) Constant |
| 22. | Lethargic—
(A)Enervating | (B) Interrogating | (C) Beautiful | (D) Smart |
| 23. | Shoddy —
(A) Exotic | (B) Superior | (C) Garrulous | (D) Inadequate |
| 24. | Untenable—
(A)Positive | (B) Tremulous | (C) Tender | (D) Supportable |

KEY

| 1.A | 2.D | 3.B | 4.B | 5.A | 6.C | 7.A | 8.C | 9.A | 10.C |
|------|------|------|-------|------|------|------|------|------|------|
| 11.D | 12.C | 13.A | 14. B | 15.A | 16.C | 17.A | 18.C | 19.B | 20.B |
| 21.B | 22.D | 23.D | 24.B | 25.D | | | | | |

Exercise

I. Choose the correct meaning of the word given.

| 1. | Antagonism
a) achievement | b) enmity | c) peculiarity | d) dedication |
|-----|--|----------------|----------------|----------------|
| 2. | Convivial
a) sociable | b) shameful | c) calm | d) hardship |
| 3. | Profligate
a) extravagant | b) prohibit | c) analise | d) end |
| 4. | Acrid
a) unprofessional | b) uncertain | c) ancient | d) harsh |
| 5. | Idiosyncrasy
a) transformation | b) appeasement | c) abnormality | d) inspiration |
| 6. | Illusory
a) absolute | b) hate | c) unreal | d) inspire |
| 7. | Noxious
a) vague | b) negligible | c) cheerful | d) deadly |
| 8. | Anarchy
a) boost | b) escape | c) disorder | d) surprising |
| 9. | Taciturn
a) tightlipped | b) nomadic | c) frustrated | d) peak |
| 10. | Abashed
a) composed | b) degraded | c) hopeless | d) ashamed |
| 11. | Barmy
a) rational | b) foolish | c) ruined | d) deadly |
| 12. | Concede
a) veil | b) reveal | c) accept | d) deny |
| 13. | Debacle
a) success | b) failure | c) poverty | d) excess |
| 14. | Edgy
a) irritable | b) expensive | c) joyful | d) placid |

| 15. | Fallacy a) understanding | b) treachery | c) belief | d) untruth |
|-----|-----------------------------------|--------------|----------------|----------------|
| 16. | Gargantuan
a) showy | b) chatty | c) huge | d) wordy |
| 17. | Hallucination
a) cheating | b) joy | c) fantasy | d) annoyance |
| 18. | Iconoclasm
a) belief | b) theory | c) concept | d) questioning |
| 19. | Jingoism
a) nationalism | b) curse | c) moderation | d) anxiety |
| 20. | Labyrinthine
a) simple | b) difficult | c) twisting | d) sad |
| 21. | Magniloquent
a) modest | b) lofty | c) temporary | d) skilled |
| 22. | Narcissism
a) generosity | b) worry | c) nationalism | d) self-love |
| 23. | Odium
a) hatred | b) progeny | c) love | d) neglect |
| 24. | Paranoia
a) trust | b) equality | c) anxiety | d) mockery |
| 25. | Quixotic
a) Practical | b) funny | c) active | d) unrealistic |
| 26. | Rapine
a) protection | b) robbery | c) enmity | d) calmness |
| 27. | Sanguinary
a) brutal | b) cheerful | c) merciful | d) clever |
| 28. | Thralldom
a) burglar | b) argument | c) slavery | d) excitement |
| 29. | Vendetta
a) respect | b) welcome | c) scorn | d) enmity |

| 30. | Whopping
a) enormous | b) curious | c) good | d) enthusiastic |
|-----|------------------------------|-------------|--------------|-----------------|
| 31. | Abstemious
a) greedy | b) moderate | c) boring | d) absent |
| 32. | Balderdash a) curse | b) greed | c) rubbish | d) dislike |
| 33. | Chum
a) friend | b) glamour | c) repulsion | d) purity |
| 34. | Debonair
a) modest | b) charming | c) poor | d) critical |
| 35. | Effrontery a) shyness | b) fluency | c) nobility | d) arrogance |

II. Fill in the blanks choosing the correct word.

| 1. | In business one sho | uld be realistic and . | | |
|----|---|-----------------------------------|--|--------------------------------------|
| | a) entertaining | b) enterprising | c) risky | d) interesting |
| 2. | The medal had to be
a) immediately | e awarded t
b) deliberately | o soldiers widow.
c) respectfully | d) posthumously |
| 3. | Over the last decade
a) evolved | e, terrorism ha
b) contributed | as a threat to civilized c) threatened | l society.
d) emerged |
| 4. | Police A co
city. | ooking oil adulteratio | on racket when they ra | aided a godown in the |
| | a) captured | b) took | c) unearthed | d) obtained |
| 5. | Due to his corrupt p | practices, the officer | was | |
| | a) rewarded | b) praised | c) demoted | d) promoted |
| 6. | India and the Europ
summit to be held in | ean Union on Friday
n India. | plans for ho | lding the 14 th bilateral |
| | a) firmed up | b) to hold | c) decided | d) considering |
| 7. | Troops of India and on Sunday. | Pakistan continued | exchange of fire | the line of control |
| | a) through | b) along | c) beside | d) at |

| 8. | They elected him as the leader of the legislative party, the way for him to take the oath of office as Himachal Pradesh Chief Minister. | | | |
|-----------------------------|---|--|--|--|
| | a) giving | b) putting | c) offering | d) paving |
| 9. | The UN Security (
Friday. | Council imp | posed new sanctions o | n North Korea on |
| | a) unanimously | b) impressively | c) anonymously | d) indifferently |
| 10. | The former Presid
him in 2012. | ent returned to the o | country for the first tir | ne since a coup |
| | a) imposed | b) allowed | c) deposed | d) critcised |
| 11. | Many Palestinians | in Bethlehem desc | ribed their own leader | ship as |
| | a) interesting | b) qualified | c) official | d) feckless |
| 12. | The university pro
multi-disciplinary | vides broad-based .
courses. | curriculum u | nderscored by |
| | a) legible | b) interesting | c) comprehensive | d) educated |
| 13. | Some jewellery sh
pay more. | ops engage celebrit | ies as ambas | sadors and make you |
| | a) clever | b) brand | c) famous | d) reputed |
| 14. | The special judge
a) verdict | pronounced the
b) order | in a packed co
c) sentence | urtroom.
d) justice |
| 15 | At least 33 passen | gers were killed wh | en a hus Into th | e Banas river |
| 10. | a) jumped | b) got | c) ran | d) plunged |
| | | KE | YS | |
| I. | | | | |
| 1. B | 2. A 3. A
12 C 13 B | 4. \mathbf{D} 5. \mathbf{C}
14 \mathbf{A} 15 \mathbf{D} | 6. C 7. D 8. | $\begin{array}{cccccccccccccccccccccccccccccccccccc$ |
| 21. B | 22. D 23. A | 24. C 25. D | $26. \mathbf{B} \qquad 27. \mathbf{A} \qquad 28$ | 8. C 29. D 30. A |
| 31. B | 32. C 33. A | 34. B 35. D | | |
| II. | | | | |
| 1. B
11. D | 2. C 3. D
12. C 13. B | 4. C 5. C
14. A 15. D | 6. A 7. B 8. | D 9. A 10. C |
| | | | | |

13. READING COMPREHENSION

HOW TO COMPREHEND, THE CORRECT WAY

Comprehension means the power of understanding. The main aim of comprehension is to test a person's understanding of the passage given. The person's understanding capacity and his intelligence will depend upon his practicing and various methods of approaching and tackling of the questions of this type.

The students should carefully go through the passages given and then answer the questions based on them. Hereunder given a few hints to be followed while attempting to answer the questions.

- 1. Go through the passage carefully and quickly to get the idea of it.
- 2. Read again a bit slowly to enable to know the details
- 3. The idea of a simple, complex and compound sentences to be held together in the mind and follow the right sequence of events to be able to distinguish between the important and unimportant facts.
- 4. Then the questions have to be answered one by one in your own words in complete and simple sentences.

Passage 1:

In June 2009, apparel manufacturer, Levi Strauss India Pvt. Ltd. (Levis) offered to sell its well-known Levi's brand of jeans and other Levi's products on Equated Monthly installments (EMI) payable through credit cards. Analysts viewed this as a bid by the company to increase sales against the backdrop of the economic downturn. The company planned to arrest its decline in sales through this innovative offer. Analysts felt that the offer was the first such in the branded apparel industry. On the launch of the scheme, Shumone Chattered (Chatterjee), MD, Levi's said, "It is for the first time that a brand is offering this kind of deal in India. EMI has proven good for several industries such as housing and white goods; therefore I feel that it will make a significant difference to the branded apparel industry as well."

The offer, launched as a pilot program in Bangalore, was valid only for consumers who purchased products worth Rs. 1,500 and above. The consumers had to settle the bill in three installments. The EMIs were on zero percent interest. Levi's had entered into a tie-up with ICICI Bank to offer this scheme. In return, the bank received service charges from Levi's for each transaction.

Levi's is the Indian subsidiary of US-based Levi Strauss & Co. It sells denim jeans under the brand Levi's a popular and aspirational brand of jeans in India. As of September 2009, Levi's operated through 230 stores and 500 other points of sale in nearly 200 cities.

1. What makes significant difference to the branded apparel industry, according to passage?) (b) controlling the decline in sales (a) tie up with ICICI Bank (c) expanding the number of stores (d) EMI option extended to their customers 2. What is the bid by the company to increase sales, according to the passage? () (a) to sell Levi's brand of jeans through debit cards (b) to sell Levi's brand of jeans on EMI s (c) to give zero percent interest for the bill amount below Rs.1500 (d) stop selling other products of Levi's 3. The offer, launched as a pilot program in Bangalore, was valid only for consumers () (a) the customers of ICICI Bank only (b) for the consumers who purchased products worth Rs.1500 and below (c) for consumers who purchased products worth Rs. 1,500 and above (d) who purchased products in Bangalore 4. Levi's operated through 230 storesin nearly 200 cities. () (a) through 200 stores (b) in Bangalore

(c) 500 other points of sale in nearly 200 cities.

(d). through 230 stores

Passage 2:

When we have worked continuously for some time we need relaxation. To pursue hobbies is the best way of relaxing. My favourite hobbies are gardening, stamp-collection and photography.

I have loved gardening since my boyhood. I enjoy watering my garden every morning and evening. It gives me enough physical exercise and sends me back to my work with renewed zest and vigor. It is vary amusing digging up fresh beds for new plants. I grow flowers as well as vegetables. I beam with satisfaction when I cast my eyes on my luxuriant garden. The sight of the lively garden is increasingly refreshing.

My second hobby is stamp-collection. I have collected hundreds of stamps. I have arranged them in five books. My uncle, who often goes abroad on business, has been helping me to collect rare stamps. He sends me foreign stamps from the places he visits. Whenever I have a little leisure, I sit down at a table with my precious stamp-books, arranging new stamps in them and writing names of countries. Each stamp has a story to tell me of distant lands and strange peoples. Looking through the stamps, I can follow the history of nations.

I also love photography. Whenever I go for a picnic or on an excursion or travel round a strange place, I take my camera with me and snap interesting objects. I have a number of valuable snapshots, some of them highly recreational.

| 1. | Hobbies are not mean
(a) relaxation
these | nt for
(b) pleasure | (c) leisure | ()
(d) none of |
|----|--|--|--|----------------------|
| 2. | The speaker of the pa
(a) he casts his eye on
(c) he waters the gard | issage get physical
n luxuriant garden
len | energy because
(b) he grows flowers
(d) he often plans picnics | () |
| 3. | He collects stamps be
(a) his uncle goes abr
(c) to follow the histo | ecause
road
ory of nations | (b) his uncle has the sa
(d) he has leisure | ()
ame hobby |
| 4. | Digging up fresh bed
(a) surprise | s for new plants, gi
(b) interest | ives the speaker
(c) health | ()
(d) vegetables |

Passage 3:

India is an agricultural country and most of its people live in villages. A village is a collection of small huts in the midst of fields on which the village farmers work. Some villages are big while others are comparatively small. They are generally cut off from the cities and have a different kind of life.

The villagers live in the midst of natural surroundings. The charms of nature justify the remark of the famous English poet Gowper, "God made the country and man made the town". As we rise early in the morning, we can listen to the sweet songs of birds. We can enjoy the beauty of rising sun and the sweet breeze of day down. The flowing of the river with a murmuring sound, the beauty of the greenery of fields around are the various pleasures that abound in the country side.

The villagers pass a healthy, peaceful life. There is no smoke and noise of the city factories. They breathe fresh air which promotes their health. They also get pure ghee and milk. There is no hustle and bustle and no worry as in the modern city life. The villagers, therefore, are happy and healthy. They lead a simple life and they have and never dream of those luxuries and comforts that modern science has provided us in such ample measure.

| 1. One of the reasons for the villagers to have a peaceful life is | | |
|--|---|--|
| | (a) they already have luxury | (b) because of agricultural hard work |
| | (c) there is less smoke | (d) absence of smoke |
| 2. | One of the pleasures of villagers is
(a) simple life
(c) they get pure ghee and milk | ()
(b) plenty of entertainment avenues
(d) greenery of agricultural fields |
| | (c) they get pure gree and mink | (d) greenery of agricultural fields |
| 3. | According to the passage, villagers
(a) peaceful life (b) Comforts
(c) modern science (d) nothing | have a dream ()
and luxaries |

4. Villagers are happy because of

(a) no knowledge of luxuries (b) no hustle bustle

(c) no modern facilities (d) no connection to citie

Passage 4:

By the beginning of the twentieth century, doctors knew that many diseases were caused by living microbes. They knew about immunization and vaccines. Thanks to the efforts of scientists like Jenner, Pasteur, Koch and Ehrlich, Lister, had taught them the **value** of antiseptics. Known chemical disinfectants, such as carbolic acid, would kill germs, but they would also injure cell tissues. How could harmful microbes be destroyed without at the same time injuring body tissues?

In 1900 to a shipping clerk – Alexander Fleming – a career in science seemed like a **distant** dream. Alexander was born on August 6, 1881, the youngest son of an ayrshire Scottish farmer. He was able to complete High School but then his family's funds **ran out**. At sixteen he took a job as a shipping clerk and stayed there for four years. In 1901, Alexander came into a small legacy which enabled him to continue his education and on the advice of one of his brothers, who was doctor, he chose to prepare for a career in medicine.

Alexander did usually well in medical school along with rifle shooting, swimming, water polo and painting. After his graduation his teacher Prof. Wright asked him to join him in bacteriological research, to which he **readily** agreed.

Questions:

- 1. According to passage, what was the main problem being encountered by doctors? (A) How to eliminate microbes while protecting body cells.
 - (B) How to use known chemical disinfectants.
 - (C) How to get fresh carbolic acid in time to treat the patient.

(D) How to convince the patient to get vaccination regularly.

2. Which of the following was taught to the doctors at the beginning of twentieth century?

(A) Scientists can help doctors in the use of disinfectants.

- (B) The role and importance of antiseptics in medical treatment.
- (C) Pursuing a career in medicine is a difficult job.
- (D)Good microbes help in developing body cells.
- Why did Fleming take up the job as a shipping clerk?(A)On the advice of one of his brothers.
 - (B) His financial position was not good at that time.
 - (C) It was his cherished dream.
 - (D) It was a very prospective job with opportunities to go abroad.
- 4. Why was it possible for Alexander to continue his studies?

(A) The inspiration given by his farmer father.

(B) His desire to become a scientist at any cost.

(C) The shipping job gave him enough money.

(D) The assistance and guidance provided by his brother.

- 5. Who amongst the following has not been mentioned in the passage as 'Scientist'? (A) Jenner (B) Pasteur (C) Wright (D) Lister
- 6. Which of the following statements is NOT TRUE in the context of the passage?(A) Alexander's father was a Scottish farmer.

(B) One of Alexander's brother was a doctor.

- (C) Alexander's performance in the medical school was very good.
- (D) Harmful microbes attack and cause diseases to tissues which are injured by chemical disinfectants.

Which of the following is most nearly the same in meaning as the word printed in bold as used in the passage?

| 7. | Value –
(A)Cost | (B) Price | e (C) Importanc | | e (D) Respect | |
|----|-----------------------------|--------------|-----------------|-----|---------------|--|
| 8. | Ran out —(A)Left for | (B) Retained | (C) Increased | (D) | Dwindled | |

Which of the following is the most opposite in meaning of the word printed in bold as used in the passage?

| 9. | Readily —(A)Abruptly | (B) Suddenly | (C) Lately | (D) Reluctantly |
|-----|---------------------------------|--------------|------------|-----------------|
| 10. | Distant —
(A)Possible | (B) Close | (C) Remote | (D) Difficult |

Passage 5:

Scientist Henry Mosely was born in a reputed family on November 23, 1887. His father – a professor of Anatomy at the University of Oxford had an **untimely** death in 1891. However, his mother had sufficient income from family estates to keep her three children in school and to **allow** young Henry to build and equip a simple private laboratory. Thus as a boy he was most familiar with a variety of neighborhood birds and birds' nests. He also would search for pre-historic artifacts with his sister and his mother on his weekends and holiday vacation. On one occasion, Henry **found** a beautiful arrow-head on a visit to the Shetland Islands. His pride in this find was so great that he had to show it to two of his friends, Julian Huxley and Charles Darwin. All the three boys were of approximately the same age and were grand children of three famous scientists.

Henry **spent** five years at Eton, after which he entered Trinity College, Oxford, with a scholarship in Natural Science. Before he graduated with honours in Natural

Science, he was already dreaming of a career in pure science. He was greatly inspired to do research by scientist Rutherford, whom he met at Manchester.

Questions:

| 1. | Why did Henry decide to make a career in Science? |
|----|---|
| | (A)He was given a scholarship. |
| | (B) His father was a scientist. |
| | (C) To fulfill his father's dream. |
| | (D) Rutherford advised him accordingly. |
| | |

- Which of the following seems to be the probable reason for Henry's developing friendship with Julian and Charles?
 (A) They were contemporaries and came from respectable families.
 (B) He wanted to become a scientist with their help.
 (C) They were interested in setting up a private laboratory.
- **3.**Where did Henry finish his college education?
(A)Eton
(B) Shetland
(C) Oxford(D) Manchester
- 4. Why did Henry show the arrowhead to his friends?
 - (A) It was very beautiful and belonged to his family.
 - (B) It was very evident and had historical value.
 - (C) He had received it from his father.
 - (D) It was developed in his private laboratory.
- 5. What helped Henry to develop keen interest in natural beauty of surrounding areas? (A)Not given in the passage.
 - (B) His inheritance of a large family estate.
 - (C) His friendship with grand children from scientists' families.
 - (D) His knowledgeable mother and sister.
- 6. Where did Henry use to spend his weekends and holidays?
 - (A) His family estate at Shetland.
 - (B) At Manchester with Rutherford.
 - (C) At Oxford with his friends.
 - (D) In his laboratory at Eton.

Which of the following is most nearly the same in meaning as the word printed in bold as used in the passage?

| 7. | Found —
(A)Established | (B) Discovered | (C) Organised (D) La | id |
|----|----------------------------------|----------------|----------------------|-------------|
| 8. | Untimely—
(A)Prematurely | (B) Quick | (C) Timeless | (D) Eternal |

Which of the following is the most opposite in meaning of the word printed in bold as used in the passage?

| 9. | Spent – (A) Installed | (B) Established | (C) Recouped (D) Saved | |
|-----|------------------------------|-----------------|------------------------|-------------|
| 10. | Allow –
(A)Permit | (B)Forbid | (C) Avoid | (D) Recover |

Passage 6:

I hope there are not many who sneer at the conquest of science as materialistic avenues to the betterment of human conditions. A spiritual civilization is not necessarily one of poverty and disease, man drawn rickshaw and the handcart. It is the thing to say that wisdom is more **precious** than rubies and the wise man is happy whatever befalls him and quite another to hold that poverty and ill-health are necessary for spiritual advance. While poverty is spiritual when it is voluntary, the mass poverty of people is a sign of sloth and failure. Our philosophy of life recognizes the production and increase of wealth among the legitimate aims of human endeavour. Pursuit of wealth does not, itself, spell spiritual ruin. It is a means, in itself ethically colourless, neither good nor evil, but a necessary means for the attainment of higher life for the individual and the mass of mankind. What counts is the purpose for which wealth is striven after. So long as we realize that it is a means to a higher end, we can boldly venture out on the path of the conquest of Nature's secrets and their utilization for man's service. There are so many ills that flesh in heir to which need not be met by fatalism and folded hands. Instead of facing suffering and disease by apologetic justification of the ways of God to man, nobler piety demands their reduction and **ultimate** removal.

Questions:

- 1. What opens materialistic means to the betterment of human conditions?
 - (A) Industrialization (B) Conquest of Science
 - (B) ways of doing work
 - (D) Earning of wealth by hook Scientific or by crook
- 2. Poverty may be spiritual only when it is
 - (A) Imposed
 - (B) Voluntary
 - (C) Divinely ordained
 - (D) Sanctioned by the powers that be
- 3. What does our philosophy recognize as one of the legitimate means of human endeavour?
 - (A) Entering into wedlock and producing children
 - (B) Conquest of Science
 - (C) Production and increase of wealth
 - (D) Foreign conquest

- 4. Pursuit of wealth is always recommended if
 - (A) It enables us to be materially well off
 - (B) It raises our self-condition
 - (C) It makes us wise
 - (D) It becomes a means to a higher end
- 5. Fatalism and folded hands here mean
 - (A) Wrong faith in providence and inaction
 - (B) Believing that man is subject to death and hence leaving everything to the will of God.
 - (C) Believing something will turn up and doing nothing
 - (D) Both (A) and (B)
- 6. The suitable title to the above passage may be
 - (A) Pursuit of Wealth and Higher Life
 - (B) The Blessing of Poverty
 - (C) Suffering and Disease Ordained by God
 - (D) The Importance of Wisdom

Pick out the word or expression that is closest in meaning (Synonym) to the given word of the passage.

| 7. Sneer – | | | |
|------------|--------------|-------------------|----------|
| (A) Snuff | (B) Nauseate | (C) Show contempt | (D) Peep |

- 8. Apologetic
 - (A) Expressing regret (B) Prayerful (C) Boastful (D) Kind

Pick out the word or expression which is opposite in meaning (Antonym) to the given word of the passage.

| 9. | Precious
(A) Costly | (B) Popular | (C) Cheap | (D) Significant |
|-----|-------------------------------|------------------|------------|-----------------|
| 10. | Ultimate –
(A) Prior | (B) Posterior (C |) Anterior | (D) Last |

Passage 7:

Compulsory sport in schools has often provoked bitter controversy and both parents and their children have expressed themselves forcefully on the subject. Their chief arguments have been based on the accepted fact that both mentally and physically youngsters are widely different. A child who through disinclination or through inability to play any game well prefers not to join in school games, should be allowed to follow his own particular bent, preferably by doing extra work on a subject within the school curriculum, or taking part in the activities of one of the school societies. Those who are unsuited to any particular game or physical efforts because of a **frail** physique or bodily defect should be given more sympathetic consideration. While those pleas from the parents deserve a kindly hearing, the good of the children as a whole must be kept in mind. If we are not careful the logical conclusion will be reached where only those who excel in athletics will take part in school games, and nobody would accept that as **sensible**. This must also be borne in mind that both parents and children are apt to **exaggerate** conditions and the former only too often become over-concerned for the safety and well-being of their offspring. Too many times have those 'excused games' been found involved in adventures requiring far more physical effort and **danger** than the games from which they have been excused. Experts have declared that in games and athletics with the possible exception of the 'tug-of-war', the body will stop functioning long before any physical harm can be caused.

Questions:

- 1. According to certain people including parents and children, a child not inclined to participate in games
 - (A) Must be exempted from games
 - (B) Should not be considered for exemption from games
 - (C) Should be allowed to follow any extra- curricular activity in lieu of games
 - (D) Should be fined and then exempted from games
- 2. The main point of controversy is
 - (A)Mental and physical differences among the youngsters
 - (B) Financial inability of the parents
 - (C) Disturbances in education
 - (D) Feeling of indiscipline
- 3.Conditions put forth by children and parents for avoiding games are –
(A)Genuine(B) False(C) Exaggerated(D) Imaginary
- 4. Only those who are proficient in games should take part in them. This argument
 - (A) Is not acceptable to anyone
 - (B) Is acceptable a;most to all
 - (C) Is not acceptable to sports loving persons
 - (D) Is not accepted by anybody as sensible
- 5. The phrase 'excused games' means
 - (A) Games for which players generally avail exemption
 - (B) Games played by those who are exempted from compulsory school games
 - (C) Games for which no excuse is permissible
 - (D) Games which are open to children
- 6. A suitable heading to the above passage may be
 - (A) Games in schools
 - (B) Compulsory sports in schools
 - (C) Children and games
 - (D) Importance of games in schools

| Pick out the word or expressio | on that is closest in meani | ng (Synonym) to the given w | ord |
|--------------------------------|-----------------------------|-----------------------------|-----|
| of the passage. | | | |

| 7. | Frail
(A)F | –
eeble | | (B) T | ough | | (C) T | urgid | | (D) C | old |
|------|--|------------|---------------------------------|------------------|---------------------------------|---------|------------------|----------------------|-------------|---------------|------|
| 8. | B. Exaggerate –
(A) Vociferate
Stretch beyond th
<i>Pick out the word or</i>
<i>given word of the pas</i> | | he truth
• express
ssage. | (B) V
sion wh | ibrate
ich is o _l | pposite | (C) E
in mear | xpatiate
ning (An | e
tonym) | (D)
to the | |
| 9. | Danger
(A)Risk (B) Peril | | (C) Security (D) Insecurity | | | у | | | | | |
| 10. | Sensible
(A)Discreet | | (B) P | (B) Prudent | | (C) D | (C) Defeasible | | (D) Ir | nsensible | |
| | | | | |] | KEY | | | | | |
| Pass | age 1: | 1 | . d | 2. b | | 3. c | | 4. c 8 | k d | | |
| Pass | age 2: | 1 | . d | 2. c | | 3. c | | 4.b | | | |
| Pass | age 3: | 1 | . d | 2. d | | . d | | 4. D | | | |
| Pass | age 4: | 1.A | 2.B | 3.B | 4.D | 5.C | 6.D | 7.C | 8.D | 9.D | 10.B |
| Pass | age 5: | 1.D | 2.A | 3.C | 4.B | 5.D | 6.A | 7.B | 8.A | 9.D | 10.B |
| Pass | age 6: | 1.B | 2.B | 3.C | 4.D | 5.A | 6.A | 7.C | 8.B | 9.C | 10.A |
| Pass | age 7: | 1.C | 2.A | 3.C | 4.D | 5.B | 6.B | 7.A | 8.D | 9.C | 10.D |

14. QUESTIONS

| <i>I</i> . | Choose the correc | t <u>preposition</u> . | | |
|----------------|--|------------------------------|---------------------------------------|----------------------|
| 1. | She was born | 2004. | | |
| | (a) on | (b) the | (c) in | (d) of |
| 2. | They are waiting | the bus. | | |
| | (a) to | (b) for | (c) in | (d) by |
| 3. | Don't forget to brin | ng some flowers | you. | |
| | (a) to | (b) for | (c) with | (d) many |
| 4. | I haven't smoked | ages. | | |
| | (a) in | (b) hardly | (c) for | (d) to |
| 5. | You can look up th | ne word a | dictionary. | |
| | (a) in | (b) from | (c) by | (d) in |
| 6. | She is allergic | insect stings. | | |
| | (a) to | (b) for | (c) from | (d) by |
| 7. | I'm looking | my keys. Have y | you fond them? | |
| | (a) above | (b) for | (c) at | (d) after |
| 8. | The song was write | ten Mador | ına. | |
| | (a) down | (b) by | (c) for | (d) after |
| 9. | He likes to travel | Spain in su | immer. | |
| | (a) from | (b) after | (c) around | (d) to |
| 10. | The police car chas | sed the robbers | the streets. | |
| | (a) through | (b) above | (c) under | (d) past |
| 1) | c 2) b 3) c | 4) c 5) d | 6) a 7) b 8) | b 9) d 10) a |
| π | Fill in the blanks | with the annual is | | ti a ca |
| П.
1 | Ful in the blanks | have sugar than in | e phruse/vero/preposu
ioo | uon. |
| 1. | (a) no monosition | _nave sugar than ju | (a) to | (\mathbf{d}) to a |
| r | (a) no preposition
Sridhar has been | (U) III
in Lotlaunta | $\frac{(0)}{\sin 22} \frac{10}{2000}$ | (u) 100 |
| Ζ. | (a) to stay | (b) stayed | (a) stay | (d) staving |
| 2 | (a) to stay | (U) stayed | (C) stay | (u) staying |
| 5. | (a) learns | laula. | (c) learning | (d) learn |
| 1 | (a) Icallis | to BBC news y | when I entered the hour | |
| 4. | (a) listen | (b) listening | (c) listened | (d) heard |
| 5 | SBI sees no stress | (0) listening
gold loan n | ortfolio | (u) licalu |
| 5. | (a) upon | (b) about | (c) on | (d) in |
| 6 | (a) upon
Gross refining mer | (0) about | (0) on
where we set $2/bbl$ | (u) III |
| 0. | (a) from | (b) of | (c) for | (d) off |
| 7 | (a) nom
They might | form diverse | backgrounds but the | v had one thing in |
| /. | common music | | backgrounds but the | y had one thing in |
| | (a) have come | (b) have came | (c) had come | (d) had came |
| Q | (a) have come | | (c) had come | (u) had came |
| 0. | and Nilja 500 Co | shanad ratios | ose ratio,o-speed,r-do | wir and 5-up sinned |
| | (a) of | (b) to | (c) off | (d) with |
| 0 | Roval Enfield is as | t to a new y | variant of its Dullat Tw | (u) will
vinepark |
| 2. | (a) start | (b) lounch | (a) released | (d) made |
| | (a) stall | | (c) released | (u) made |

| 10. | The kidney b
visual resem | bean or red bean, know
blance to a kidney. | wn as rajma in India, | gets its name of its |
|-----|------------------------------|---|-------------------------|-----------------------------|
| | (a) about | (b) from | (c) due to | (d) because |
| 11. | six | percent of engineerin | ng graduates are deer | ned employable in the IT |
| | industry. | e e | 6.6 | 1 2 |
| | (a) at | (b) of | (c) from | (d) about |
| 12. | v | vords in the dictionary | y whenever you find r | new words. |
| | (a) look for | (b) look up | (c) look in | (d) look after |
| 13. | Do not beat a | anyone 'below the bel | t' means adopt | means. |
| | (a) unfair | (b) secret | (c) behind | (d) fair |
| 14. | Every family | has a 'black sheep' r | means they have | person. |
| | (a) undesirab | ble (b) favourite | (c) dark comp | lexioned (d) desirable |
| 15. | 'Burn the mi | dnight oil' means wo | rk | |
| | (a) hard | (b) using oil l | amp (c) hardly | (d) rarely |
| 16. | 'Cut corners' | ' means | | |
| | (a) design | (b) change sh | ape (c) spend econ | omically (d) make |
| | round | | | |
| 17. | We shall star | t two o' clock | in the morning. | |
| | (a) on | (b) according | to (c) for | (d) at |
| 18. | India is movi | ing pro | sperity. | |
| | (a) toward | (b) two wards | (c) two words | (d) towards |
| 19. | 'Cut one's co | oat according to one's | cloth' means live with | thin one's |
| | (a) country | (b) income | (c) duty | (d) premises |
| 20. | They travelle | ed the South | India. | |
| | (a) a round | (b) around | (c) rounded | (d) rounding |
| 21. | 'gift of the g | ab' means skill of | | |
| | (a) gifting | (b) filling the | gaps (c) famous | (d) speaking |
| 22. | ha | ving Royal Enfield bi | ike that Chief Ministe | r has nothing. |
| | (a) beside | (b) besides | (c) before side | (d) left side |
| 23. | | _ the pressure of 'ragg | ging' he preferred to j | oin college near his house. |
| | (a) withstand | ling (b) bearing | (c) without sta | nding (d)notwithstanding |
| 24. | 'hard nut to o | crack' means a | person or problem | to solve. |
| | (a) difficult | (b) easy | (c) different | (d) diffident |
| 25. | they | were from English r | nedium background, | they say they cannot write |
| | Urdu. | | | |
| | (a) since | (b) sins | (c) scenes | (d) seen |
| 1) | c 2) d 3 | B) c 4) b 5) | c 6) c 7) a | 8) d 9) b 10) d |
| 11) | d 12) a 13 | (3) a 14) a 15) | a 16) c 17) d | 18) d 19) b 20) b |
| 21) | a 22) b 23 | 5) d 24) a 25) | a | |
| | | VAA | | |

VOCABULARY A BUSY DAY

III. Fill in the blank choosing the correct word.

| 1. | The total installed | a generation capa | city, including invert | er, batteries | and ot | ther |
|----|---------------------|-------------------|------------------------|---------------|------------|------|
| | is 200 |) units. | | | | |
| | (a) instruments | (b) furniture | (c) paraphernalia | (d) things | | |
| 2. | Vodafone's 3G ser | vices had | very well | | | |
| 2. | Vodafone's 3G ser | vices had | very well | (u) unings | (u) things | |

| (a) took off | (b)take off | (c) taken of | (d) taken off |
|---|---|---|--|
| After the request to | for the Nati | ional anthem, everyo | ne was shocked to hear |
| a popular song from | m a Hindi film. | | |
| (a) rise | (b) raise | (c) rice | (d) raised |
| ICICI Bank, HDFO | C Bank and Axis Ban | nk were named by Co | bropost for |
| in money launderin | ıg. | · | · |
| (a) involving | (b) making | (c) meddling | (d) indulging |
| Ricin is a lethal po | ison, with no | which is found i | n castor beans. |
| (a) antibiotics | (b) antidote | (c) anti science | (d) anti medical |
| Twitter is | a feature that lets a | n advertisers target a | ds based on words that |
| appear in users' tw | veets. | U | |
| (a) introducing | (b) introduced | (c) introduce | (d) investing |
| The mango season | has just wit | h the 'rasalu' arriving | g in the markets. |
| (a) began | (b) begin | (c) beginning | (d) begun |
| Media should be | the last to | in a situation whe | ere government allows |
| pubs and decides t | heir timings. | | C |
| (a) raise fingers | (b) point fingers | (c) show fingers | (d) find fingers |
| As the sun started | , peop | le were forced to us | se caps, umbrellas and |
| scarves. | · · · | | - |
| (a) beat down | (b) beated down | (c) beating down | (d) beaten down |
| Twitter has | an app that l | lets people find mus | ic they like and tweet |
| songs from iTunes | | | |
| (a) launching | (b) launch | (c) launched | (d) lunch |
| | | | |
| c 2) d 3) a | 4) d 5) b | 6) a 7) d 8 |) b 9) c 10) c |
| Idantify the course | at waa ahulam fan the | undaylinad words | |
| The brother was al | vous playing pranks | on his little sister | |
| (a) injuries | (b) mischievous ac | $\frac{1}{2}$ on this indice sister. | (d) detractions |
| (a) injunes | (0) miseme vous ac | | |
| Let us not prate ab | out our virtues | (c) dettiments | (d) defidetions |
| Let us not <u>prate</u> ab | out our virtues. | (c) speak foolishly | v about |
| Let us not <u>prate</u> ab
(a) discard
(d) restore | out our virtues.
(b) forsake | (c) speak foolishly | y about |
| Let us not <u>prate</u> ab
(a) discard
(d) restore
The little girl pratt | out our virtues.
(b) forsake
led endlessly about h | (c) speak foolishly | y about |
| Let us not <u>prate</u> ab
(a) discard
(d) restore
The little girl <u>pratt</u>
(a) fondled | out our virtues.
(b) forsake
<u>led</u> endlessly about h
(b) ravished | (c) speak foolishly
ner dolls. | (d) babbled |
| Let us not <u>prate</u> ab
(a) discard
(d) restore
The little girl <u>pratt</u>
(a) fondled
In the preamble to | out our virtues.
(b) forsake
<u>led</u> endlessly about h
(b) ravished
the constitution, the | (c) speak foolishly
ner dolls.
(c) caressed
purpose of the docu | (d) deductions
y about
(d) babbled
ment is set forth. |
| Let us not <u>prate</u> ab
(a) discard
(d) restore
The little girl <u>pratt</u>
(a) fondled
In the <u>preamble</u> to
(a) content | out our virtues.
(b) forsake
<u>led</u> endlessly about h
(b) ravished
the constitution, the
(b) context | (c) speak foolishly
ner dolls.
(c) caressed
purpose of the docur
(c) epilogue | (d) definetions
y about
(d) babbled
ment is set forth. |
| Let us not <u>prate</u> ab
(a) discard
(d) restore
The little girl <u>pratt</u>
(a) fondled
In the <u>preamble</u> to
(a) content
(d) introductory sta | out our virtues.
(b) forsake
<u>led</u> endlessly about h
(b) ravished
the constitution, the
(b) context
atement | (c) speak foolishly (c) caressed purpose of the documents (c) epilogue | (d) babbled
(d) babbled
nent is set forth. |
| Let us not <u>prate</u> ab
(a) discard
(d) restore
The little girl <u>pratt</u>
(a) fondled
In the <u>preamble</u> to
(a) content
(d) introductory sta
The expert thinks | out our virtues.
(b) forsake
<u>led</u> endlessly about h
(b) ravished
the constitution, the
(b) context
atement
that this stock is a pr | (c) speak foolishly (c) speak foolishly (c) caressed purpose of the document (c) epilogue | (d) babbled
(d) babbled
ment is set forth.
and advises against its |
| Let us not <u>prate</u> ab
(a) discard
(d) restore
The little girl <u>pratt</u>
(a) fondled
In the <u>preamble</u> to
(a) content
(d) introductory sta
The expert thinks
purchases. | out our virtues.
(b) forsake
<u>led</u> endlessly about h
(b) ravished
the constitution, the
(b) context
atement
that this stock is a <u>pr</u> | (c) speak foolishly (c) caressed (c) caressed purpose of the docur (c) epilogue | (d) definetions
about
(d) babbled
ment is set forth.
and advises against its |
| Let us not <u>prate</u> ab
(a) discard
(d) restore
The little girl <u>pratt</u>
(a) fondled
In the <u>preamble</u> to
(a) content
(d) introductory sta
The expert thinks
purchases.
(a) ascertained | out our virtues.
(b) forsake
<u>led</u> endlessly about h
(b) ravished
the constitution, the
(b) context
atement
that this stock is a <u>pr</u>
(b) uncertain | (c) speak foolishly (c) speak foolishly (c) caressed purpose of the docur (c) epilogue | (d) deductions
(d) babbled
nent is set forth.
and advises against its
(d) decisive |
| Let us not <u>prate</u> ab
(a) discard
(d) restore
The little girl <u>pratt</u>
(a) fondled
In the <u>preamble</u> to
(a) content
(d) introductory sta
The expert thinks
purchases.
(a) ascertained
Born Centuries too | out our virtues.
(b) forsake
<u>led</u> endlessly about h
(b) ravished
the constitution, the
(b) context
atement
that this stock is a <u>pr</u>
(b) uncertain
a late, the scholar was | (c) speak foolishly (c) speak foolishly (c) caressed purpose of the docur (c) epilogue recarious investment (c) doubtless s anachronism in mo | (d) declaterions
(d) babbled
ment is set forth.
and advises against its
(d) decisive
dern urban society. |
| Let us not <u>prate</u> ab
(a) discard
(d) restore
The little girl <u>pratt</u>
(a) fondled
In the <u>preamble</u> to
(a) content
(d) introductory sta
The expert thinks
purchases.
(a) ascertained
Born Centuries too
(a) misdated perso | out our virtues.
(b) forsake
<u>led</u> endlessly about h
(b) ravished
the constitution, the
(b) context
atement
that this stock is a <u>pr</u>
(b) uncertain
late, the scholar was
n (b) fop | (c) speak foolishly (c) speak foolishly (c) caressed purpose of the docur (c) epilogue recarious investment (c) doubtless s anachronism in mo (c) snob | (d) dediated on s (d) babbled (d) babbled and advises against its (d) decisive dern urban society. (d) chic |
| Let us not <u>prate</u> ab
(a) discard
(d) restore
The little girl <u>pratt</u>
(a) fondled
In the <u>preamble</u> to
(a) content
(d) introductory sta
The expert thinks
purchases.
(a) ascertained
Born Centuries too
(a) misdated perso
We cannot condom | out our virtues.
(b) forsake
<u>led</u> endlessly about h
(b) ravished
the constitution, the
(b) context
atement
that this stock is a <u>pr</u>
(b) uncertain
late, the scholar was
n (b) fop
e such knavery in pu | (c) speak foolishly (c) speak foolishly (c) caressed purpose of the docur (c) epilogue recarious investment (c) doubtless s <u>anachronism</u> in mo (c) snob iblic officials | (d) deductions (d) babbled ment is set forth. and advises against its (d) decisive dern urban society. (d) chic |
| Let us not <u>prate</u> ab
(a) discard
(d) restore
The little girl <u>pratt</u>
(a) fondled
In the <u>preamble</u> to
(a) content
(d) introductory sta
The expert thinks
purchases.
(a) ascertained
Born Centuries too
(a) misdated perso
We cannot condom
(a) gentility | out our virtues.
(b) forsake
<u>led</u> endlessly about h
(b) ravished
the constitution, the
(b) context
atement
that this stock is a <u>pr</u>
(b) uncertain
) late, the scholar was
n (b) fop
e such <u>knavery</u> in pu
(b) snobbishness | (c) speak foolishly (c) speak foolishly (c) caressed purpose of the docur (c) epilogue recarious investment (c) doubtless s anachronism in mo (c) snob iblic officials (c) haughtiness | (d) deductions (d) babbled (d) babbled nent is set forth. and advises against its (d) decisive dern urban society. (d) chic (d) rascality |
| Let us not <u>prate</u> ab
(a) discard
(d) restore
The little girl <u>pratt</u>
(a) fondled
In the <u>preamble</u> to
(a) content
(d) introductory sta
The expert thinks
purchases.
(a) ascertained
Born Centuries too
(a) misdated perso
We cannot condom
(a) gentility
It is interesting to | out our virtues.
(b) forsake
<u>led</u> endlessly about h
(b) ravished
the constitution, the
(b) context
atement
that this stock is a <u>pr</u>
(b) uncertain
b late, the scholar was
n (b) fop
e such <u>knavery</u> in pu
(b) snobbishness
note how public o | (c) speak foolishly (c) speak foolishly (c) caressed purpose of the docur (c) epilogue recarious investment (c) doubtless s anachronism in mo (c) snob iblic officials (c) haughtiness opinion oscillates bet | (d) deductions (d) babbled (d) babbled (d) decisive (d) decisive (d) chic (d) rascality (d) tween the extremes of |
| Let us not <u>prate</u> ab
(a) discard
(d) restore
The little girl <u>pratt</u>
(a) fondled
In the <u>preamble</u> to
(a) content
(d) introductory sta
The expert thinks
purchases.
(a) ascertained
Born Centuries too
(a) misdated perso
We cannot condom
(a) gentility
It is interesting to
optimums and pess | out our virtues.
(b) forsake
<u>led</u> endlessly about h
(b) ravished
the constitution, the
(b) context
atement
that this stock is a <u>pr</u>
(b) uncertain
b late, the scholar was
n (b) fop
e such <u>knavery</u> in pu
(b) snobbishness
note how public o
simism. | (c) speak foolishly (c) speak foolishly (c) caressed purpose of the docur (c) epilogue recarious investment (c) doubtless s anachronism in mo (c) snob blic officials (c) haughtiness pinion oscillates be | (d) deductions (d) babbled ment is set forth. and advises against its (d) decisive dern urban society. (d) chic (d) rascality tween the extremes of |
| | After the request to
a popular song from
(a) rise
ICICI Bank, HDFC
in money launderin
(a) involving
Ricin is a lethal po
(a) antibiotics
Twitter is
appear in users' tw
(a) introducing
The mango season
(a) began
Media should be t
pubs and decides th
(a) raise fingers
As the sun started
scarves.
(a) beat down
Twitter has
songs from iTunes
(a) launching
c 2) d 3) a
<i>Identify the correct</i>
The brother was al
(a) injuries | After the request to for the Natianal popular song from a Hindi film. (a) rise (b) raise ICICI Bank, HDFC Bank and Axis Barrin money laundering. (a) involving (b) making Ricin is a lethal poison, with no (a) antibiotics (b) antidote Twitter is a feature that lets and appear in users' tweets. (a) introducing (b) introduced The mango season has just with (a) began (b) begin Media should be the last to pubs and decides their timings. (a) raise fingers (a) beat down (b) beated down Twitter has an app that I songs from iTunes. (a) launching (b) launch (b) launch (c) 2) d 3) a 4) d 5) b | After the request to for the National anthem, everyon a popular song from a Hindi film. (a) rise (b) raise (c) rice ICICI Bank, HDFC Bank and Axis Bank were named by Commoney laundering. (a) involving (b) making (c) meddling Ricin is a lethal poison, with no which is found if (a) antibiotics (b) antidote (c) anti science Twitter is a feature that lets an advertisers target a appear in users' tweets. (a) introducing (b) introduced (c) introduce The mango season has just with the 'rasalu' arriving (a) began (b) begin (c) beginning (c) beginning Media should be the last to in a situation whe pubs and decides their timings. (a) raise fingers (b) point fingers (c) show fingers As the sun started an app that lets people find muss songs from iTunes. (a) launching (b) launch (c) launched c 2) d 3) a 4) d 5) b 6) a 7) d 8 |

| 9. | These books display the <u>quintessence</u> of wit. | | | | | | | | | | | | | | | | | | |
|--|---|--------------------|--|---------|--------|--------------|---------------|--------------------------|--------------------------------|-----------------------------|--------------------------------------|---------------|-------|--------------|--------------|------------|------------|-------|----|
| | (a) dregs (b) essence; marrow (c | | | | | | | w(c) residue (d) probity | | | | ty | | | | | | | |
| 10. | In China, most people venerate their and | | | | | | | | ancest | cestors | | | | | | | | | |
| | (a) revere (b) scorn | | | | | | (c |) red | lress | | | (d) shirk | | | | | | | |
| 1) | b | 2) | c | 3) | d | 4) | d | 5) | b | 6) | а | 7) | d | 8) | c | 9) | b | 10) | а |
| V. | T | DIO | MS | | | | | | | | | | | | | | | | |
| 1. | N | Av co | mpu | ter sl | hut c | lown | une | xpec | tedl | v whi | le I v | vas v | vriti | ng tha | at es | sav. a | and | I had | to |
| | S | tart a | gain | from | l scra | atch. | | 1 | | 5 | | | | 0 | | 5) | | | |
| | (: | a) Fr | om v | vhere | e the | com | pute | r was | s sci | ratche | d | | | | | | | | |
| | (1 | b) Fr | om t | he be | ginr | ning | 1 | | | | | | | | | | | | |
| | Ò | c) Th | ie ca | t scra | itche | ed me | ; | | | | | | | | | | | | |
| |) | d) Th | ne co | mput | ter so | cratel | ned t | he ca | at | | | | | | | | | | |
| 2. | Ň | Íy na | me t | hrew | a w | et bla | anke | t on | my | plans | try o | out fo | r the | e play | ·. | | | | |
| | (: | a) Pu | t a w | et bla | anke | t on | my r | lans | 2 | (b |) Th | rew a | a we | t blar | nket | at me | | | |
| | (| (c) Discouraged me | | | | | | | (d |)
Go | t ang | gry o | n me | | | | | | |
| 3. | Ì | t was | rain | ing c | ats a | and d | o <u>gs</u> v | when | Ιw | valked | to se | choo | l thi | s mor | ning | | | | |
| (a) Raining heavily (b) Cats and dogs fall | | | | | | | lling | with | the | rain | | | | | | | | | |
| | (| c) An | imal | s in 1 | my p | ath | | | | (d | (d) Dogs and cats are in the rain | | | | | | | | |
| 4. | I | f I dio | d tha | t my | dad | woul | ld <u>ki</u> | <u>ll</u> me | | | | - | | | | | | | |
| | (: | a) Ca | use me to die (b) Get really mad at me | | | | | | | | | | | | | | | | |
| | (| c) Da | d wo | ould o | die | | | | | (d) Dad will shoot me | | | | | | | | | |
| 5. | N | /ly m | usic | teach | ner n | nakes | s me | learr | ı my | iy pieces <u>by heart</u> . | | | | | | | | | |
| | (: | a) Me | emor | ize tł | nem | | | | (b) Write them on paper hearts | | | | | S | | | | | |
| | (| c) Us | e my | v hear | rt to | learn | the | n | (d) A piece of my heart | | | | | | | | | | |
| 6. | Ν | ∕ly m | othe | r and | I do | n't <u>s</u> | ee ey | ve to | eye | on th | e wa | y I d | ress | | | | | | |
| | (: | a) Lo | ok e | ach o | other | in th | e ey | e | | (b |) Lo | ok fr | om | one e | ye to | o the | othe | er | |
| | (• | c) Sta | are ea | ach o | ther | | | | | (d |) Do | n't a | gree | with | eacl | h oth | er | | |
| 7. | I | 'd get | t in b | oig tro | oubl | e if n | ny m | om l | near | d me | using | g a <u>fc</u> | our l | etter v | word | <u>l</u> . | | | |
| | (; | a) Wo | ord v | vith f | our | letter | • | | | (b | (b) Swear word | | | | | | | | |
| (c) Four words (d) Short word | | | | | | | | | | | | | | | | | | | |
| 8. | S | he do | besn | 't car | e ab | out y | ou. S | She's | jus | t <u>look</u> | ing c | <u>out fo</u> | or nu | <u>imber</u> | one | <u>.</u> | | | |
| | (: | a) Lo | okin | g out | one | e of th | ne wi | indov | WS | (b | (b) looking out for her own interest | | | | | | | | |
| | () | c) loc | oking | g for t | the f | irst o | ne | | | _(d |) to | be th | e on | ly on | e | | | | |
| 9. | N | Ay fri | iend | told | me t | o <u>bre</u> | <u>ak a</u> | <u>leg</u> t | oefo | re I w | ent o | on sta | ige, | | | | | | |
| | (: | a) fra | cture | e the | bone | e in n | ny le | g | | (b |) bre | ak a | leg | off th | e tat | ole | | | |
| 10 | () | c) W1 | shed | me g | good | luck | | c | | (d |) fig | hting | g wit | h the | legs | 1.0 | | | |
| 10. | Ć | helse | ea wa | as go | ing 1 | to try | out | tor t | he b | aseba | II tea | ım, b | ut s | he go | t <u>col</u> | d fee | <u>t</u> . | | |
| | () | a) fee | t we | re to | o col | ld | | | | (b |) wa | s afr | aid t | o try | | | | | |
| | (• | c) put | t her | shoe | s on | inste | ead | | | (d |) leg | s fee | ling | cold | | | | | |
| | | | | | | | | | | | | | | | | | | | |

SYNONYMS

| VI. | Choose the corre | ct word for the und | lerlined word. | |
|------|--------------------------|--------------------------------|------------------------------|------------------------|
| 1. | Carlos was <u>happy</u> | when he got his ne | ew bike. | |
| | (a) glad | (b) excited | (c) sad | (d) joyful |
| 2. | The person in the | bank service was v | ery <u>ignoble</u> man. | |
| | (a) noble | (b) sophisticated | (c) gentle | (d) pious |
| 3. | The other compar | ny is a <u>rival</u> compan | y to us. | |
| | (a) partner | (b) competitor | (c) claimant | (d) enemy |
| 4. | The person is ver | y <u>civil</u> in this localit | ty. | |
| | (a) formal | (b) polite | (c) social | (d) sophisticated |
| 5. | The Border Sec | urity Force interce | e <u>pted</u> yesterday a tr | uck carrying arms and |
| | ammunition. | | | |
| | (a) interrupted | (b) met | (c) stopped | (d) found |
| 6. | He was punished | to rigorous impriso | nment for <u>larcency</u> . | |
| | (a) stealing | (b) forgery | (c) dacoity | (d) murder |
| 7. | He enjoys <u>posturi</u> | <u>ng</u> before an audier | nce. | |
| | (a) taking up a po | sition | (b) pretending | (c) acting |
| | (d) putting onesel | f into show poses | | |
| 1) | 2) | 2) h (1) | 5) | () $()$ $()$ $()$ $()$ |
| 1) | a 2) a | 5) 0 4) | c 3) c | 0) a /) d |
| | | ANTO | ONYMS | |
| VII. | Choose the corre | ct word. | | |
| 1. | PARALLEL | | | |
| | (a) divergent | (b) curved | (c) random | (d) wavy |
| 2. | NOVEL | | | · / • |
| | (a) formal | (b) ancient | (c) customary | (d) traditional |
| 3. | MANAGE | | | |
| | (a) direct | (b) avail | (c) bungle | (d) wild |
| 4. | ARID | | | |
| | (a) plentiful | (b) productive | (c) humid | (d) agreeable |
| 5. | IMPULSIVE | | | |
| | (a) cautious | (b) considerate | (c) clever | (d) cunning |
| 6. | ENGULFED | | | |
| _ | (a) encircled | (b) grouped | (c) disfigured | (d) detached |
| 7. | LUXURIANT | | | |
| 0 | (a) barrn | (b) small | (c) ghastly | (d) decaying |
| 8. | ZEST | (1) 11 | () 1:00 | |
| 0 | (a) restive | (b) callous | (c) indifference | (d) distaste |
| 9. | REPEL | (1) | () | |
| | (a) attract | (b) concentrate | (c) attend | (d) continue |
| 10. | FACITIOUS | | | |
| 11 | (a) ridiculous | (b) genuine | (c) engineered | (d) magnificent |
| 11. | DORSAL | (1) (1) | | (1) (1) |
| 10 | (a) inactive | (b) ventral | (c) peripheral | (d) central |
| 12. | EPILUGUE | | | |

| 13 | (a) conver | sation | (| b) dialogue | | (c) dramatic | | (d) prologue |
|-----|-----------------------|----------|---|-------------|---|--------------|---|------------------|
| 13. | (a) sustain | L 12 | (| b) conserve | | (c) preserve | | (d) maintain |
| 14. | ACQUIT | | | | | | | |
| | (a) confirm | n | (| b) blame | | (c) punish | | (d) indict |
| 15. | ABORIGI
(a) modern | NAL
n | (| b) popular | | (c) current | | (d) contemporary |
| 1) | а | 2) | d | 3) | с | 4) | с | 5) a |
| 6) | d | 7) | а | 8) | d | 9) | а | 10) b |
| 11) | b | 12) | d | 13) | b | 14) | d | 15) a |

PAST, PRESENT AND FUTURE TENSES

VIII. Fill up the blanks with appropriate tense.

| 1. | First, she frowned and then she | | | | | | | |
|----|---------------------------------|-----------------------------------|-------------------|----------------|--|--|--|--|
| | (a) smiling | (b) smiled | (c) smile | (d) pleased | | | | |
| 2. | Ι | the kitchen floor. | | | | | | |
| | (a) moping | (b) mopped | (c) mop | (d) moaned | | | | |
| 3. | Jack and Jill | their notes | 5. | | | | | |
| | (a) writed | (b) writing | (c) are writing | (d) written | | | | |
| 4. | Tomorrow, I | a donut. | | | | | | |
| | (a) buyed | (b) will buy | (c) buying | (d) bought | | | | |
| 5. | Sally is | behind the tree. | | | | | | |
| | (a) hide | (b) hided | (c) hiding | (d) hidden | | | | |
| 6. | The leaves | The leaves to fall from the trees | | | | | | |
| | (a) beginning | (b) begined | (c) are beginning | (d) begun | | | | |
| 7. | The court is | the prisone | | | | | | |
| | (a) released | (b) release | (c) releasing | (d) 423eleased | | | | |
| 8. | He | on the rug. | | | | | | |
| | (a) tripped | (b) trip | (c) tripping | (d) topped | | | | |
| 1) | b 2) b | 3) c 4) b | 5) c 6) c | 7) c 8) a | | | | |

IX. REPORTED SPEECH

- 1. Tom said, "I went to visit my friends this weekend."
 - (a) Tom said he wants to visit his friends that weekend
 - (b) Tom said he wanted to visit his friends that weekend
 - (c) Tom said he wanted to visit his friends this weekend
 - (d) Tom said he wish to visit his friends the weekend
- 2. Jerry said, "I'm studying English a lot the moment".
 - (a) Jerry said he was studying English a lot at that moment
 - (b) Jerry said he was studying English a lot at the moment
 - (c) Jerry said he wasn't studying English a lot
 - (d) Jerry said I was studying English a lot at that moment
- 3. Jack said, "He must be guilty!"
 - (a) Jack said he must have been guilty

- (b) Jack said he must have be guilty
- (c) Jack said he musn't be guilty
- (d) Jack said he must has been guilty
- 4. You said, "I will help you!"
 - (a) You said you would help me!
 - (b) You said I would help you
 - (c) You said you would help her
 - (d) You said you will help her
- Key 1) b 2) a 3) a 4) a

X. PASSIVE SENTENCE

- 1. "Burglars broke into the house." The passive voice of this sentence is
 - (a) The house was broken
 - (b) The burglars was broken
 - (c) The house has been broken into
 - (d) The house was broken into
- 2. "Shut the door", The passive voice form of this sentence is
 - (a) Let the door be shut
 - (b) The door ought to be shut
 - (c) The door may be shut
 - (d) Let the door shut
- 3. Someone used to send me anonymous letters. The passive voice should be
 - (a) I was used to be sent anonymous letters
 - (b) Anonymous letters used to be sent to me
 - (c) I used to be sent anonymous letters
 - (d) Anonymous letters sent to me
- 4. She is used to cleaning the floor everyday
 - (a) The floor is used to clean by she everyday
 - (b) The floor is used to being cleaned everyday
 - (c) The floor is used to be clean everyday
 - (d) The cleaning of floor is everyday
- 5. They oughtn't to give children sweets
 - (a) Children oughtn't to give them sweets
 - (b) Children oughtn't to be given sweets
 - (c) Sweets oughtn't to be given to children
 - (d) Do not give sweets to children
- 6. He didn't show them the right place
 - (a) The right place wasn't shown
 - (b) He didn't show the right place to them
 - (c) The right place was not shown to them
 - (d) They weren't shown the right place
- 7. No one could tell her the secret
 - (a) She couldn't be told the secret
 - (b) A secret cannot be told to her
 - (c) The secret couldn't be told to her
 - (d) She could be told the secret

- 8. Someone taught them the passive voice
 - (a) The passive voice was taught to them
 - (b) They taught the passive voice
 - (c) They were taught the passive voice
 - (d) They had been taught the passive voice
- 9. They allowed him a second loan this year
 - (a) A second loan was allowed to his this year
 - (b) He was allowed a second loan this year
 - (c) He was allowed this year a second loan
 - (d) A second loan allowed to him
- 1) d 2) а 3) c 4) b 5) b 6) d 7) 8) 9) b а c

PARTS OF SPEECH

XI. Identify the part of speech of the underlined word in each of the following sentences The clown chosed a day around the ring and then fall flat on her face

| 1. | The clown chased | a dog around the <u>ring</u> | g and then fell flat on | ner face. |
|-----|--------------------------|-------------------------------|-------------------------------------|-------------------------|
| | (a) verb | (b) noun | (c) pronoun | (d) adverb |
| 2. | The geese indolen | <u>tly</u> waddled across th | e intersection. | |
| | (a) adverb | (b) verb | (c) adjective | (d) pronoun |
| 3. | Yikes! I'm late for | class. | | |
| | (a) adjective | (b) conjunction | (c) interjection | (d) preposition |
| 4. | Bruno's <u>shabby</u> th | nesaurus tumbled ou | t of the book bag w | then the bus suddenly |
| | pulled out in traffi | c. | | |
| | (a) noun | (b) pronoun | (c) adverb | (d) adjective |
| 5. | Mr. Frederick ang | ily <u>stamped</u> out the fi | re that the local hooli | gans had started on his |
| | verandah. | | | |
| | (a) adverb | (b) verb | (c) pronoun | (d) adjective |
| 6. | Later that summer | , she asked herself, w | hat was <u>I</u> thinking of | ? |
| | (a) noun | (b) adjective | (c) pronoun | (d) preposition |
| 7. | She thought that t | he twenty zucchini p | olants <u>would</u> not <u>be</u> e | enough so she planted |
| | another ten. | | | |
| | (a) adverb | (b) pronoun | (c) verb | (d) preposition |
| 8. | <u>Although</u> she gav | e hundreds of zucch | nini away, the enorm | nous mound left over |
| | frightened her. | | | |
| | (a) interjection | (b) preposition | (c) conjunction | (d) adjective |
| 9. | Everywhere she w | ent, she talked about | the prolific veggies. | |
| | (a) noun | (b) pronoun | (c) verb | (d) adverb |
| 10. | The manager conf | <u>idently</u> made his pres | entation to the board | of directors. |
| | (a) pronoun | (b) verb | (c) adverb | (d) noun |
| 11. | Frankenstein is the | e name of the scientis | t not the monster. | |
| | (a) preposition | (b) conjunction | (c) verb | (d) pronoun |
| 12. | Everyone in the ro | om cheered when the | e announcement was | made |
| | (a) noun | (b) interjection | (c) preposition | (d) pronoun |
| 13. | The sun was shinin | ng as we <u>set</u> out for o | ur first winter camping | ng trip. |
| | (a) verb | (b) adverb | (c) preposition | (d) pronoun |
| 14. | Dust covered ever | y surface in the locke | d bedroom. | |
| | | | | |

| | (a) adjective | (b) noun | (c) pronoun | (d) preposition | | | | |
|------|--|------------------------|-----------------------|------------------------------|--|--|--|--|
| 15. | They wondered if there truly was honor <u>among</u> thieves. | | | | | | | |
| | (a) adjective | (b) pronoun | (c) preposition | (d) adverb | | | | |
| 16. | Exciting new prod | ucts and effective | marketing, strategies | es will guarantee the | | | | |
| | (a) conjunction | (b) propolin | (c) preposition | (d) verb | | | | |
| 17 | Her greatest fear is | that the world will (| (c) preposition | a comfortable pair of | | | | |
| 17. | earrings. | | | a connortable pair <u>or</u> | | | | |
| 18. | (a) pronoun
That suitcase is <u>her</u> | (b) preposition | (c) conjunction | (d) verb | | | | |
| | (a) noun | (b) verb | (c) pronoun | (d) adjective | | | | |
| 19. | Small children often | n insist that they can | do it by themselves. | | | | | |
| | (a) conjunction | (b) adjective | (c) pronoun | (d) adverb | | | | |
| 20. | The census taker kn | ocked loudly on all | the doors but nobody | was home. | | | | |
| | (a) adverb | (b) adjective | (c) verb | (d) conjunction | | | | |
| 1) | (h - 2) = (3) = (2) | 4) d 5) b | (0, c, 7), (c, 8) | (c - 9) (b - 10) (c | | | | |
| 11) | c 12) d 13) a | 14) b 15) c 12 | l6) a 17) b 18) | c 19) b 20) a | | | | |
| XII. | Choose the correct | meaning for the wo | rd given. | | | | | |
| 1. | ANIMOSITY | 0.0 | 0 | | | | | |
| | (a) unknown | (b) hatred | (c) loving | (d) closeness | | | | |
| 2. | DESOLATE | (1) • 1 | () 1 ' | (1) 1. | | | | |
| 3. | (a) mingle
FRENZY | (b) social | (c) polite | (d) solitary | | | | |
| 5. | (a) angry | (b) confused | (c)excitable | (d) frantic | | | | |
| 4. | PERTURBED | | | | | | | |
| 5 | (a)disturbed | (b) related | (c) composed | (d) passionate | | | | |
| 5. | (a) aimless | (b) hopeless | (c) helpless | (d) unfortunate | | | | |
| 6. | ELATION | (c) heperess | (c) neipiess | (.) | | | | |
| _ | (a) ill tempered | (b) high spirits | (c) dull | (d) emotional | | | | |
| 7. | LACKADAISICAI | (h) and articial | (a) un anthusiastia | (d) visionany | | | | |
| 8. | OBSOLETE | (b) superficial | (c) unentitusiastic | (d) visionary | | | | |
| 9 | (a) fashionable | (b) out dated | (c) up to date | (d) accurate | | | | |
|). | (a) liquid state | (b) loose | (c) clear | (d) lacking | | | | |
| 10. | CHAOTIC | (-) | (-) | ()8 | | | | |
| 11. | (a) applicable
REVERENTIAL | (b) demanding | (c) specific | (d) more confusing | | | | |
| - | (a) cunning | (b) pious | (c) valuable | (d) fixed | | | | |
| 12. | ALLURING | | <pre>//> ···</pre> | | | | | |
| 12 | (a) testing | (b) acquiring | (c) surprising | (d) tempting | | | | |
| 13. | AMICABLE | (b) friendly | (a) suitable | (d) useful | | | | |
| 14. | ANOMALOUS | (b) menury | | (u) useiui | | | | |

| 15 | (a) unusual | (b) familiar | (c) ill timed | (d) factual | | | | | | |
|---------------|-------------------------------------|--|---|-------------------------------------|--|--|--|--|--|--|
| 15. | (a) bold | (b) audible | (c) financial | (d) healthy | | | | | | |
| 16. | BRAWL | | | | | | | | | |
| 17. | (a) negotiations
CALLOUS | (b) talks | (c) consensus | (d) quarrel | | | | | | |
| 18. | (a) Approachable
CLEMENCY | (b) insensitive | (c) inevitable | (d) accusing | | | | | | |
| 19. | (a) cooperative
EULOGY | (b) commanding | g (c) strict | (d) mercy | | | | | | |
| 20. | (a) ecological
GARRULOUS | (b) laudation | (c) criticize | (d) allege | | | | | | |
| | (a) gambling | (b) luxurious | (c) accommodatin | g (d) talkative | | | | | | |
| 1)
11) | b 2) d 3) c
b 12) d 13) b | 4) a 5) d
14) a 15) a | 6) b 7) c 8
16) d 17) b 18 | 8) b 9) c 10) d
8) d 19) b 20) d | | | | | | |
| viii | | , , | , , | , , , | | | | | | |
| <i>XIII</i> . | Choose the correct | answer. | | | | | | | | |
| 1. | R : "Ves I wish to | ", ", ", ", ", ", ", ", ", ", ", ", ", " | | | | | | | | |
| | (a) A doesn't like B | to go | (b) A wants B to g | 70 | | | | | | |
| | (c) B wants to go | 10 50 | (d) B requests A to | o nermit | | | | | | |
| 2. | A: Would vou min | d explaining gram | explaining grammar basics to me? | | | | | | | |
| | B: Yes, I do | 1 88 | | | | | | | | |
| | (a) B takes it seriou | S | (b) B is reluctant | ıt | | | | | | |
| | (c) B wants to expla | ain | (d) B wants to try | | | | | | | |
| 3. | A: We shall go out
B: That's ok. | provided the wea | ther is fine. | | | | | | | |
| | (a) A is sure of goir | ng out | (b) A seeks Bs con | nsent | | | | | | |
| | (c) A is doubtful | C | (d) A is desperate | Ś | | | | | | |
| 4. | A: In the event the | meeting is postpo | oned, I'll let you know. | | | | | | | |
| | B: I'll be waiting. | | | | | | | | | |
| | (a) A is planning to | postpone it | (b) A will inform | (b) A will inform about it | | | | | | |
| | (c) A is determined | to conduct meeting | ng (d) A wants to pos | stpone it | | | | | | |
| 5. | A: Can I come to the | ne office today?. | | | | | | | | |
| | B: Don't come unl | ess I call you . | | | | | | | | |
| | (a) B orders A to co | ome | (b) B waits for A | 1 | | | | | | |
| (| (c) B is asking A to | come | (d) B is not clear a | bout time | | | | | | |
| 6. | A: I want to talk to | you on condition | the strike is called off | • | | | | | | |
| | B: We want you to | talk to us first. | (h) A de seu ?4 | 4 4 a 4 a 11 a | | | | | | |
| | (a) A has no precon | uition | (d) A gupports stri | ι ω ιαικ
Iro | | | | | | |
| 7 | (C)A puis a condition | ne willing to return | (u) A supports stri
rn money on time I don | Nu
it mind lending to you | | | | | | |
| /. | B • OK please do it | t winning to retur | in money on unle,1 don | i i minu ienumg to you. | | | | | | |
| | (a) A is willing to 1 | end money | (b) A is nutting co | ndition | | | | | | |
| | (c) A doesn't have t | money | (d) R wants to len | d money to A | | | | | | |
| | | | | | | | | | | |
| 8. | ABC College of Management is a unique specialization "Business Analytics" |
|-----|--|
| 9. | (a) giving (b) allotting (c) offering (d) serves
The revenue has said service tax will be on erection of pandals or
shamiyana for organizing a function. |
| 10. | (a) implied (b) imposed (c) imported (d) empowered
The smallest of the species slightly more than 5.5 cm and weighs about 2 |
| | (a) measure (b) measuring (c) will measures (d) measures |
| 1) | c 2) c 3) c 4) b 5) d 6) c 7) b 8) c 9) b 10) d |
| | ICET - English
Choose the right meaning for the underlined : |
| 1. | He will have to <u>forgo</u> the pleasure of attending the lecture as he is unwell.
(a) Go later (b) Forget (c) Give up (d) Go first |
| 2. | My brother decided to put up his flat as <u>collateral</u> security to get a loan.
(a) Unacceptable (b) Property acceptable (c) Unconditional (d) Cordial |
| 3. | She left a measly tip for the waiter.(a) Less(b) More(c) Voucher(d) Insulting |
| 4. | We enjoyed a leisurely stroll on Sunday morning.(a) Skating(b) Jogging(c) Playing a game(d) Leisurely walk |
| 5. | Those boys are always bickering when they play cricket.(a) Engage in quarrel(b) Cheat(c) Play tricks(d) Assault |
| 6. | Kabir did not heed the advice of others because of his <u>obstinacy</u> .
(a) Intelligence (b) Innocence (c) Unsound mind (d) Stubborn |
| 7. | Ali ran up <u>stupendous</u> debts because of his fondness of luxuries.
(a) Enjoyed (b) Huge (c) Sought (d) Unwanted |
| | Choose the antonyms for the underlined: |
| 1. | Some students are less confident than their <u>peers</u>
(a) Juniors (b) Of equal rank (c) Seniors (d) Of different nationals |
| 2. | People who <u>perpetrate</u> violent crime should be punished secretly.
(a) Responsible for (b) Convict (c) Irresponsible (d) Involved in |
| 3. | The storm raged with relentless fury.(a) Unsteady(b) Steady & persistent (c) Sturdy(d) Studey |
| 4. | I could see the pinnacle of the Himalayas above the clouds. |

| | (a) Highest point | (b) Middle point | (c) Invisible point | (d) Bottom | |
|---------------|---|---|---|--|--------------------|
| 5. | Firdous became <u>fla</u>
(a) Dull | bby due to lack of ph
(b) Strong | nysical activity.
(c) Weak | (d) Thin | |
| 6. | India can send men
(a) hasslefree | to space but <u>there is</u>
(b) unforeseen drav | <u>a catch</u> .
vback (c) a loopho | le (d) understa | nding |
| Word
Choos | s in Pairs as Idioms
se the right meaning | :
g for the underlined | idioms: | | |
| 1. | The objects in his r
(a) in disorder | oom are always at <u>si</u>
(b) in order | xes and sevens
(c) in circle | (d) in square | |
| 2. | She had sixty serva
(a) dispute | nts ar her <u>beck and c</u>
(b) disposal | <u>all</u>
(c) dispose | (d) depose | |
| 3. | The thief was beate
(a) very carefully | n <u>black and blue</u> by (b) very slowly | y the villagers
(c) very severely | (d) very politel | у |
| 4. | He was <u>born</u> <u>and br</u>
(a) studied
(d) brought up since | r <u>ed</u> in Begum Bazaa
(b) worked
e birth | ar
(c) bread factory | | |
| 5. | It's very difficult to
(a) shop | earn one's <u>bread &</u>
(b) livelihood | butter these days
(c) dairy products | (d) s | weets |
| 6. | It was <u>raining cats</u>
(a) rain moderately | <u>& dogs</u> few days ago | (b)rain heavily | (c) rain rarely | (d) rain regularly |
| 7. | I do not believe in <u>c</u>
(a) shy
(c) friendly behavior | eye to eye as it leads
our | to bitterness
(b) maintaining eye
(d) revengeful attitu | e contact
ude | |
| 8. | We should be <u>fair &</u>
(a)cunning | <u>& square</u> in our dealin
(b) careful | ngs
(c) honest | (d) intelligent | |
| 9. | Greater chunk of pe
poverty
(a)without provision | cople in our country land (b) rich | ead a <u>hand to mouth</u>
(c) middleclass | life on account of
(d) royal family | f their |
| 10. | There are no <u>hard &</u>
(a)fixed | <u>& fast</u> rules
(b) flexible | (c) fabulous | (d) adjustable | |
| 11. | She stands <u>head & s</u>
(a) moderate | <u>shoulders</u> above all c
(b) last | other students in the o
(c) average | class
(d) much better | |
| 12. | Discuss your proble | ems <u>heart to heart w</u> i | th your wives & hus | bands | |

| | (a)sincerely | (b) secretely | (c) officially | (d) professionally |
|--------------|--|---|---|--|
| 13. | People raised a <u>hue</u>
(a) no objection | & cry against new ta
(b) appreiciated | ax proposals on 'wha
(c) general alarm | tsap'
(d) supported |
| 14. | The railway station (a) dull | was a scene of <u>hustle</u>
(b) energetic activit | e <u>& bustle</u>
y (c) peaceful | (d) organized |
| 15. | They gave the comp
(a) through a perso | plaint against the offi
on (b) on telephone | icer in <u>black & white</u>
(c)orally | (d) in written |
| 16. | India in olden days
(a) scarcity
(c) poverty | was known to be a la
(b) abundant food
(d) commerce | and of <u>milk & honey</u>
supply | |
| 17. | The Supreme Court
constitution | declared the provisio | on of the Act <u>null & v</u> | <u>void</u> as it is against the |
| | (a) vand | (b) acceptable | (c) invalid | (d) postpolled |
| 18. | Many Bangladeshis
course of time
(a) citizens | who came to India b
(b) friends | became <u>part & parcel</u>
(c) business people | of the land in due
(d) essential part |
| 19. | We should think ov
(a) positives | er the <u>pros & cons</u> of
(b) negatives | f a matter before aim
(c) points for & aga | ing at a decision
inst (d) supporting |
| 20. | I go for a brisk wa
(a) if it rains | lk every morning <u>rai</u>
(b)whether it rains o | <u>n or shine</u>
or not (c) in summe | r(d) in winter |
| 21. | We should do all w (a) no competition | ork <u>shoulder to shou</u>
(b) unanimous | <u>lder</u> for the progress
(c) in close competi | of the project
tion (d) busy |
| 22. | $\frac{\text{Time \& Tide}}{(a) \text{ something}}$ | or none.
(b) everything | (c) few things | (d) nothing |
| <u>Choos</u> | e the right option f | rom the given: | | |
| 1. | I was informed on p
(a) had been received
(c) had received | bhone but no written
ed | confirmation
(b)has been receive
(d) has received | so far.
d |
| 2. | The city was kept _
(a) Over | (b) At | w for several days.
(c) On | (d) Under |
| 3. | I cannot bear
(a) Separation from
(c) Separation of yo | you
you | (b) Your's separation
(d) Your separation | on |

| 4. | Mr. Latif's propert | y was divided | his daughter and | son. |
|-----|--|---|---|---|
| | (a) Among | (b) Amidst | (c) Between | (d) Into |
| 5. | Everyone wants to | for one's | achievements. | |
| | (a) Admire | (b) Be admired | (c) Be admiring | (d) Being admired |
| 6. | We hope that we sl
(a) It was hoped th
(b) It is hoped the
(c) The match is he
(d) Winning the m | nall win the match.
Ie match would be wo
match will be won by
oped to be won
atch is hoped by us | on by us
/ us | |
| 7. | The Chinese surrer
(a) Quebec was sur
(b) The English we
(c) Quebec was sur
(d) Quebec was be | ndered quebec to the
rrendered 1759 by th
ere surrendered quebe
rrendered by the Chin
ing surrendered to th | English in 1759.
e Chinese to the Eng
ec in 1759 by the Chi
nese to the English in
e English in 1759 by | lish.
inese.
1759.
the Chinese. |
| 8. | Hindustan Petroleu
(a)Happened | ım Co. to make up fo | r the losses
(b) Caused | on sale of fuel.
(c) Incurred(d) Created |
| 9. | There are many cha
(a) Meet | allenges to be
(b) Achieved | (c)Achieve | (d)Met |
| 10. | The new unit woul
Settled up | d be on 75 a
(b) Set up | acres.
(c) Settling up | (d)Set |
| 11 | - | 1 | | ·1 1· 1 |
| 11. | (a) Variations | (b) Variants | (c) Varieties | (d) Varies |
| 12. | Merchant acquiring
(a) Facilitation | g business in
(b) Facilitate | of payment throu
(c) Felicitation | ugh debit/credit card.
(d) Felicitate |
| 13. | Indian companies r | prepare to | with the rising de | emand |
| | (a) Keep out | (b) Keep up | (c) Keep dow | (d) None |
| 14. | The project
(a) Comprising | one, two & thr
(b) Compressed | ee BHK apartments. | (c) Compassed(d) Comprises |
| 15. | Social Networking | site Facebook has _ | Helsniki-base | d fitness tracking app |
| | (a) Acquisition | (b) Acquit | (c)Acquired | (d)Procured |
| 16. | The willful bank lo mark | oan by 5 | 00 customers crossed | d the Rs 70,000 crore |
| | (a) Faulters | (b) Violators | (c) Breakers | (d) Default |

17. Amazon (global e-commerce retailer & e-reading device maker) has its eyes
 the education sector in Indi(a)
 (a) Settled on (b) Set on (c) Setting on (d) Set

- 18. National Airlines Air India _____ operating a flight to Bhuj in Gujarat.
 (a) Would (b) Is going to (c) Would be going to (d)Would be
- 19. The e-commerce portal zaamor.com plans to feature modern diamond jewellery collections ______ by in house artisans of VBJ.
 (a) Handcrafted (b) Handycrafted (c) Handcraft (d) Handcropped
- 20. Harvard MBA student Ms Amrita Singal won the grand prize in the 'Social Enterprise' for her venture 'Saathi'
 (a) Branch (b) Category (c) Brand (d) Group
- 21. The competition, which supports both students and alumni launching new business & social impact ______ is inspired by the belief that 'one simple idea can change everything'
 (a) Venture (b) Ventures (c) Vents (d) Business
- 22. The _____ in the social enterprise track was "Tomato Jos", a tomato processing company _____ by MBA students.
 (a) Runner up, found (b) Run up, founded
 (c) Run up, find (d) Runner up, founded
- 23. 'Tomato Jos' is a vertically integrated tomato processing company that ______ small farmers in Nigeria ______ tomatoes that can be made into paste.
 (a) Helps, grows
 (b) Helps, grow
 (c) Help, grow
 (d) (a) Help, growing

Miscellaneous

Choose the right Prepositions:

| 1. | He was Los | ndon 2000 _ | two years. | |
|----|---------------------|---------------------|-------------------|-----------------|
| | (a) yet, in ,for | (b) in, in ,far | (c) in, into ,for | (d) in, in ,for |
| 2. | I have kept your bo | ooks shelf. Pl | ease get them. | |
| | (a) At | (b) into | (c) on | (d) closer |
| 3. | They saw the radio | her desk. | <i>(</i>) | |
| | (a) into | (b) around | (c) at | (d) away |
| 4. | Ahmad usually con | nesbike. | () 1 | (1) 1 |
| | (a)with | (b)on | (c) bye | (d) along |
| 5. | Is it not desirable | to stop the vehicle | traffic lights. | |
| | (a) away | (b)atter | (c)at | (d) far |
| | | | | |

| 6. | Nagesh Kuknoor fo
(a) a | orgot the keys
(b)into | the grass.
(c)inside | (d)on | |
|-----|---|-------------------------------------|--|--------------------------------------|----------|
| 7. | Azhar always puts | his watch | his cupboard. | | (in) |
| 8. | We should apprecia | ate and complim | nent those who come | bicycles. | (on) |
| 9. | The buses generall | y do not stop | the bus stop. | | (at) |
| 10. | My teacher stays _ | the first | floor. | | (on) |
| 11. | She left some foo | d the plat | e. | | (on) |
| 12. | Cipla said it
(a) Sell | Nexavar(ca
(b) Would hav |) at Rs 6,840 for a mont
re sell (c) Has sell | hly dose.
(d) Would sel | 1 |
| 13. | CBDT stands for
(a) Central bank of
(c) Central board o | direct taxes
f disputes | (b) Central board
(d) Central bank o | of direct taxes
f direct tribunal | |
| 14. | Generic drug prices
(a) Behind | s are(b) Away | the reach of millions c
(c) Beyond | of sufferers of ca
(d) Of | ncer. |
| 15. | Finance Minister h
(a) time and again | ad also pointed (
(b) time & out | out
of tide (d) again & af | ter(d) time & tid | le |
| 16. | German sportswea
Reebok stores in In | r maker Adidas
Idi(a) | s said it planned to | 1/3 of : | its 900 |
| | (a) Shut off | (b) Call on | (c) Call off | (d) Shut down | n |
| 17. | The price of 'Sorar
(a) Has been | nib used for treat
(b) Have been | ting kidney cancer
(c) Had | cut by 76
(d) Has | 5%. |
| 18. | Audi, the Germar
capacity at Aurang | abad(MH) by 50 | anufacturer plans
)%. | the prod | duction |
| | (a) To heighten | (b) To hike | (c) To aggravate | (d) To be hike | ed |
| 19. | Brain Cancer drug
(a) Would | 'Temposide'
(b) Will | available at (
(c) Would be | 65,000/-
(d) Must | |
| 20. | Sumsung India is month. | to | launch its first Androi | d 4.0 tablet ear | rly this |
| | (a) Geared | (b) Gear down | (c) Gearing in | (d) Gearing u | р |
| 21. | Audi, a part of the
Skoda | e Volkswagen g | roup, the many | ufacturing facilit | ty with |
| | (a) Will shared | (b) Can shared | l (c) Shares | (d) Shall shar | ed |
| 22. | The manager is not | attending | the matter. | | |

| | (a) On | (b) To | (c) Of | (d) Off |
|-----|---|---|--|--|
| 23. | People always com
(a) On | ment others (b) At | without knowing th (c) About | e facts.
(d) Of |
| 24. | The CM congratul
Championship in 20
(a) For | ated Saina Nehwal
)15.
(b) On | winning t | he world Badminton |
| 25. | We shouldn't objec
(a) To | t this petty $(b) At$ | pleasures.
(c) On | (d) Of |
| 26. | We all should refer
(a) Too | (b) With | Thesaurus for synor
(c) At | nyms antonyms
(d) To |
| 27. | We should always
competitive worl(d)
(a) At | come up
(b) For | a new idea to surv
(c) With | vive in the cut throat
(d) No preposition |
| 28. | Khalid always drop
(a) From | s out the g
(b) No prep | ame whenever he lo
(c) Off | ses hope of winning
(d) Of |
| 29. | A: Can you comple
B : Yes I can
(a) Willingness | te the project in one of (b) Intention | day?
(c) Ability | (d) Purpose |
| 30. | A: I want you to tak
B: Can you brief me
(a) Ability | te up this job
e about it
(b) Command | (c) Request | (d) Possibility |
| 31. | A: you must read or
(a) Probability | ne/two articles every
(b) Wishes | day in order to get go
(c Necessity | ood grade.
(b) Possibility |
| 32. | A: Will you help meB: Yes. Why not?(a) B wants to to(c) B is willing | e in completing this v
reason | work?
(b) B is questioning
(d) B doesn't | , why not himself |
| 33. | A: you will have to
B: Should I? A mea
(a) Only I should do
(c) Others are unwil | invite the chief gues
ns
it
lling | t
(b) Others can also
(d) B wishes to do t | invite
he job |
| | | Popular Ta | g lines | |
| 1. | Have it your way.
(a) Burger king | (b) Pizza hut | (c) Dosa house | (d) Almond house |

| 2. | Just do it.
(a) Reebok | (b) Nike | (c) Ad | lidas | (d) Bata |
|---------|--------------------------------------|---------------------------------------|----------|---------------|---------------------|
| 3. | King of beers.
(a) Budweiser | (b) Kingfisher | (c) Ba | gpiper | (d) Royal challenge |
| 4. | I'm Lovin it!
(a) Alex kitchen | (b) KFC | (c) Ta | j | (d) McDonalds |
| 5. | Think different.
(a) Orange | (b) Blackberry | (c) Ap | ople | (d) Samsung |
| 6. | They're Gr-r-r-reat!
(a) Oats | (b) Kellog's Cornf | lakes | | |
| 7. | Thousands of possil
(a) Best deal | bilities, get yours.
(b) Best sale | (c) Be | st offer | (d) Best buy |
| 8. | $\frac{1}{(a) Black bull}$ | wings
(b) Brown Bull | (c) Re | d Bull | (d) White Bull |
| Verh - | - Prenosition: | | | | |
| 1. | Ask for | | 15. | Angry abou | t |
| 2. | Belong to | | 16. | Different fro | om |
| 3. | Happen to | | 17. | Fed up with | |
| 4. | Listen to | | 18. | Good at | |
| 5. | Speak to | | 19. | Bad at | |
| 6. | Thank for | | 20. | Interested in | 1 |
| 7. | Think <u>about</u> | | 21. | Married to | |
| 8. | Wait <u>for</u> | | 22. | Sorry about | |
| 9. | Look <u>at</u> | | 23. | Sorry for (de | oing) |
| 10. | Look <u>for</u> | | 24. | Onholida | y |
| 11. | Look <u>after</u> (case) | | 25. | on-televisio | n |
| 12. | Depend <u>on</u> /bank <u>on</u> | | 26. | on radio | |
| 13. | afraid of | | 27. | on the phon | e |
| 14. | Angry with | | 28. | On time | |
| Spot tl | he underlined Par | t that has error : | | | |
| 1. | I started/ teaching / | 10 years back. | | | |
| | a l | о с | | | |
| 2. | They had been/ con | ducting/ this course | /since 5 | years. | 1 |
| | a | D | | C | a |
| 3. | It is/ very difficult/ | for guessing/ the pa | per. | A | |
| | a U | C | | u | |

| 4. | He usually/ waking
a | g up/ by 5 am.
b | с | |
|-----|--|---------------------------------------|---------------------------------------|----------------------------------|
| 5. | They are/ very bad
a | / in writing/ applica
b c | tion letters. | d |
| 6. | I have been/ impro
a | ving/ my handwriti
b | ng/ for 2000 January.
c | d |
| | | VER | RBS | |
| 1. | He has been studyi
(a) for a long time
child | ng English
(b) since 1985 | (c) recently | (d) since he was a |
| 2. | I have studied Frem
(a) for a long time | (b) since 1987 | (c) a&b | (d) none |
| 3. | I have been studyin
(a) for a long time | ng Spanish
(b) since 1990 | (c) a&b | (d) none |
| 4. | How long
(a) have | you been studying
(b) had | mathematics when yo
(c) do | ou joined Pharmacy.
(d) none |
| 5. | The cell phone
(a) had been | ringing fo
(b) has been | or two minutes before
(c) was | it was answered.
(d) was been |
| 6. | I have been looking
(a) find | g for my umbrella a
(b) found | ll day, but I haven't
(c) founded | it.
(d) been finding |
| 7. | You have been talk
(a) was not | king about grammar
(b) weren't | , but I l
(c) haven't been | istening.
(d) was not been |
| 8. | When we got there
(a) Did not | the movie
(b) Was not | begun.
(c) Had not | (d) Wasn't been |
| 9. | The flight(a) Had not, reach | arrived when we
(b) Had not, reach | the airport.
ned(c) Hasn't reached | (d) Haven't reached |
| 10. | He was listening
(a) Didn't he | (b) Weren't he | (c) Doesn't he | (d) Wasn't he |
| 11. | We have finished t
(a) Didn't we | enses?
(b) Don't we | (c) Haven't we | (d) Did we |
| 12. | He wasn't writing
(a) Wasn't he | the notes
(b) Was he | _? (c) Weren't he | (d) Didn't he |
| 13. | They attended the | marriage on Sunday | v at Hitex? | |

| | (a) Did they | (b) Didn't they | (c) Weren't they | (d) Were they | | |
|-----|---------------------|--|------------------------|------------------|--|--|
| 14. | As soon as she | discovered t | he truth, she told eve | eryone about it. | | |
| | (a) Has | (b) No need of vert | o (c) Will have | (d) Had | | |
| 15. | Hem | otionless after she | disappea | ared. | | |
| | (a) Was standing, l | nas | (b) Stood, had | | | |
| | (c) Was standing, l | nad | (d) Stood, has | | | |
| 16. | They have been | for 20 year | s. | | | |
| | (a) Marrying | (b) married | (c) marriage | (d) none | | |
| 17. | By five thirty we | worked | two hours. | | | |
| | (a) Have, from | (b) Had, since | (c) Had, for | (d) Have, for | | |
| 18. | I mailed 1 | the resume by the tim | e she enquired. | | | |
| | (a) No need of vert | b (b) Have | (c) Did | (d) Had | | |
| 19. | I her befo | ore she me. | | | | |
| - | (a) Saw, saw | (b) Had seen, saw | (c) Seen, saw | (d) Seen, seen | | |
| 20. | She did not see me | till I had seen her | ? | | | |
| | (a) Didn't she | (b) Does she | (c) Did she | (d) Doesn't she | | |
| 21. | We all t | his morning. | | | | |
| | (a) Were shopping | (a) Were shopping (b) Were in the shopping | | | | |
| | (c) Have shopping | (d) Have been shop | pping | | | |
| 22. | I haven't seen her | since morning. | | | | |
| | (a) Haven't I | (b) Hadn't I | (c) Have I | (d) Had I | | |
| 23. | It has been a week | since I | | | | |
| | (a) Had phoned | (b) Have phoned | (c) Did phoned | (d) Phoned | | |
| 24. | We four | nd the solution to this | problem. | | | |
| | (a) Already | (b) Have a; ready | (c) Almost | (d) All ready | | |
| 25. | We haven't found | the solution yet. | ? | | | |
| | (a) Hadn't we | (b) Have we | (c) Had we | (d) Did we | | |
| 26. | She is an Engineer | ?? | | | | |
| | (a) Is she | (b) Does she | (c) Isn't she | (d) Doesn't she | | |
| 27. | Aren't we practicin | ng much | _? | | | |
| | (a) Do we | (c) Don't we | (c) Are we | (d) Didn't we | | |
| 28. | You wrote CAT la | st year too. | _? | | | |
| | (a) Don't you | (b) Weren't you | (c) Wasn't you | (d) Didn't you | | |
| | | | | | | |

| 29. | The thief(a) Is absconding | (b) Has absconded | (c) Absconding | (d) None |
|-----|--------------------------------------|--|--|-------------------------------|
| 30. | Itme
(a) Is costing | ten rupees.
(b) Costs | (c) Costing | (d) Cost |
| 31. | She he
(a) resembles | er father.
(b) is resembling | (c) resemble | (d) resembled |
| | <u>C</u> | HOOSE THE COR | RECT ANSWER | |
| 1. | I attended the marr
(a) an order | iage because it was _
(b) an obligation | (c) official | (d) my duty |
| 2. | There are many are
(a) interfere | as in which govern
(b) introduce | ment can
(c) intervene | _effectively.
(d) interact |
| 3. | What is needed is a (a) with | n arrangement for be
(b) among | etter coordination
(c) in | them.
(d) of |
| 4. | The CBI did not rai
(a) main | ise to issue
(b) jurisdiction | e when the charge sho
(c) important | eet was filed
(d)jargon |
| 5. | The osama series a:
(a) credible | ired each week is an (b) creditable | tale of th
(c) incredible | e young couple
(d) chaotic |
| 6. | The audience appre
(a) delegation | cciated the of
(b) denotation | Ashoka schooling ir (c) direction | n Gurukul.
(d) depiction |
| 7. | Hindi is the
(a) official | of Hyderabad.
(b) unofficial | (c) lingua franca | (d) semi official. |
| 8. | A student should no (a)with | ot be thought more th
(b) for | nan he can think
(c) about | (d) of . |
| 9. | The coach dived(a) in | (b) into | ing pool.
(c) onto | (d) upon |
| 10. | The PM accepted _
Britain. | the offer | of bilateral talks mad | de by the president of |
| 11. | She works quite ha
(a)with | rd. You can't accuse
(b) on | her being laz | (d) so
zy.
(d) of |
| 12. | The plan of action p
2020. | proposed by the chief | f minister is in conso | nance vision |
| | (a) any | (b) for | (c) about | (d) with |

CHOOSE THE RIGHT WORD

| 13. | The manager | his staff on the | ir excellent performa | nce. |
|---------|---------------------|-----------------------|------------------------|----------------|
| | (a) complemented | (b) supplicated | (c) complemental | (d) reprimand |
| 14. | Who will | the children while | their mother is in the | hospital. |
| | (a)look for | (b) look after | (c) look at | (d) look upon |
| 15. | He has a reputation | hone | sty | |
| | (a) with | (b) at | (c) for | (d) of |
| 16. | The building does n | not have the basic | washing | 3. |
| | (a) aberrations | (b) ablutions | (c) amenities | (d) angularies |
| 17. | Don't scold the boy | /, he'll | in time | |
| | (a) come round | (b) come through | (c)come back | (d)come over |
| Fill in | the blanks with the | e correct prepositio | ns: | |
| 1. | They stay the | second floor | | |
| | (a) In | (b) on | (c) at | (d) inside |
| 2. | She looked | _ the baby | | |
| | (a) later | (b) alter | (c) after | (d) along |
| 3. | They entered | _ the house at 5am | | |
| | (a) into | (b) inside | (c) in | (d) none |
| 4. | We called | the patient in the ho | ospital | |
| | (a) in | (b) of | (c) off | (d) on |
| 5. | Please return my bo | ook | | |
| | (a) back | (b) behind | (c) beside | (d) none |
| 6. | Kindly go | _ the syllabus carefu | ılly | |
| | (a) by | (b) buy | (c) bye | (d) through |
| | | Preposit | ions: | |
| In | the kitchen | | Ona shelf | |

| ln | the kitchen | On | a shelf |
|----|---|----|---|
| | the garden | | a plate |
| | London/Laldarwaja | | a balcony |
| | the cupboard | | the floor |
| At | the bus stop
the door
the traffic light
her desk | | the gram
the envelope
the ceiling |

Phrasal Verbs:

| Get in | | | Got on the bus | | | | |
|------------------------------------|--|---|---|-----------------------|--|--|--|
| Got in | | | Put on your coat | | | | |
| Got ou | t | | <i>Take off</i> your shoes | | | | |
| Get ou | t | | <i>Turn on/off</i> (light/machine/tap etc)
Switch on/off (light/machine) | | | | |
| | | | | | | | |
| | | | Pick up & put down | ,
, | | | |
| | | | | | | | |
| 1. | He stood at the cent | re of the room and | to cry | | | | |
| | (a) Begin | (b) begun | (c) began | (d) had began | | | |
| 2. | In order to
procession to the pr | _ the deadline for the
incipal's room. | e payment of fees, th | he students went in a | | | |
| | (a) Extend | (b) Accelerate | (c) Move | (d) Forward | | | |
| 3. | It is quite dark here. | Pleaset | he light. | | | | |
| | (a) Put | (b) Burn | (c) Switch | (d) Switch on | | | |
| | | | | | | | |
| 4. | Dr. Salim | practicing medicine | since 1990 | | | | |
| | (a) Is | (b) Has been | (c) Had been | (d) Shall | | | |
| 5. | The change in climate may your health | | | | | | |
| - | (a) Effect | (b) Affect | (c) Inflict | (d) Reflect | | | |
| | | | | | | | |
| Choose phrases/verbs/prepositions: | | | | | | | |
| 1. | I will the io | h in two days. | | | | | |
| 1. | (a) Finished | (b) Finish | (c) Completed | (d) Concluded | | | |
| | (d) I mislied | (0) 1 111311 | (c) completed | (d) Concluded | | | |
| 2. | They are leaving | Mumbai nex | t week by KingFishe | er Airlines. | | | |
| | (a) To | (b) Of | (c) With | (d) For | | | |
| 2 | TT' 1 1/1 ' | 1 1 1 | | | | | |
| 3. | His health is | $\underline{\qquad}$ day by day. | | | | | |
| | (a) Decreasing | (b) Increasing | (c) Deteriorating | (d) Descending | | | |
| 4. | Leaving car during | the camp | us is strictly prohibit | ted. | | | |
| | (a) In | (b) Onto | (c) On | (d) Into | | | |
| | (u) III | (0) 01110 | (•) • | (4) 1110 | | | |
| 5. | The workers | the strike after he | e convinced them. | | | | |
| • | (a) Call off | (b) Call of | (c) Called of | (d) Called off | | | |
| | () ••••••••• | (-) | (-) | (-) | | | |
| 6. | I have been teaching here 2000 December. | | | | | | |
| - | (a) From | (b) For | (c) By | (d) Since | | | |
| | () | | (-) = j | (-) > | | | |

15. BUSINESS TERMINOLOTY

Concepts

Absolute Monopoly: Single producer without substitute and control over output, also known as pure monopoly or perfect monopoly

Administered Prices: Prices decided by government or such agencies instead of demand supply forces

Ad valorem Tax: A duty which is imposed on commodities in proportion to their value

Appreciation: An increase in value of stocks, shares and currency

Account: Record of financial transactions over a period of time

Accepting House: Firm usually a Merchant Bank which accepts bills of exchange at a discount for immediate payment to the issuer

Acid Test Ratio: Ratio of liquid assets to current liabilities giving indication of a company's solvency

Acquirer: A person or company which buys something

Adjourn: To stop a meeting for a period

Ad man: Man who works in advertising

Amortize: To pay off by putting money aside regularly over a period of time.

Actuary: Person employed by an insurance company or other organizations to calculate risk involved in premiums (insurance)

Antedate: To put an earlier date on a document

Arbitrage: Selling and buying of foreign currencies to get profit on difference in exchange rates.

Asset: Thing which belongs to a company or a person and which has a value

Average Due Date: The average date when several payments fall due.

Average Cost: Average cost is cost per unit of output

Average Revenue: AR refers to revenue per unit output

Balanced Budget: When current income equals current expenditure is called balanced budget

Backward Integration: If a firm takes control of its suppliers. Ex. Raw materials

Balance Sheet: It is a list of assets and liabilities of a firm at a point of time

Balance of payments: Transactions of a country with the rest of the world during a given year. It includes exports and imports of goods and services

Balance of trade: It refers to exports and imports of goods between two countries. If exports are more it is 'favourable balance of trade' and if imports it is 'unfavourable balance of trade'

Business: Busy - ness. Any activity carried mainly with the objective of earning profit.

Bad debt: A debt which cannot be recovered

Book-keeping: A systematic recording to business transactions in the books of accounts maintained by a trader

Bank rate: Rate of interest at which RBI finances commercial banks

Blue Chip: The term applies to most reliable industrial shares of reputed companies which have stable growth and least risk.

Boom: Stage of business cycle when production employment and spending are all high

Bank Deposits: The funds deposited in bank accounts

Barter System: A method of exchanging goods to goods without a medium of exchange like money

Bear: A bear is a speculator who sells securities in anticipation of a fall in prices of securities

Bill of Exchange: It is an instrument in writing, containing an unconditional order signed by the banker directing a certain person to pay a certain sum of money to certain person or bearer of the instrument.

Black Market: A market which is established without legal sanction

Blue Chip Rate: Refers tot lowest interest rate payable by borrowers having highest credit rate

Brain Drain: Migration of educated and skilled labour from poorer to richer countries

Brand: A brand is a name, term, sign, symbol or design or a combination of all these to identify a particular seller or the group of sellers which differentiates them from competitors

Break-even Point: A no profit and loss point in business

Broker: One who buys and sells bonds and other financial assets

Budget Deficit: Budget deficit is the difference between total revenues and total expenditure

Bullion Market: Precious metals like gold or silver which are held in bulk

Buyer's Market: A market where goods and services are available in plenty and their supply exceeds demand

'B' Shares: Ordinary shares with special voting rights (Owned by the founder of a company and his family)

Baby bonds: US bonds in small denominations.

Bankrupt: A person who has been declared by a court not to be capable of paying his debts.

Bear: Person who sells shares because he thinks the price will fall and he will be able to buy them again more cheaply later

Bilateral: Between two parties or countries

Blind Testing: Testing a product on consumers without telling them what brand it is

By-Product: Product made as a result of manufacturing a main product

Capital: Money, property and assets used in business

Cargo: Load of goods which are sent in a ship or plane etc.

Capitalist: Person who invests money in business

Cartel: Group of companies which try to fix the price or to regulate supply

Company: A group of people organized to buy, sell or provide a service

Conglomerate: Group of subsidiary companies linked together and forming a group, each making very different types of products.

Consortium: Group of companies which work together on a particular project.

Credit Worthiness: Ability of a customer to pay for goods bought on credit

Crisis: Serious economic situation where decisions have to be taken rapidly

Customs duty: Tax payable on goods exported and imported from a country

Current Assets: The assets which can be converted into cash within a short period of time.

Countervailing Duty: An additional import duty imposed on a commodity to offset a reduction of price as a result of export subsidy in the country of it origin

Current liabilities: The liabilities which are repayable within a short period of time within one year

Cyclical unemployment: When aggregate demand for goods and services in the economy falls for below its capacity, a large chunk of labour gets unemployed. This cyclical unemployment

Cash Reserve Ratio: A minimum percentage reserve to be kept against their net demand and time liabilities to be kept with RBI. It ranges from 3 to 15%

Current Ratio: It is also called as "Acid test Ratio" It is the ratio of current assets to current liabilities

Debenture: Agreement to repay a debt with fixed interest using the company's assets as security

Debtor: Person who owes money

Deed: Legal document or written agreement

Deregulate: To remove government controls from an industry

Disinvest: To reduce investment by not replacing capital assets when they wear out

Dog: Product that has low market share and low growth rate and so, is likely to be dropped from the company's product line

Dear Money: When interest rates are high and borrowing is expensive

Deflation: A situation when prices and money incomes are falling

Demand: The quantity of a commodity that will be bought at a particular price

Demand Draft: It is a Bill of Exchange and negotiable instrument

Depression: Prolonged and severe slowing down of economic activity

Devaluation: Fall in the external value of currency

Disinflation: A mild form of deflation when a policy is adopted to check inflation

Dividend: The amount of distributed profit as a percentage of the nominal value of the share capital

Division of Labour: Dividing complex work into components and making individuals responsible for each division

Dumping: The sale of a good in a foreign market at a price below its marginal cost

Duopoly: A form of imperfect competition where there are only two producers

Duopsony: When there are two buyers of a particular good or service. It is duopsony

Depreciation: Reduction in the value of a fixed asset due to wear and tear, passage of time and obsolescence etc.

Direct Taxes: If the burden of tax is borne by the tax payers themselves it is a direct tax Ex. Income tax, gift tax

Demonetisation: When there is lots of unaccounted money (black money) the government withdraws currency of higher denominations, to unearth black money, it is called demonetisation

Easy Money: Refers to a general state of ease and cheapness of borrowing in the financial system

Economic Growth: The rate of expansion of the national product or total value of production of goods and services of a country

Economics of Scale: Saving of expenditure because of increase in and expansion of operations

Exchange Rate: The rate at which one currency can be exchanged for another foreign currency

Elasticity: The degree of responsiveness of demand or supply to a change in price

Fixed cost: The cost which cannot change with a change in the volume of output

Forward Market: A contract to buy or sell commodities or securities at a fixed future date at a price agreed in the contract

Free Market: A market where there is no intervention of government and the supply, demand operate freely

FIFO: First In First Out

Franchise: License to trade using brand name and paying a royalty for it

Gift-edged: Investment which is very safe. Ex: Government Securities

Excise Duty: It is a tax levied on certain commodities produced in the country

Endorse: To sign a bill or a cheque on the back to show that you accept

Face value: Value written on a currency note, coin, bank not, or a share certificate

Factors of Production: Resources required for production. They are divided broadly into 4: Land, Labour, Capital and Organization

Flat Money: Money which the state declares to be legal tender

Finished Good: Good which is ready for consumption of use

Fiscal Policy: Policy of the government on taxes, expenditure, public debt, etc.

Hot Money: Money that moves across borders in response to interest rate differences is called Hot Money

Inflation: A continuous rise in prices or value of money

Indent: An order of listing the goods required.

Invoice: A detailed list goods supplied and services rendered with their values

Interest: A payment by a borrower for a sum of money for a period of time. The remuneration for capital

Inventory: The raw materials, work in goods and finished good maintained by organization to meet operational needs

Intermediate Good: It is neither raw material nor a finished product

Indemnity: Guarantee of payment after a loss

Goodwill: Good reputation of a business

Guarantor: A person who promises to pay someone's debts

Gross Domestic Product: The total value of goods and services produced during a year within the domestic territory of a nation

Hard Currency: The exchange value of currency is stable due to the strong performance of its economy. Ex: US dollar

Hyper Inflation: A very high rate of inflation generally exceeds 1000 percent per annum

Hierarchy: The line of authority in an organization that runs in order of rank from top management to the lowest level

Issued Capital: The actual amount of capital issued by a company and allotted in shares to investors.

Laissez-faire: Refers to a policy of non interference by the state. **Lease:** An agreement to use others property or assets with a periodic payment. **Liabilities:**

Refers to claims actual or potential or an individual or institution. LIFO: Last In First Out

Liquid Assets: Assets in the form of money or which can be quickly converted into money

Liquidation (Winding-up): The process of the existence of the company terminated

Lead Time: The length of time between ordering and supply of something and receiving it.

MODVAT: Modified Value Added Tax

Management: It is an act of getting things done through others by planning, organizing, leading and controlling

Market Price: The price determined by market forces *i.e.* supply and demand

Merger: A Union of two or more firms in transaction by which one absorbs the others

Multinational Corporation: A large corporation with operations and decisions spread over several countries but controlled by central headquarters

Most Favoured Nation: Country which has the best terms of trade

Nationalise: To bring private owned industry into state control

Niche: A special place occupied by one company (a niche company)

NNP: Net National Product, GNP - Depreciation

NPU: Net Present Value. Used in estimating present value of money of future outflows and capital budgeting decision

Net Profit: Gross Profit - (Tax + Depreciation)

Open Economy: An economy when is involved in international trade

Opportunity Cost: The next best alternative use of a factor of production

Open Cheque: A cheque which is not crossed

Open Market Operations: Buying and selling of securities done by RBI. It is a method of controlling inflation and depression

Overhead Costs: Costs which are not chargeable to any unit produced. Ex: salaries, rent, research, etc.

Preference Share: Shares with a fixed rate of dividend as a priority payment than ordinary shareholders

Promoter: One who starts a new business venture. It can be a new company or a firm

P&L Account: It is income statement. A summary of revenue and expenditure of a business

Par Value: Means the nominal or face value of a share or security

Paid-up-capital: That part of the issued capital which is paid by the shareholders.

Penetration Pricing: Practice of charging a lower price in order to capture the major part of the market.

Price Discrimination: Charging different prices for different customers

Price: Refers to value of a commodity expressed in terms of money

Rate of Return: Refers to earning from the investment

Repo Rate: Repo is a short term for repurchase agreement for RBI selling a government security at a competitive rate in the market and absorb excess liquidity

Revenue Expenditure: The expenditure incurred for day to day administration of a business

Royalty: Money paid to an inventor, writer

SDRs: Special Drawing Rights

Securities: Investment in stocks and shares certificates which shows your investment in stocks and shares

Sampling: Testing a product by taking a small amount

Shell Company: A company which will not trade but for namesake listed in the stock exchange

Stagflation: Inflation and stagnation of the economy

Stock Broking: Trade of dealing in shares for clients

Stock holder: Person who holds shares in a company

Sunrise Industries: Companies in the field of electronics and other high-tech areas

Stock Exchange: A highly organized market for dealings in stocks and shares

Sinking Fund: It is a fund created for a specific purpose of redeeming debts on a specific date

Self Currency: The currency that keeps on fluctuating in terms of other currencies

Trade Discount: The discount given by a manufacturer to the dealer and to the retailer from the wholesaler

Tax-evasion: Failing to report income or improperly claiming deductions

Tax Avoidance: Avoiding tax by taking benefit of all available deductions

Takeover: By buying more than 50% of the shares of a business

Turnkey Operation: Where a company takes the responsibility of everything so that it is completely ready for the purchaser to takeover

Turn Around: To make a company change from loss making to profit making

Tycoon: Important Businessman

Turnover: Total sales of a business during a particular period

VAT: Value Added Tax: A tax levied on the value of each of the processes carried out by a business

Variable Costs: Expenses that change directly with a change in output

Wall Street: Street in New York where the stock exchange is situated. The American financial centre

WTO: World Trade Organization: International Organization set up with the aim of reducing restrictions in trade between countries

Wash Sales: It is a transaction in which a speculator sells a security and then buys it at higher price through another broker to create impression on that particular share

Yield: Money earned in on investment

Zero Coupon Bond: Bond which yields no interest but sold at a discount

Zero Based Budgeting: To begin from scratch of each activity without taking into consideration of previous allotments.

Exercise

- 1. Which company's famously advertised vision statement is 'The Network is the Computer'?
 - (a) Cisco Systems
 - (b) Lucent Technologies
 - (c) Sun Microsystems
 - (d) Nortel Networks
- 2. The software company I-flex Solutions was originally a division of which famous financial services company?
 - (a) Citigroup
 - (b) ICICI
 - (c) HSBC
 - (d) ABN Amro Bank 8.
- 3. Which former advertising personality has recently been named the Undersecretary of the State for 'public diplomacy and public affairs' of the US in an exercise to rebrand the US following the September 11 terrorist strikes?
 - (a) Charlotte Beers 9.
 - (b) Jay Chiat
 - (c) Martin Sorrel
 - (d) George Lois
- 4. Which premium international range of luggage was recently launched in India by BlowPlast?
 - (a) Samsonite
 - (b) Strolley
 - (c) American Tourister
 - (d) Delsey
- 5. This year saw the launch of Yahoo! Amazon.com and the famous launch of the Orange mobile phone service in the UK. Which year was this?
 (a) 1992 (b) 1994

- (c) 1995 (d) 1993
- 6. Henry Ford revolutionised the car market with the first mass-produced car, the Fort Model T. In which year was it launched?
 (a) 1924 (b) 1912
 (c) 1908 (d) 1897
- 7. Your firm has decided to localize its products and services to meet local market demands. A good approach to use would be.....segmentation.
 (a) Geographic (b) Benefit
 (c) End-use (d) Customer
 - Consumers can show their allegiance to brands, stores, or companies. Marketers can use this information to segment consumers by.....
 - (a) User status
 - (b) Loyalty

8.

- (c) Store Type
- (d) Brand preference

When the size, purchasing power, and profiles of business market segments can be determined, they are said to posses the requirement of being (a) Measurable (b) Accessible (c) Substantial (d) Actionable

- 10. This group determines a product's position relative to competing products.
 - (a) Manufacturers
 - (b) Wholesalers
 - (c) Retailers
 - (d) Consumers
- A company or store gains a(n)
 by understanding customer needs better than competitors do

- (a) Competitive advantage
- (b) Positioning advantage
- (c) Cost advantage
- (d) Efficiency advantage
- 12. Firms gain this type of advantage through the way they design their distribution coverage, expertise, and performance. Which differentiation is it?
 - (a) Services differentiation
 - (b) Channel differentiation
 - (c) People differentiation
 - (d) Product differentiation
- 13. When firms use symbols, colours, or characters to convey their personalities, they are usingdifferentiation?
 - (a) Image (b) People
 - (c) Company (d) Reputation
- 14. When Competitors cannot easily copy this difference to promote, we say we have a(n) difference?
 (a) Distinctive (b) Profitable
 - (c) Preemptive (d) Superior
- 15. You have just created the 'perfect' ad. It communicates the full mix of benefits upon which the brand is positioned. This full . positioning is called......
 - (a) Value proposition
 - (b) AIDA
 - (c) Capturing the consumers attention
 - (d) Value profiling
- 16. The answer to the customer's question, "Why should I buy your brand?" is found in the
 - (a) Quality image
 - (b) Customer services
 - (c) Value proposition
 - (d) Encyclopaedia

- 17. Canara Bank and Oriental Bank of Commerce signed an agreement with HSBC. Which of the following is / are correct in this context?
 - (a) They joined hands to set up a life insurance venture
 - (b) The proposed venture would be controlled by Canara Bank with 51% stake
 - (c) Oriental Bank of Commerce would hold 23% stake and HSBC 26%
 - (d) All of the above
- 18. AV Birla group company, Madura Garments owns some of the well-known textile brands in India. These brands are
 A) Allen Solly
 B) Van Heusen
 C) Louis Philippe
 Choose the answer from the choices given below
 (a) A and C
 (b) A and B
 (c) Band C
 (d) All of these
- 19. First Store is the BPO subsidiary of which Indian Bank?
 (a) ICICI(b) SBI Bank
 (c) HDFC (d) HSBC India
- 20. Who is the Chairman of the Pension Fund Regulatory and Development Authority (PFRDA)?
 (a) D. Swrup
 (b) M. Damadaran
 - (b) M. Damodaran
 - (c) Pramod Bajpayee
 - (d) C. Rangarajan
- 21. "Smart Money" is a term used for
 - (a) Internet Banking(b) Credit Card
 - (c) Cash with Bank
 - (c) Cash with Bank
 - (d) Cash with Public

- 22. SBI is going to enter into a JV with which telecom company to enable money transaction from one count to another through mobile?
 (a) Airtel
 (b) MTNL
 - (c) Idea (d) Hutch
- 23. CSN is the biggest steel company of which country?
 (a) Britain (b) US a (c) Russia (d) Brazil
- 24. zzzzz Motor Company emphasizes "quality first zzzzz tough" in its truck products. The company has developed a differentiation strategy based on (a) People (b) Image (c) Products (d) Services
- 25. We define aas anything that can be offered to a market of attention, acquisition, use, or consumption and that might satisfy a want or need.
 - (a) Private brand
 - (b) Service variability
 - (c) Service
 - (d) Product
- 26..... are a form of product that consists of activities, benefits, or satisfactions offered for sale that are essentially intangible and do not result in the ownership of anything.
 - (a) Line extensions
 - (b) Services
 - (c) Brands
 - (d) Consumer products
- 27. Many companies are moving to a new level in creating value for their customers. They are developing and delivering total customer experiences. Whereas

products are tangible and services are intangible, experiences are

- (a) Product quality
- (b) Memorable
- (c) Unsought product
- (d) Internal marketing
- 28.....are products and services bought by final consumers for personal consumption. These include convenience products, shopping products, specialty products, and unsought products.
 (a) Services
 - (b) Consumer products
 - (c) Line extensions
 - (d) Industrial products
- 29. A(n)is a name, term, sign, symbol, design, or a combination of these, that indentifies that maker or seller of a product or service.
 - (a) Service
 - (b) Brand
 - (c) Co-branding
 - (d) Internal marketing
- 30. At the very least, the identifies the product or brand. It might also describe several things about the product.
 - (a) Line extension
 - (b) Social marketing
 - (c) Label
 - (d) Specialty product
- 31. A company can increase its business in four ways. Which is not one of these ways?
 - (a) It can add new product lines, thus widening its product mix
 - (b) It can lengthen its existing product lines

- (c) It can add more versions of each product and thus deepen its product mix
- (d) The company can discontinue some of its lines
- 32. Some analysts see as the major enduring asset of a company, outlasting the company's specific products and facilities.
 - (a) Brands
 - (b) Convenience products
 - (c) Specialty products
 - (d) Unsought products
- 33. Marketers need to position their brands clearly in target customer's minds. They can position brands at any of three levels. At the lowest level, they can position the brand on
 - (a) Interactive marketing
 - (b) Internal marketing
 - (c) Product attributes
 - (d) Strong beliefs and values
- Retailers have become concerned that there are already too many brands, with too few differences between them. Thus, Procter & Gamble and other large consumer - product marketers

are now pursuing...... strategies weeding out weaker brands and focusing their marketing dollars only on brands that can achieve the number-one or number two market share positions in their categories

- (a) Megabrand
- (b) Service inseparability
- (c) Social marketing
- (d) Unsought product
- 35. Companies must carefully manage their brands. First, the

brand's positioning must be continuously communicated to consumers. Major brand marketers often spend huge amounts on advertising to create brand and to build preference and loyalty

- (a) Extension
- (b) Awareness
- (c) Packaging
- (d) Internal marketing
- 36. The brand's positioning will not take hold fully unless everyone in the company lives the brand. This suggests that managing a company's brand assets can no longer be left only to
 (a) Product line
 - (b) Product mix
 - (c) Brand extension
 - (d) Brand managers
- 37. Building a(n) and re-educating customers can be a huge undertaking for a company. It cost tens of millions of dollars just for a special four-week advertising campaign to announce the new name, followed by considerable ongoing advertising expenses to the Verizon Company.
 - (a) Product mix
 - (b) Service intangibility
 - (c) New image
 - (d) Internal market
- 38. Name the worlds largest insurer which said it would offer its first insurance coverage complying with Islamic law, tapping a market that could be worth \$15 billion by 2015. Its unit would offer Islamic insurance coverage or takaful, for areas such as health, motor and property to

Gulf Arab customers before expanding to Asia

- (a) American International Group
- (b) Allianz Insurance Group
- (c) Aviva Insurance Group
- (d) Maxlife Insurance Group
- 39. Ten private business houses have signed deals with government for setting up thermal power plants in the state. The plants envisage a total investment of over Rs.46,000 crores to produce 10,920 MW of power. This is the first time that the state government signed so many MoUs for thermal power 44 on a single day. (a) Jharkhand (b) Orissa (c) Chhattisgarh (d) MP
- 40. Every product seems to go through a life cycle. Which of the following is not a major challenge presented by the PLC? 45
 - (a) All products eventually decline
 - (b) A firm must be good at developing new products to replace aging ones
 - (c) The firm must be good at adapting its marketing strategies 46
 - (d) It is difficult to plot the stages as a product goes through the stages
- 41. Products may fail because
 - (a) The market size may have been overestimated
 - (b) The product's design did not meet consumer expectations 47
 - (c) They were prices too high
 - (d) Any of the above

- 42. A company can obtain new products through new product development. Which of the following define(s) new products?
 - (a) Original products
 - (b) Product improvements
 - (c) Product modification
 - (d) All of the above
- 43. New product development starts with
 - (a) Idea generation
 - (b) Idea screening
 - (c) Concept development
 - (d) Concept testing
- 44. A is the way consumers perceive an actual or potential product.
 - (a) Product idea
 - (b) Product concept
 - (c) Product image
 - (d) Test market
- 45. The search for new product ideas should be rather tan haphazard
 - (a) Consistent
 - (b) Systematic
 - (c) Continual
 - (d) Strategically planned
- 46. The purpose of idea generation is to create a of ideas. The purpose of succeeding stages is to that number.
 - (a) Small number, reduce
 - (b) Small number, increase
 - (c) Large number, increase
 - (d) Large number, reduce
- 47. What do we call a detailed version of a new idea stated in meaningful customer terms?(a) Product idea
 - (b) Product concept

- (c) Product image
- (d) Product proposal
- 48. When developing new products, it is important for a firm to distinguish between a product concept, a product image, and a product
 - (a) Idea
 - (b) Proposal
 - (c) Life-cycle
 - (d) All of the above
- 49. With what groups do firms conduct concept testing for new

- products?
- (a) Suppliers
- (b) Employees
- (c) Target customers
- (d) Focus groups
- 50. Many firms routinely test new product concepts with consumers before attempting to
 - (a) Commercialize them
 - (b) Turn them into actual new product
 - (c) Price them
 - (d) Create advertising and promotion

KEY

| 1) | c | 2) | а | 3) | а | 4) | d | 5) b |
|-----|---|-----|---|-----|---|-----|---|-------|
| 6) | c | 7) | а | 8) | b | 9) | а | 10) d |
| 11) | а | 12) | b | 13) | а | 14) | c | 15) a |
| 16) | c | 17) | d | 18) | d | 19) | а | 20) a |
| 21) | b | 22) | а | 23) | d | 24) | d | 25) d |
| 26) | b | 27) | b | 28) | b | 29) | b | 30) c |
| 3D | d | 32) | а | 33) | c | 34) | а | 35) b |
| 36) | d | 37) | c | 38) | а | 39) | b | 40) d |
| 41) | d | 42) | d | 43) | а | 44) | c | 45) b |
| 46) | d | 47) | b | 48) | а | 49) | c | 50) b |

16. COMPUTER TERMINOLOGY Concepts

ASCII: American Standard Code for Information Interchange: It is a seven bit code format used for data communication

ARPANET: Advanced Research Projects Agency Network: Developed by Department of Defence (America)

ALU: Arithmetic Logic Unit: It is a part of CPU, which performs arithmetic and logical operations on integers

Alphanumeric Code: Code that represents numbers, alphabets, special symbols

Artificial Intelligence (AI): It is a branch of Computer Science, which makes computers, to think like human beings

ANSI: American National Standards Institute: which provides standards to display Alphanumeric characters, Punctuation marks and other characters

Assembly Program: A low level program which uses in programming to product machine language

Algorithm: Set of instructions for solving specific problem in a finite number of steps.

ARRAY: A group of logically related elements (Names, Roll No.) identified by a single name.

ATM: Asynchronous Transfer Mode: It is one way of Data Transmission in a network which transfers data in the form of character, (character by character)

ATM: Automatic Teller Machine: It is a bank outlet from which customers can make transactions, like withdraw of money, from their accounts

Application Program: A piece of software that performs specific kinds of tasks

Attachment: A file (ex: audio or video, picture) that is sent with an e-mail message

Bandwidth: In a network connection, band-width is the maximum carrying capacity for data traffic

BASIC: Beginners Ail-Purpose Symbolic Instruction Code: It's a programming language which is easy to learn and easy to use

Batch Processing: A technique in which items to be processed are collected into groups (batched) to permit convenient and efficient processing

BPS: Bits per second: It is data transfer rate (units)

Browse: To move through or surf the internet

Browser: A software tool to surf the internet

Bug: An error in a program

Buffer: Is a small, high speed storage element

BUS: The circuit wires used for transferring date between various components of a computer

Byte: A unit of computer memory made up of 8 bits

Bar Code: A code consisting of a number of magnetic ink lines that are imprinted on a table in varying widths and can be read with a scanning device

B2C: Business to Consumer: Business use the internet to offer their products / services to consumers. It is a form of e-commerce

B2B: Business to Consumer: Business place order for supplies / services with another business directly on the internet

Boot: Process of starting up of a computer system *i.e.* loading the operating system into the memory

Binary Code: Code using bits (0 and 1) to represent data

BIOS: Basic input / output system: Instructions that control the computer's hardware

CRT: Cathode Ray Tube: A technical name for the picture tube (or screen) of a computer monitor

CPU: Central Processing Unit: Provides the fundamental command and instructions environment for the computer. It consists of 3 parts

- 1) ALU: Arithmetic Logic Unit
- 2) **CU:** Control Unit
- 3) **MMU:** Main Memory Unit

CAD: Computer Aided Design: It is widely used in the design of electronic circuits, roads etc.

CAM: Computer Aided Manufacturing

COBOL: Common Business Oriental Language: A high level language capable of performing all the calculations used in business

Computer Network: Several computers connected together for the purpose of having data, and other resources

C: is a high level programming language used for various applications

Client: A computer in the network requesting for services

.com: A website name extension used for commercial organizations on the internet

Cursor: A marker that indicates the position of a letter / digit typed on the screen

Compiler: A software program that converts source code written in high level language into computer understandable machine code

Chip: A device that processes information at the most basic level within a computer

Compressed files: Files that have been temporarily condensed. Ex: ZIP files

CD-ROM: Computer Disc Read Only Memory *i.e.* one type of secondary storage device

Computer: A machine used for processing, storing data according to a set of instructions

C2B: Consumer to Business: These sites permit consumers to specify their requirements of a particular product / service which can be met by the business

C2C: Consumer to Consumer: A website where seller can sell a product / services to another consumer via internet Example: E-Bay

Concurrent Processing: The capacity of an operating system to share memory among several programmes and to execute the instructions during the same time

Cryptography: A technique for conversion of plane text into cyper text (unreadable format)

Data: Characters grouped together in a specific pattern. Information stored in a computer

Database: It is a collection of data put together to serve a particular requirement

DBMS: Data Base Management System: Its a software to control and manage data

Data Entry: Any process of entering data into a computer

DTP: Desk Top Publishing: Software category developed to produce high quality documents

Download: Transfer of files from one computer to another

Domain (or) Domain Name: The address of URL of a particular website

DOS: Disk Operating System: It is a single user operating system where in only one programme can be executed / run at a time

Data Structure: It refers to the logical structuring of data in the memory

Debug: Removing errors (bugs) from the programme

EXE: A file extension denoting an executable programme.

E-mail: Electronic Mail: A service provided by a website for exchange of messages

E-Commerce: Business done via internet

FORTRAN: Formula Translation is one of the oldest high level languages used for scientific purposes

Floppy Disk: A secondary storage device

File: A collection of logically related records

Finger: A software tool used to determine whether another uses is logged on to the internet

Flowchart: Pictorial representation of step by step sequence for solving a problem

File Extension: A code usually of 3 letters that appears at the end of a filename after a dot to indicate its format

Format: To alter the appearance of a file

FTP: File Transfer Protocol

Folder: An electronic storage area used to keep related documents / files

Gigabyte: 1024 mega bytes

GUI: Graphic User Interface: An interface which provides visual presentation of information. Example: Widows

Gateway: A special purpose computer system for exchanging information across incompatible networks

Garbage: Collection of data which is no more usable

GIGO: Garbage In Garbage Out

Hacker: A skilled programmer who breaks into secured computer system

Hard Copy: A copy of computer's output printed on a paper

Hard Disk: Main Memory area of a computer which stores bulk amount of data

Hardware: Electronic, magnetic and mechanical devices used in a computer **Home Page:** The first screen / page of a website.

HTML: Hyper Text Markup Language: A language that describes how a page should be formatted

High-level Language: Programming language which is based on functions and procedures

Host: Any computer on a network that provides services to other computers

HTTP: Hyper Text Transfer Protocol: A protocol used for transfer of information on the internet

Instruction: A command that is recognized by the CPU

Interpreter: A program (s/w) that reads each line of a program to check for syntax errors. It converts source code into object code

Intranet: The vast collection of inter-connected networks, using different protocols

Intranet: A private network for internal use only belonging to a company, also known as LAN

ISP: Internet Service Provider: An organization which provides Internet services on a pay-per-use basis

Icon: Pictorial representation of a file or a function (on the display screen) **Import:** To bring an element from another program

Java: A high level object oriented programming language developed by SUN micro systems for internet applications

Joystick: The input device normally used for playing computer games

JPEG: Joint Photographies Experts Group: A compressed format for storing images

JDBC: Java Data Base Connectivity: An application used to connect to the database using java.

Kilobyte: A unit for memory capacity. 1 KB = 1024 bytes

Kernel: A special program in the operating system which performs basic operations of the operating system

LAN: Local Area Connection: A collection of computers and other nodes linked together in a room within a building which share resources. It is also called Intranet

Label: A name attached to an entity for identification

LSI: Large Scale Integration: Technology used to squeeze hundreds of components onto a single chip

Linux: A multiuser and multitasking operating system developed by Linus. It is a free software which is available in the Internet

Laptop: A portable computer

Log on: A term used to denote user connectivity to the network

Log off: A term used to denote used disconnectivity to the network

Megabyte: A unit of memory capacity 1MB = 1024 KB

Memory: Computer capacity for storing information

Modem: Modulator - Demodulator: Modulation is a process of converting digital data in analog data. Demodulation is a process of converting analog data into digital. A device that allows a computer to transmit data to other computer via telephone lines

Motherboard: The main circuit board inside a computer

Mouse: An input device, used to point the cursor to a certain command

MS-DOS: Microsoft Disk Operating System: It is a single user operating system, used by personal computers

Multimedia: A computer system which has ability to present information by integrating text, graphics, sounds and video

Multiprocessing: The simultaneous execution of two or more set of instructions in a single computer

Multiprogramming: A technique for handling two or more independent programs simultaneously

Mainframe Computer: A computer having single processor of limited capacity

Mini Computer: A computer which is known as PC (Personal Computer)

Network: Collection of computers and peripherals devices connected together

Node: Any electronic device connected to other devices in the network

NLP: Natural Language Processing: Is a way to make a computer to understand any natural language. Example: English, Telugu, Hindi

OS: Operating System: The software programme that controls the running of a computer. It is bridge between software and hardware.

On-line: The status of a computer that is actively connected to the internet

Off-line: The status of a computer that is disconnected to the Internet

Output: Information transferred from the internal memory of the computer to some external device

Pixel: Picture Element: At dot on a computer screen

Peripheral: A hardware device that can be connected to PC

Programme: A series of instructions written for execution by a computer user

Port: A physical socket that allows users to connect a peripheral device to a PC

Port: A logical address of a service in the computer

Plugins: Programmes that are needed to open and run certain files such as video clips or second files

Print Preview: On-screen display that shows users exactly how the active document will look when printed

Portal: Web page / site which personalized and portable access to multiple information

Pocket: A unit of information transmitted from one device to another on a network

Parity Bit: A bit which contains the number of ones (Is) in the data. Even parity for even-number of ones and odd parity for odd number of ones

Pascal: A high-level language used for scientific applications

Password: A group of characters by which a user is uniquely identified when logging on to a system

Protocol: A set of rules that computers use while communicating with each other **Package:** Collection of programs usually for specific applications

RAM: Random Access Memory: A type of memory in which any location can be accessed

ROM: Read Only Memory: It performs read operation only, the information on ROM is made permanent at the time of hardware production

Records: Set of fields on a related subject

Resolution: A measure of the precision of computer output. It is measured in dots per inch or pixels

Router: A special purpose system that handles the connection between two or more networks

RTOS: Real Time Operating System

Software: Computer programmes that are used in a computer to access the hardware devices

Source Code (or) Source Program: A program written in source language

Search Engine: A special kind of website used to find links for other websites

Scanner: A hardware device used to scan any existing picture or photograph into digital format

Secondary Storage: Storage devices that supplement a computer's primary storage. Example: Floppy, CD, etc.

Simulation: A model of real life situation

Spam: Unwanted mails sent by unidentified users.

Surf: To move through the Internet

SQL: Structured Query Language: It is the standardised query language for requesting information from a database

Spooling: Simultaneous Peripheral Operations Online. It is a processing technique which is used in input / output operations

Syntax: The set of rules governing the construction of valid statements in a language

Single User Operating System: Operating system that allows only one application program at a time. Example: DOS

Soft Copy: Any Computer that operates at very high speeds and is used to process large amounts of data

Swapping: Interchanging of memory location from main memory to secondary storage

Server: A computer which provides services which is connected to a network

System Software: A software that operates the PC

Topology: The organization of a computer network
Template: A format for saving a document

Task Bar: A bar usually situated at the bottom of the screen in windows

TCP / **IP:** Transmission Control Protocol / Internet Protocol: A Protocol which is used to transfer data in the Internet

Unix: A multitasking operating system

Upload: Sending a file from one computer to a remote computer

URL: Uniform Resource Locator: The standard way to give addresses of any resource on the internet

USB: Universal Serial Bus: A hardware connector that allows users to add different devices

Utilities: Software that assist in certain computer functions

VLSI: Very Large Scale Integration: Design and production technique to place thousands of electronic components within a small integrated chip

Video Conferencing: Conducting a conference among participants at different sites by using computer networks

VDU: Video Display Unit: A computer terminal with monitor and keyboard

VIRUS: Viral Information Resources Under Sieze: A programme designed to replicate and spread on its own usually without the user's knowledge

Voice Mail: A computerised system for receiving / recording and formatting audio messages

Volatile Memory: A type of memory in which data stored is lost when the power is turned off. Example : RAM

Variable: It is named symbol and refers to a storage location in the memory

WAN: Wide Area Network: A network that connects different cities and countries together via leased lines or satellite links.

Web Page: Simple text file that contains text, images and other types of files of particular site in the internet.

Web Server: Web Documents or Pages stored on internet connected computer

Word Processor: A software required to create, edit and store away document. Example: MS-word

WWW: World Wife Web is a composition of millions of liked web pages that can be viewed by using any of the web browser

Worms: Self contained programs that enter a computer and generate their own commands

XML: Extended Markup Language: A tag language which is used to create and manage web pages

Zip File: A file that has been compressed with Win Zip Compression program

EXERCISE

7.

- 1. 1K is equivalent to (a) 2^6 (b) 2^8 (c) 2^{10} (d) none of these
- 2. Binary coded decimal numbers express each decimal digit as

 (a) bits
 (b) bytes
 (c) word
 (d) none of these
- 3. The basic operations performed by a computer is
 - (a) Arithmetic operations
 - (b) Logical operations
 - (c) Storage and retrieval operations
 - (d) All the above
- 4. The earliest calculating device is
 - (a) Abacus
 - (b) Clock
 - (c) Difference engine
 - (d) None of the above
- 5. The man who built the first mechanical calculator was
 (a) Joseph Marie Jacquard
 (b) John Mauchly
 (c) Blaise Pascal
 - (d) Howard Aiken
- 6. Punched cards were first introduced by
 (a) Powers (b) Pascal (c) Jacquard (d) Hollerith

- The first machine which would be called the prototype of the modern computer was
 - (a) Automatic loom
 - (b) Difference engine
 - (c) Analytic engine
 - (d) Slide rule
- 8. Computes built before the first generation of computers were
 - (a) Mechanical
 - (b) Electro-mechanical
 - (c) Electrical
 - (d) None of the above
- 9. First generation computers used (a) Vacuum tubes
 - (b) Transistors
 - (c) Integrated circuits
 - (d) Wires
- 10. VLSI was first used with the computers of(a) Second generation
 - (b) Third generation
 - (c) Fourth generation
 - (d) None of the above
- 11. Second generation computers started appearing in(a) 1950 (b) 1955
 - (c) 1960 (d) 1970

12. Word length of a home computer is

| (a) 8 bits | (b) 16 bits |
|-------------|-------------|
| (c) 32 bits | (d) 64 bits |

- 13. VAX-11 from DEC is a
 - (a) Mini-computer
 - (b) Supermini-computer
 - (c) Mainframe computer
 - (d) None of the above
- 14. At present, a super computer has the computing capability of (a) 4,000 PCs
 - (b) 40,000 PCs
 - (c) 4 million PCs
 - (d) None of the above
- 15. Cursor is a
 - (a) Pixel
 - (b) Thin blinking line
 - (c) Pointing device
 - (d) None of the above
- 16. Backspace key is a
 - (a) Control key
 - (b) Function key
 - (c) Character key
 - (d) None of the above
- 17. In a high resolution mode, the number of dots in a line is
 (a) 320 (b) 640
 (c) 760 (d) 900
- 18. Programs stored in ROM are called
 (a) hardware
 (b) firmware (c) software
 (d) none of these
- 19. The unit 'kilo instructions per second' is used to measure the speed of(a) processor (b) disk drive (c) printer(d) tape drive
- 20. Integrated circuits are classified on the basis of

- (a) Manufacturing company
- (b) Type of computer
- (c) Number of translators
- (d) None of the above
- 21. A binary system has
 - (a) Two symbols (a) and (b)
 - (b) Two symbols 0 and 1
 - (c) At least two symbols
 - (d) None of the above
- 22. The nine's complement of a decimal number is obtained by
 - (a) Dividing the given number by9
 - (b) Multiplying the given number by 9
 - (c) Subtracting each digit of the number from 9
 - (d) Adding each digit of the number to 9
- 23. A compiler
 - (a) Is a computer program
 - (b) Translate a high-level language into machine language
 - (c) Is a part of software
 - (d) None of the above
- 24. Computer software includes
 - (a) Application programs
 - (b) Operating system programs
 - (c) Packaged programs
 - (d) All the above

25. Machine language

- (a) Is the language in which programs were first written
- (b) Is the only language understood by the computer
- (c) Differs from one type of computer to another
- (d) All the above
- 26. Assembly language

- (a) Uses alphabetic codes in place of binary numbers used in machine language
- (b) Is the easiest language to write programs
- (c) Need not be translated into machine language
- (d) None of the above
- 27. A source program is
 - (a) A program written in a machine language
 - (b) A program to be translated into machine language
 - (c) A machine language translation of a program written in a high level language
 - (d) None of the above
- 28. Stand-alone programs refer to
 - (a) Source program
 - (b) Object programs
 - (c) Executable programs
 - (d) None of the above
- 29. Algorithm and flowchart help us to
 - (a) Know the memory capacity
 - (b) Identify the base of a number system
 - (c) Direct the output to a printer
 - (d) Specify a problem completely and clearly
- 30. The steps in an algorithm
 - (a) Must follow a prescribed order
 - (b) Need not follow any order
 - (c) Will follow a prescribed order sometimes
 - (d) Will follow a random order
- 31. The octal system has the following symbols
 (a) 0, 1, 2, 3, 4 5, 6, 7, 8, 9
 (b) 0, 1, 2, 3, 4, 5, 6, 7

- (c) 0, 1 (d) 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, f
- 32. The decimal equivalent of binary number 101 is(a) 5 (b) 6 (c) 8 (d) 10
- 33. Ever piece of information is stored in the computer memory in terms of(a) Character
 - (b) Digits
 - (c) Character and digits
 - (d) Zeros and ones
- 34. BCD stands for
 - (a) Binary Coded Decimal
 - (b) Bits Coded Decimal
 - (c) Bytes Coded Decimal
 - (d) Binary Coded Data
- 35. EBCDIC stands for
 - (a) Extended Binary Coded Data Interchange Code
 - (b) Extended Binary Coded Decimal Interchange Code
 - (c) Extended Binary Coded Digits Interchange Code
 - (d) Extended Binary Coded Decimal Information Code
- 36. The decimal equivalent of a octal number 76 is
 - (a) 66 (b) 64
 - (c) 62 (d) 58
- 37. EPROM can be used for
 - (a) Erasing the contents of ROM
 - (b) Reconstructing the contents of ROM
 - (c) Erasing and reconstructing the contents of ROM
 - (d) Duplicating ROM

- 38. Which device can understand the difference between data and program?
 - (a) Input devices
 - (b) Output devices
 - (c) Memory
 - (d) microprocessor
- 39. The decimal equivalent of hexadecimal number 4B3 is
 (a) 1200 (b) 1230
 (c) 1203 (d) 1215
- 40. The sum of the binary number 101 and 1101 is (a) 10110 (b) 10010 (c) 10101 (d) 10100
- 41. The symbols 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, f belongs to
 (a) Decimal system
 (b) Octal system
 (c) Hexadecimal system
 (d) None of the above
- 42. The octal equivalent of a decimal number 65 is
 (a) 111
 (b) 101
 (c)100 (d)110
- 43. Memory unit is one part of
 - (a) Input device
 - (b) Control unit
 - (c) Output device
 - (d) Central processing unit

- 44. The programs which are as permanent as hardware and stored in ROM is known as
 (a) hardware
 (b) software
 (c) firmware
 (d) ROM ware
- 45. The hexadecimal equivalent of a decimal number 740 is
 (a) 2EB
 (b) 2EC
 (c) 2ED
 (d) E2D
- 46. Evaluate $111101_2 10010_2$ (a)101110₂ (b) IIIOIO2 (c)110101₂ (d) 10101 h
- 47. The primary units of computer are(a) Input, output, CPU, auxiliary storage unit
 - (b) Input, output, CPU
 - (c) Input, CPU, auxiliary storage unit
 - (d) Input, output, memory
- 48. The octal equivalent of a binary number 01001 is(a) 51 (b) 22 (c) 11 (d) 12
- 49. 1 MB is equivalent to (a) 2^{20} bytes (b) 2^{10} bytes (b) 2^{40} bytes (d) 2^{8} bytes
- 50. The hexadecimal equivalent of a binary number 10011010 is (a) 9A (b) A9 (c) B9 (d) 9B

| KEY |
|-----|
|-----|

| 1) | С | 2) | а | 3) | d | 4) | а | 5) | С | 6) | d | 7) | С |
|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|
| 8) | b | 9) | а | 10) | С | 11) | b | 12) | а | 13) | b | 14) | b |
| 15) | b | 16) | а | 17) | b | 18) | b | 19) | а | 20) | С | 21) | b |
| 22) | С | 23) | b | 24) | d | 25) | d | 26) | а | 27) | b | 28) | С |
| 29) | d | 30) | а | 31) | b | 32) | а | 33) | d | 34) | а | 35) | b |
| 36) | С | 37) | С | 38) | d | 39) | С | 40) | b | 41) | С | 42) | b |
| 43) | d | 44) | С | 45) | а | 46) | d | 47) | а | 48) | С | 49) | А |
| 50) | а | | | | | | | | | | | | |

Communication Ability

| ICET-2012 Choose the Correct Answer: | |
|---|--------------------------|
| 1. A coaxial cable to which a number of computers are connected is known as
(1) Multistrand wire (2) Jelly filled cable (3)Ethernet (4)LAN | Answer:3 |
| 2. The system of transforming data into codes that are meaningless to anyone wh
possess the system for recovering initial data is
Answer:4 | io does not |
| (1) Cryogenic (2) Modulation (3) Quantization (4) Cryptograph | пу |
| 3. An electronic device that allows a single communication channel to carry simul
from many terminals is called
(1) multiplexer (2)microprocessor (3) modulator (4) expert system | taneous data
Answer:1 |
| 4. Short term advance provided by a bank to a current account holder is called A (1) Demand Draft (2) Hand loan (3)Over draft (4) Margin money | Answer:3 |
| 5. The organization which enables multilateral trade among countries is called (1) World Bank (2) World Trade Organization (3) United Nations Organization (4) International Court | Answer:2 |
| 6. The advent of mass production is ascribed to the period of
(1) Second World War (2) Internet era (3) Copper age (4) Industrial | Answer:4
Revolution |
| 7. Compared with a manual system, in a computer system basic internal control objectives change. the methodologies for implementing control change. control objectives are more difficult to achieve. (4) internal control principal | Answer:2 |
| 8. The logical organization of data in a database is called
(1) structure (2) schema (3) algorithm (4) legacy | Answer:2 |
| 9. 10 year Redeemable Bonds means that at the end of the stipulated years the B (1) is written off (2) amount is paid and settled (3) gets converted into shares (4) can be pledged in a bank | ondAnswer:2 |
| 10. Market value of Mutual Fund is expressed as
(1) Rupees per share (2) Rupees per script
(3) Gross value in rupees (4) NAV in rupees | Answer:4 |
| ICET-2012 Choose the Correct Answer: | |
| 1. The passive form of the sentence "She saw you and him." is | Answer:1 |
| (3)You and him had been seen by her. (4) You and him were being seen by | by her. |
| 2. Kamala: "Look, would you mind very much if I went out for a few minu | tes to make a |

| phone | call? It is rather i | mportant." | | | | |
|----------|----------------------------------|-------------------------------|----------------|----------------|------------------|---------------|
| | Krishna: "No, | you go ahead." | | | Ans | wer:2 |
| | Krishna's answ | ver implies that h | eis | | | |
| | (1) angry | (2)understandi | ng (3) | frustrated | (4) apologet | ic |
| 3. | A: "Why do yo | ou always behave | e like a dog i | in the mange | r?" | Answer:1 |
| | B: "I don't kno | w. It's just my na | ture, I gues | s." | | |
| | 'A' implies that | : 'B' is | | | (4) .1 | |
| | (l) a spoilsport | (2) rude | (3) aggress | sive | (4) uncouth | |
| 4. | A: "Would you | ı like a cup of co | ffee?" | | | Answer:1 |
| | B: "If you say | so." | | | | |
| | 'B' is | | | | | |
| | (1) indifferent | (2) eager | (3) casual | | (4) pleased | |
| 5. "Bro | oding over past | failures, he deci | ded to comm | nit suicide." | | Answer:4 |
| | The sentence in | mplies that | | 1. 0.1 | 1 1 | |
| | (1) suicide was (2) | $\frac{11}{1}$ | (2) |) his failures | were broad. | |
| | (3) one should (4) the theorem | erase all memor | 1es, good 01 | r bad. | | |
| | (4) the thought | of his past failur | | uccision. | | |
| 6. | A: "I saw red y | when he put the l | olame on m | e." | | |
| | B: "I understan | d you weren't di | riving the ca | ar when the a | ccident happ | ened." 'A' is |
| | (1) angry | (2) annoyed | (3) furious | (4) rese | ntful | |
| 7 "The | e man was a sou | are neg in a rour | d hole " | | Ans | wer 3 |
| /. III | The speaker in | nplies that the m | an was | | 1 1115 | |
| | (1) a loner | (2) a recluse | (3) a misfit | (4) a bo | ore | |
| ICET- | 2012 Fill in | the blank with | the approp | oriate phras | e / verb / pre | position: |
| 1. I | five lang | uages. | | | Ans | wer:1 |
| | (1) know | (2) am knowin | g (3) kno | own | (4) knowing | 5 |
| | | | | | | |
| 1. He v | was desperate | a job. | | | Ans | wer:1 |
| | (1) for | (2) on | (3) at | | (4) about | |
| 1. | our advertis | ed programme. | we will be s | howing a fili | m. Ans | wer:4 |
| | (1) In regard to | $(2) \ln st$ | oite of (3) |) On behalf o | f (4) I | n place of |
| | | | | | | - |
| 1.He ha | as five children | on his 1 | neagre sala | ry. | Ans | wer:1 |
| | (1) to look afte | $r \qquad (2) \text{ to } le$ | bok at (3) |) to look to | (4) t | o look for |
| 2 Н≏ | me at cha | ss vesterdav | | | Ang | wer·? |
| 2. IIC _ | (1)bet | (2)beat | (3) bait | (4) bea | t-up | ***** |
| | (1)000 | (_) | (c) cure | (1) 000 | - - P | |

| 1. Their | r house is hidde | nt | he trees. | | Answer:2 |
|----------|------------------|--------------|-------------|------------|----------|
| | (1) among | (2) by | (3) with | (4) on | |
| 1. Live | your me | eans. | | | Answer:2 |
| | (1) without | (2) within | (3) from | (4) on | |
| _ | | | | | |
| 5 | _ you change y | our mind, le | et us know. | | Answer:4 |
| | (1) Could | (2) Might | (3) Would | (4) Should | |

ICET-2012 Read the following passage and answer the five questions.

Philosophy in the East is an art of life and way of living. The proper aim of philosophisin according to the Indian mind, is not to obtain knowledge for its own sake but for the sake of making life better. Philosophy in the soil of India is a personal attitude towards life and the universe. To philosophise is not merely to read and know philosophy; it is also to think philosophically. Philosophy begins in wonder, doubt and curiosity. It grows out of our developing awareness of the problems of human existence. Philosophy does not shrink from facing the difficult and unsolved problems of our life. There are certain perennial problems which interest mankind and for which philosophers have sought answers. Philosophy is primarily concerned with the soul, God, immortality, world, knowledge and similar other problems, which again owe their solutions to the proper estimate of life. Many questions, however, have been answered only tentatively, and many problems remain unsolved.

| 1. What is the meaning of 'perennial'? | | Answer:2 |
|--|---------------|-----------------|
| (1) momentary (2) everlasting | (3) temporary | (4) short-lived |

| 2. How can problems be solved ? | Answer:2 |
|---------------------------------|--------------------------|
| (1) by proper evaluation | (2) by meditating |
| (3) by acknowledging them | (4) by transcending them |

| 3. How does one become philosop | bhical? Answer:4 |
|---------------------------------|---|
| (1) through reading | (2) through discussion |
| (3) through writing | (4) through knowledge of the complexities of life |

| 4. Why is the study of philosophy valuable? | Answer:1 |
|---|---|
| (l) It adds wisdom to one's life. | (2)It deals with spirituality. |
| (3) It deals with the problems of life. | (4)It provides answers to all problems. |

5. What is the aim of philosophy in the East?

Answer:2

(1) learning (2) self-realisation

(3) material gain (4) professional advancement

ICET-2012 Read the following passage and answer questions :

Although languages have come into existence and died away throughout human history, it was only in the 1990s, following the publication of a series of worldwide surveys, that people began to notice that the rate of disappearance was significantly increasing. The thrust of these facts is easy to summarise: of the 6,000 or so languages in the world, it seems probable that about half of these will disappear in the course of the present century. It is a rate of loss unprecedented in recorded history.

The impact of dominant languages on minority languages is a matter of universal concern, and the role of English is specially implicated. The growth of English as a global language is not the sole factor in explaining language endangerment. Although it is English that has been the critical factor in the disappearance of languages in such parts of the world as Australia and North America, this language is of little relevance when we consider the corresponding losses that have taken place in South America or in many parts of Asia, where such languages as Spanish, Portuguese, Russian, Arabic and Chinese have replaced local languages.

Languages die. A language lives on, after the last native speaker dies, only if it has been written down or recorded in some way. At the turn of the millennium, some 2000 languages had still not been documented. When one of these languages disappears, the consequences are truly catastrophic. When people die, they leave signs of their presence in this world, in the form of their dwelling places, burial mounds and artifacts - in a word, their archaeology. But, spoken language leaves no archaeology. When a language dies which has never been documented, it is as if it has never been. 1. Which of the following statements is true? Answer:2

(1) A language is not documented by the native speakers.

(2)A language continues to live if it has been documented.

(3) Native speakers do not allow other languages to dominate their language.

(4) English has dominated all languages in the world.

| 2. What is the disadvantage of spoken language | ge? | Answer:3 |
|---|----------------------------------|----------|
| (1) It will certainly die. | | |
| (2) It cannot survive the onslaught of o | ther languages. | |
| (3)It leaves no trace when it dies. | | |
| (4) Native speakers find it difficult to r | emember it. | |
| 3. What will happen by the end of the present | century? | Answer:4 |
| (1) The number of languages will be 3 | 000. | |
| (2) The number of languages will be le | ess than 3000. | |
| (3) The number of languages will be m | nore than 3000. | |
| (4) The number of languages may be a | about 3000. | |
| 4. What does 'catastrophic' mean? | | Answer:1 |
| (1) Causing a lot of damage | (2) Causing a lot of anger | |
| (3) Causing a lot of annoyance | (4) Causing a lot of disturbance | 3 |
| 5. What is the author's view about the language | es of the world? | Answer:3 |
| (1) People are unaware of the dving la | ngilages | |
| (2) People were unaware of the dving | languages | |
| (3) People have been aware of the dying | ng languages | |
| (A) People thought that languages did t | not die | |
| (+) Copic mought that languages did | not die. | |
| ICET-2012 Read the following passage | and answer questions : | |
| C 1 d 1 1 1 d 1 1 1 1 1 1 | | C |

So now let's talk about how discipline relates to self-esteem. In studies of children, Coopersmith found that power and witholding affection were associated with children who demonstrated low self-esteem, but management techniques were associated with children who exhibited high self-

esteem. So it seems that parents should use physical punishment and witholding of affection with caution, right? Well, most psychologists oppose physical punishment for children under the age of 2, and some psychologists believe that discipline should be achieved without any physical punishment for children of all ages, referencing the fact that discipline means 'to teach' whereas punishment means 'to harm'. Anyway it's generally agreed that reinforcement of good behaviour is more effective than waiting for bad behaviour that requires punishment. But when discipline is necessary, setting limits with negative consequences that are consistently enforced seems to promote healthy development of self-esteem in children, especially when these management techniques are supplemented with approval, attention, and affection. I mean, when parents try to catch their children in the act of doing something right and use that as a basis for positive reinforcement of their behaviour.

| 5. stale | emate (1) movement | (2) stan | dstill | (3) attitude | Answer:2 (4) accustomed |
|---|--|---------------------------------|---|---|---|
| 5. stale | emate | | | | Answer:2 |
| | | | | | |
| 4. trill | (1) fall | (2) run | | (4) cut | Answer:4 (4) sing |
| 4 411 | | | | | A |
| 3. expe | edient
(1) appropriate | (2) adv | visable | (3) quicken | Answer:1
(4)dismiss |
| 2. ging | erly
(1) carefully | (2) maa | le of spice | (3) lightly | Answer:1
(4) quickly |
| (1) relating to money
(3) relating to diseases | | | (2) relating to(4) relating to | | |
| ICET-
1. pecu | (3) teaching process
-2012 Choose the
uniary | ss
ie correct m | (4) managem
eaning for the | he word given : | Answer:1 |
| 5. The | study of Coopersmi
Answer:2
(1) enforcement of | th found that | low self-este | em associated wit | h children is due to |
| | (1) discipline is not(3) teaching is enou | t necessary.
1gh. (4)use p | (2) punishmo
positive reinfo | ent is to be avoided
preement when the | d totally.
by do something right. |
| 4. To h | elp healthy develop | ment of self-e | esteem in chil | dren. | Answer:4 |
| 3. Phys | sical punishment for
(1) all psychologis | r children bel
ts (2) some p | ow the age of
sychologists (| two is opposed b
(3) most psycholo | y Answer:3
gists (4) all parents |
| | (3) set limits for ne | gative conse | quences | (4) shower affe | ection |
| 2. As a | gainst waiting for ba
(1) teach good beh | ad behaviour
aviour | that requires | punishment, one i
(2) reinforce g | s advised to Answer:2
ood behaviour |
| | (1) punish (2 |) harm | (3) teach | (4) catch the c | hildren doing wrong |
| 1.10 | | | | | |

| 6. haggard
(1) exhausted | (2) worried | (3) sad | (4) gloc | Answer:1 |
|--|--|---|---------------------------------|-------------------------|
| ICET-2012 Fill in
1. The van and the car
(1) collided | the blank choosing the
head-on in the
(2) colluded | e correct word
e dark.
(3) collated | :
(4) coll | Answer:1
ocated |
| 2. During the Emergent law. | cy, the Prime Minister _ | any oppos | ition by impleme | enting martial |
| (1) postponed | (2) pre-empted | (3) defied | (4) greeted | Answer:2 |
| 3. We face the (1) grimy | prospect of still higher (2) grim | unemployment.
(3)grilling | (4)garish | Answer:2 |
| 4. The $\frac{1}{(1) \text{ gory}}$ mark | athon walk lasted for ter
(2) grand | n weary hours.
(3) gruesome | (4) gruelling | Answer:4 |
| ICET - 2011:Choose
1. Contiguous
(1)Infectious | the correct meaning for (2)Adjoining (3) Unl | or the word giv
awful | v en ;
(4)Prohibitive | Answer:2 |
| 2.Homogeneous Answer:3
(1)Treated milk (2)Human beings and animal groups
(3)Parts or people of similar type (4) Words spelt similarly but having different
meanings | | | | |
| 3. Insatiable
(1) Unable to b | be satisfied (2) No | t complete | (3)Fulfilled | Answer:1
(4)Covetous |
| 4.Knick-knack
(1)Game | (2)Small ornament | (3) Knock | (4) Snack | Answer:2 |
| 5.Haughty
(1) Sportive | (2)Disdainful (3)Nau | ghty | (4)Disconcerted | Answer:2
d |
| 6.Grandiloquent
(1)Grand plans | s (2)Great future (3)Exa | ggerate (4) Por | npous | Answer:4 |
| ICET - 2011: Fill in
1. When the accident h
highway. Answer:4
(1) depraved | the blank choosing the
happened, the car was sp
(2) deprived (3) dis | e correct word
beeding down th
slocated (4)dese | :
ne
erted | |

| 2. He was(1)repatriated | from the country when
(2) migrated | his visa expired.
(3)deported (4) ex | Answer:3 ported |
|--|--|---|---|
| 3.The three countries has scheme. Answer:3 | ave signed a pledg | ging to work together in | the health |
| (1)memorial | (2) memorabilia | (3)memorandum | (4) memoir |
| 4. The judge promised (1)remove | to the injustice
(2) abolish | done to him.
(3) redress | Answer:3 (4) compensate |
| ICET - 2011 Choose | e the correct answer : | | |
| 1.A deed is
(1)any written n
2.The concept of 'gangp
(1) doing things
(3)defying estab | natter. (2)a draft of annu
blank' implies
through proper channel
blished hierarchy. | lment. (3)a legal docur
ls, (2) decentralisin
(4) clinging to a | Answer:3
ment. (4)a present.
Answer:3
ng things. |
| 3. Job specific tests that
are called
Answer:2
(1)personality tests. | are desigmd to predict
(2)aptitude tests. | the potential of an indivi
(3) intelligence tests. (| idual to perform tasks
(4) verbal ability tests. |
| 4.A section of a Govern (1) diocese. | ment department in cha (2) compartment. | rge of a particular activit
(3) collegium. | ty Answer:4
(4)wing. |
| 5. 'Benchmarking' is
(1) increasing sa
(3)setting a star | ales.
Idard for performance. | (2)obtaining a brand ma(4) opting out of competition | Answer:3
ark.
stition. |
| 6.HTML means
(1) Hyper Text
(2) Hyper Text | Modern Language.
Modem Language. | (2)Hyper Text Markup
(4)Hyper Text Machine | Answer:2
Language.
e Language. |
| 7.The installation wizard
(1)perform auto
(3)guide throug | d in Windows cannot
omatic search.
h screens. | (2) installhardware.(4) do quick installation | Answer: 1 <u>OR</u> 2 |
| 8.GPS refers to
(1) Geo-Positio
(3) Geo-Proces | oning System
sing System | (2)Global Positioning S
(4)Global Pointing Syst | Answer:2
ystem
tem |
| 9.Which of the followin (1) Printer. | g is not an input device '
(2) Light pen | ?
(3)Keyboard | Answer:1 (4) Scanner |

| 10. The technique of creating a series of graphic frames to give an appearance of contiriuous movement is called Answer:2 | | | | |
|---|--|---|--|---|
| (1)booting | (2)animation | (3)diode | (4)grap | hics |
| ICET - 2011 Choos
1. A: I'm terribly sorry
B: That's O.K. I was
In this conversation
(1) apologetic | the correct answ
John. I forgot your
disappointed thou
a, the speaker B is
(2)angry (3 | wer:
birthday. I don't
gh. I know you v
) disappointed | know how it slipped
vere very busy last v
(4) unde | my mind.
veek.
Answer:4
erstanding. |
| 2. "Had they built a ho
(1) they have b
(2) they are no
(3) they have no
(4) they have no
3. A : Remember to we
B : Should I? Forge
(1) carefree. | use of their own, th
uilt a house of their
t on the road today
ot built a house of t
ot built a house of t
ear your safety belt
et it. B's reply show
(2) full of care. | ey would not hav
own.
heir own but they
their own and so t
in the car.
vs that he is
(3) callous. | e been on the road to
are not on the road t
they are on the road
(4) care | oday" means
Answer:4
today.
today.
Answer: 4
less. |
| 4. The passive form of
(1) Let nobody
(3) Do not be b | the sentence, "Do n
be beaten by you.
beaten by anybody. | not beat anybody'
(2) You sha
(4) Nobody | ' is
ll not beat anybody.
⁄ is beaten by you. | Answer:1 |
| 5. He was <u>pushed to th</u>
The sentence imp
(1) in a happy p
(3) in a despera | <u>e wall</u> and so he ha
lies that he was
position.
ate position. | d to resign the me
(2) pinned t
(4) confine | embership of the par
o the wall.
d to a cell. | ty. Answer:3 |
| 6. "Sudheer is the last p (1) Sudheer is (2) Sudheer is (3) Sudheer is (4) Sudheer is | person I'd trust with
the most suitable po
the least suitable m
not an unreliable pe
a troubleshooter. | h a secret" means
erson to share a se
an to share a secre
erson. | ecret with.
et with. | Answer:2 |
| 7. I don't like to play s
(1) play a supp
(3) play others | econd fiddle to any
orting role. (2
fiddles. (4 | yone. The speaker
) play the lead rol
) borrow anybody | does not want to
e.
y else's fiddles. | Answer:1 |
| ICET - 2011 Fill iii
1. It's time you put per
(1) to | the blank with the p_{1} paper (2) on (3) | e appropriate ph
and replied to the
) and | rase/verb/ preposit
e CEO's letter.
(4) at | ion:
Answer:1 |
| 2. Doesn't he(1) take back | his father?
(2) take after (3 |) take up | (4) take in | Answer:2 |

| 3. He did not know the answer | | Answer:1 |
|---|--------------------------------|----------------------------|
| (1) Neither did I (2) Either did I | (3) Neither have I (4) |) Either have I |
| 4. I'm sorry he disobeyed instructions. I'll take him(1) after (2) amiss (3) apart | when he gets back.
(4) back | Answer:3 |
| 5. Wage increase must be commensurate with the pres
(1) inflation (2) depression (3) def | flation (4) bur | Answer:1
eaucratisation |
| 6. The company is forging with its plans for
(1) forward (2) ahead (3) on | expansion.
(4) through | Answer:2 |
| 7. In the end, it all a question of trust.
(1) gets round to (2) adds up to (3) fee | els up to (4) cor | Answer:4 nes down to |
| 8. Despite our disagreements, we have been able to(1) reach (2) locate (3) find (4) striit | an accord.
ke | Answer:4 |

ICET - 2011 Read the following passage and answer questions .

Museums must make their collections accessible. In the past, this simply meant packing them into display cases, often with wordy labels that made little concession to the lay person. Nowadays, accessibility should demand more than this. Displays can be lively and interesting, making the best use of theatrical or architectural techniques to capture the visitor's attention and perhaps stimulate emotional response. But museums should be about more than their displays. They should make their collection accessible to the widest possible community. The provision of loan boxes of objects for class teachers is one known example of this, and recently this principle has been extended by some museums so that similar material is made available for use in treating elderly people who are losing their memory.

Museums concern themselves with 'artifacts and specimens' - not replicas. They exist to facilitate an encounter with authenticity. They present items that actually existed - were used - had meaning - at some historical time. This is a great strength and is what distinguishes them from heritage centres and theme parks, books and C.D. ROMs. Museums which rise to the challenge, which this distinction implies, and provide exciting and accessible displays, catalogues and outreach programmes, will find that their apparent competitors in 'virtual history' are in fact their allies, stimulating an appetite for the 'real thing' that museums are uniquely placed to satisfy.

1. According to the passage, museums must make their collections accessible to Answer:4(1) lay persons.(2) buyers.(3) researchers.(4) general public.

2. "But museums should be about more than their displays". This statement means: Answer:1

(1) They should go beyond their visuals.

(2) They should have more space for their collections.

(3) They should have wordy labels.

(4) They should have more displays.

3. Museums are different from heritage centres, theme parks, books and CD-ROMs because they deal with Answer:3

(1) exciting objects. (2) replicas. (3) original objects. (4) modern objects.

4. According to the passage, the "provision of loan boxes of objects" helps museums

Answer:4

(1) become popular (2) serve society (4) make objects accessible to more people (3) get publicity

5. The "real thing" refers to

(1) authentic displays. (2) catalogues

(3) outreach programmes. (4) virtual displays.

ICET - 2011 Read the following passage and answer the questions :

A stamp is, to many people, just a slip of paper that takes a letter from one town or country to another. They can't understand why stamp collectors find so much pleasure in collecting them and how we find time to indulge in our hobby. To them it seems a waste of time, effort and money. But, they do not realise that many find the effort worthwhile and many who, if they did not spend their time collecting stamps, would spend it less profitably. In our leisure hours what better occupation is there to keep us out of mischief than that of collecting stamps? An album, a packet of hinges, a new supply of stamps, and the time passes swiftly. Stamp-collecting has no limits and a collection never has an end; countries are always issuing new stamps to celebrate coronations, great events, anniversaries and deaths. And the fascination of collecting is in obtaining these stamps before one's rivals. Every sphere of stamp collecting has its fascination - receiving letters from distant countries and discovering old stamps in the leaves of dusty old books. A stamp itself has a fascination all its own. Gazing at its little picture we are

transported to the wilds of Congo, the homes of the Arabs, and the endless tracks of the Sahara desert. There is a history in a stamp. The ancient Roman Empire and the Constitution of America, India's Independence and the Allied Victory, are all conveyed to our mind's eye through stamps. We see famous men - printers, writers, scientists, soldiers, politicians - and famous incidents. Stamps, so small and minute, contain knowledge that is vast and important.

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|---------------------------|-----------------|---------------|-------------------------|----------|
| (1) the past. | | (2) the w | orld of futile fantasy. | |
| 4. The journey of a starr | np is into | | | Answer:1 |
| (3) no fascinatio | on at all. | (4) no his | storical value. | |
| (1) an inherent f | ascination. | (2) only c | official value. | |
| 3. A stamp has | | | | Answer:1 |
| (3) get fascinate | d with pictures | . (4) becom | ne complacent. | |
| (1) kill time | | (2) keep | out of mischief. | |
| 2. Stamp collection prot | fits one to | | | Answer:2 |
| (1) albums | (2) history | (3) old books | (4) dusty books | |
| 1. Stamps take us through | gh | | | Answer:2 |

Answer:1

(3) the world of savagery.

(4) the mazes of the future.

5. The passage is a contemplation on

Answer:2

- (1) stamps and their ignominious history.
- (3) the competition in collecting stamps.

(2) the usefulness of collecting stamps.(4) stamp vendors.

ICET - 2011 Read the following passage and answer questions :

How do you understand multiple intelligences? In 1983, Howard Gardner, a Harvard University Professor, developed a theory called Multiple Intelligences. In his book Frames of Mind, he outlines seven intelligences that he feels are possessed by everyone: visual/spatial, verbal/linguistic, musical/rhythm, logic/math, body/kinesthetic, interpersonal and intrapersonal. In 1996, he added an eighth intelligence : naturalistic. In short, if you have ever done things that come easily for you, you are probably drawing on one of your intelligences that is well developed. On the other hand, if you have tried to do things that are very difficult to master or understand, you may be dealing with material that calls on one of your less developed intelligences. If playing the Piano by ear comes easily to you, your musical/rhythm intelligence may be very strong. If you have trouble writing or understanding poetry, your verbal/linguistic intelligence may not be as well developed. This does not mean that you will never be able to write poetry : it simply means that you have not fully developed your skills in this area.

| 1. Hov | 1. How many intelligences does Gardner speak about? Answer:1 | | | Answer:1 | |
|---|--|-------------------|------------------|--------------------------|----------------|
| | (1) Eight | (2) Seven | (3) Multiple | (4) innumerab | le |
| 2. Inab | oility to perform | a certain task in | dicates lack of | | Answer:2 |
| | (1) spatial intel | ligence. | (2) task-related | l intelligence. | |
| | (3) naturalistic | intelligence. | (4) interperson | al intelligence. | |
| 3. Wha | at does "Kinesth | etic" mean? | | | Answer:2 |
| | (1) Dynamic | (2) Sensory | (3) Flexible | (4) Musical | |
| 4. What type of intelligence do people who can think in pictures have? Answer:4 | | | | Answer:4 | |
| | (1) Musical | (2) Naturalistic | c (3) Linguistic | (4) Visual | |
| 5. Wha | at does trouble ir | nunderstanding | poetry mean? | | Answer:4 |
| | (1) You are not | t a master of voo | cabulary. | (2) You failed to visual | ise a picture. |
| | (3) You don't ha | ave kinesthetic i | ntelligence. | . , | 1 |
| | (4) You have no | ot developed thi | s special skill. | | |

To The Secretary, APSCHE, Huderabad.

Sir

Sub:Submission of certificates of the two not approved cadidates. **Ref:**Procds.No.APSCHE/Secy/Approval/EdCET-2012/B.Ed/OU-70; Dt:02.03.13

I, M.Rama Koti Reddy, principal, Millennium College of Education, Andhra Bank Complex, Main Road, Sangareddy, Medak(Dist), here by submitting the certificates of the two Candidates of our college who were not approved by you stating that the certificates of two candidates certificates were not enclosed for approval of Category 'B' seats at the time of submission for approval.Sir you have approved 23 Candidates of our college .The names of two not approved Candidates are as follows.

Name: M.Prabhavathi D/o M. Balaiah --- Bio-Science Methodology.
 Name: G.Jyothi Laxmi D/o Narayana --- Social Studies Methodology.

I am enclosing the certificates of these two candidates and also the xerox copy of 23 Candidates approved list send by you to our college along with this letter .Kindly do the needful.

Thanking you sir.

Yours faithfully

Telangana State Council Higher Education

Notations :

- 1.Options shown in green color and with \checkmark icon are correct.
- 2.Options shown in red color and with * icon are incorrect.

| Question Paper Name : | TS ICET 2021 19th Aug 2021 Shift 1 | |
|---|------------------------------------|--|
| Subject Name : | TS ICET 2021 | |
| Creation Date : | 2021-08-19 17:48:20 | |
| Duration : | 150 | |
| Total Marks : | 200 | |
| Display Marks: | Yes | |
| Calculator : | None | |
| Magnifying Glass Required? : | No | |
| Ruler Required? : | No | |
| Eraser Required? : | No | |
| Scratch Pad Required? : | No | |
| Rough Sketch/Notepad Required? : | No | |
| Protractor Required? : | No | |
| Show Watermark on Console? : | Yes | |
| Highlighter : | No | |
| Auto Save on Console? (SA type of questions will | Ves | |
| be always auto saved) : | 100 | |

TS ICET 2021

| Group Number : | 1 |
|----------------|----------|
| Group Id : | 39448432 |

| Group Maximum Duration : | 0 |
|-------------------------------|-----|
| Group Minimum Duration : | 150 |
| Show Attended Group? : | No |
| Edit Attended Group? : | No |
| Break time : | 0 |
| Group Marks : | 200 |
| Is this Group for Examiner? : | No |

Analytical Ability

| Section Id : | 39448494 |
|---|-----------|
| Section Number : | 1 |
| Section type : | Online |
| Mandatory or Optional : | Mandatory |
| Number of Questions : | 45 |
| Number of Questions to be attempted : | 45 |
| Section Marks : | 75 |
| Enable Mark as Answered Mark for Review and | Ves |
| Clear Response : | 105 |
| Sub-Section Number : | 1 |
| Sub-Section Id : | 394484652 |
| Question Shuffling Allowed : | Yes |

Question Id : 3944846449 Question Type : COMPREHENSION Sub Question Shuffling Allowed : Yes Group Comprehension Questions : No Question Numbers : (1 to 20)

- **Note:** In questions numbered 1 to 20, a question is followed by data in the form of two statements labelled as I and II. You must decide whether the data given in the statements are sufficient to answer the questions. Using the data make an appropriate choice from (1) to (4) as per the following guidelines:
 - (a) Mark choice (1) if the statement I alone is sufficient to answer the question.
 - (b) Mark choice (2) if the statement II alone is sufficient to answer the question.
 - (c) Mark choice (3) if both the statements I and II are sufficient to answer the question but neither statement alone is sufficient.
 - (d) Mark choice (4) if both the statements I and II together are not sufficient to answer the question and additional data is required.

సూచన: 1 నుండి 20 వరకు ఇచ్చిన (పతి (పశ్నలోను ఒక (పశ్న, దాని క్రింద I, II అని

గుర్తులు గల రెండు (పవచనాలు దత్తాంశంగా ఇవ్వబడ్డాయి. ఇచ్చిన దత్తాంశాన్ని ఉపయోగించి, ఇచ్చిన (పవచనాలు (పశ్నకు సమాధానాన్ని ఇచ్చేందుకు పర్యాప్తాలు అవుతాయా లేదా అని మీరు నిర్ధారించాలి. ఈ నిర్ధారణకు (కింది మార్గదర్శక సూత్రాలు ఉపయోగించి (1) నుండి (4) వరకు సరి అయిన జవాబును ఎంపిక చేయండి.

- (a) ప్రశ్నకు సమాధానం ఇచ్చేందుకు ప్రవచనం । మాత్రమే పర్యాప్తమయితే మీ జవాబు (1) గా గుర్తించండి.
- (b) ప్రశ్నకు సమాధానం ఇచ్చేందుకు ప్రవచనం II మాత్రమే పర్యాప్తమయితే మీ జవాబు (2) గా గుర్తించండి.
- (c) ప్రశ్నకు సమాధానం ఇచ్చేందుకు ప్రవచనాలు ।, ॥ కలసి పర్యాప్తమయి అందులో ఏ ఒక్కటి కూడా పర్యాప్తం కాకపోతే మీ జవాబు (3) గా గుర్తించండి.
- (d) ప్రశ్నకు సమాధానం ఇచ్చేందుకు ప్రవచనాలు ।, ॥ కలసి కూడా పర్యాప్తం కాక అదనపు దత్తాంశం అవసరమయితే మీ జవాబు (4) గా గుర్తించండి.

Sub questions

Question Number : 1 Question Id : 3944846450 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Five persons P,Q,R,S, and T are going for a vacation on five different days of a week from Monday to Friday. Who goes on vacation Thursday?

వారంలో సోమవారం నుండి శుక్రవారం వరకు విభిన్న రోజులలో ఐదుగురు వ్యక్తులు P,Q,R,S, మరియు Tలు సెలవులపై వెళ్ళాదరు. గురువారం సెలవుపై వెళ్లేదెవరు?

 Only two persons go on vacation after *T* and before *R*. More than two persons go on vacation after *R* and before *P*.

T తరువాత R కన్న ముందు ఇద్దరు వ్యక్తులు మాత్రమే సెలవుపై వెళ్ళెదరు. R తరువాత, P కన్న ముందు ఇద్దరు వ్యక్తులకన్న ఎక్కువ మంది సెలవుపై వెళ్ళెదరు

II) T goes on vacation immediately before S, only one person goes on vacation after S and before R and P goes before Q.
 s కన్న సరిగ్గా ఒక రోజు ముందే T సెలవుపై వెళ్లెను. s తరువాత R కన్న ముందు

సరిగ్గా ఒక వ్యక్తి సెలవు పై వెళతాడు మరియు Q కన్న ముందే వెళతాడు.

Options :

- 39448424801. ᄣ 1
- 39448424802. 🏼 2
- 39448424803. 🖋 3
- 39448424804. 🗱 4

Question Number : 2 Question Id : 3944846451 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0 What is the remainder when the natural number N is divided by 10?

సహజ సంఖ్య N ను 10చే భాగించగా వచ్చు శేషమెంత ?

- I) N is divisible by 2
 2చే N నిశ్శేషంగా భాగింపబడును
- II) $N = 6^x$, x is an integer ≥ 1 $N = 6^x$, x (≥ 1) ఒక పూర్ణాంకం

Options :

39448424805. ***** 1
39448424806. ✓ 2
39448424807. ***** 3
39448424808. ***** 4

Question Number : 3 Question Id : 3944846452 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

What is the area of the rectangle?

దీర్ఘచతుర్(సం వైశాల్యమెంత ?

- I) The perimeter of the rectangle is 50cm ఆ దీర్ఘచతుర్స చుట్టకొలత 50 సెం.మీ.
- II) The ratio of length and breadth is 4 : 1 పొడవు, వెడల్పుల నిష్పత్తి 4 : 1

Options :

39448424809. ***** 1
39448424810. ***** 2
39448424811. ✓ 3
39448424812. ***** 4

Question Number : 4 Question Id : 3944846453 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0 What was the distance between the trains T_1 and T_2 in the beginning?

ప్రారంభంలో T1, T2 రైళ్ళ మధ్య దూరమెంత ఉండెను?

- I) Trains T₁ and T₂ cross each other completely in 18 seconds, while travelling in opposite directions. Speed of trains T₁ and T₂ are respectively 72 KMPH and 54 KMPH వ్యతిరేక దశలో ప్రయాణిస్తున్న T₁ మరియు T₂ రైళ్లు ఒకదానినొకటి పూర్తిగా 18 సెకన్లలో దాటగలవు. T₁ మరియు T₂ ల వేగాలు వరుసగా గంటకు 72 కి.మీ. మరియు 54 కి.మీ.
- II) Length of T₁ is 170 meters less than the length of T₂ T₁ む ふ , T₂ む ふ ぶ 、 170 知 と ひ ざ い と る

Options :

39448424813. ***** 1 39448424814. ***** 2

39448424815. 🎽 3

39448424816. ✔ 4

Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Who completes the job faster?

ఆ పనిని ఎవరు త్వరగా పూర్తి చేయగలరు ?

- I) P finishes the job in 12 days
 12 రోజుల్లో నే P ఆ పనిని పూర్తిచేయగలడు
- II) The same can be completed together by P and Q in 6²/₃ days
 అదే పనిని P మరియు Q సంయుక్తంగా 6²/₃ రోజుల్లో పూర్తి చేయగలరు

Options :

- 39448424817. ^{**} 1
 39448424818. ^{**} 2
 39448424819. ✓ 3
- 39448424820. 🇯 4

Question Number : 6 Question Id : 3944846455 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0 What is the first term of the arithmetic progression?

అంక(శేఢి లోని మొదటి పదమెంత ?

- I) The sum of the first 10 terms of the arithmetic progression is 85 ఆ అంక శేఢి లోని మొదటి 10 పదాల మొత్తం 85
- II) The sum of the first 20 terms of the arithmetic progression is 370

ఆ అంక(శేఢిలోని మొదటి 20 పదాలమొత్తం 370

Options:

39448424821. ¥ 1
39448424822. ¥ 2
39448424823. ✓ 3
39448424824. ¥ 4

Question Number : 7 Question Id : 3944846456 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Is *n* a prime number ?

n ఒక ప్రధానాంకమా ?

I) n leaves remainder 1 when divided by 6

n ను 6 చే భాగించగా వచ్చు శేషం 1

II) n leaves remainder 5 when divided by 6

n ను 6 చే భాగించగా వచ్చు శేషం 5

Options:

39448424825. * 1 39448424826. * 2 39448424827. * 3 39448424828.

Question Number : 8 Question Id : 3944846457 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

What is the lateral surface area of the right circular cylinder (taking $\pi = \frac{22}{7}$)?

ఆ స్తూపం (పక్కతల వైశాల్యమెంత ($\pi = \frac{22}{7}$ గా తీసుకోండి)?

- I) Volume of the cylinder is 3850 cm³ స్తూపం ఘనపరిమాణం 3850 సెం.మీ.³
- II) Height of the cylinder is 25 cm స్తూపం ఎత్తు 25 సెం.మీ.

Options:

39448424829. ***** 1 39448424830. ***** 2

- 39448424831. 🖋 3
- 39448424832. 🕷 4

Question Number : 9 Question Id : 3944846458 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0 What is the cost price of the article ?

ఆ వస్తువు కొన్న వెల ఎంత ?

- I) Its sale price is Rs.10,000/-దాని అమ్మకం వెల రూ. 10000/-
- II) Sale price includes taxes
 అమ్మకం వెలలో పన్ను కూడా కలిసి ఉంది.

Options:

39448424833. * 1 39448424834. * 2 39448424835. * 3 39448424836. * 4

Question Number : 10 Question Id : 3944846459 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0 Find the volume of the cone of height h and base radius r units.

భూవ్యాసార్థం r, ఎత్తు h, గా గల శంఖువు ఘనపరిమాణమెంత ?

- I) The volume of a cylinder of height h and radius r is 1694 cu. units భూవ్యాసార్ధం r, ఎత్తు h, గాగల స్తూపం ఘనపరిమాణం 1694 ఘ. యూనిట్లు
- II) Surface area of a cylinder of height h and radius r is 242 sq. units భూవ్యాసార్థం r, ఎత్తు h, గా గల స్తూపం ఉపరితల వైశాల్యం 242 చ. యూనిట్ల

Options :

39448424837. ✔ 1

39448424838. 🎽 2

39448424839. 🏼 3

39448424840. 🏼 4

Question Number : 11 Question Id : 3944846460 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

What is the value of x?

x విలువ ఎంత?

- I) $x^2 13x + 42 = 0$
- II) x is a real number x ఒక వాస్తవ సంఖ్య

Options :

39448424841. 🕷 1

39448424842. ***** 2 39448424843. ***** 3 39448424844. **√** 4

Question Number : 12 Question Id : 3944846461 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

What is the average of the real numbers *a*, *b*, *c* and *d*?

వాస్తవ సంఖ్యలు a, b, c మరియు d ల సగటు ఎంత?

- I) a + b + c = 16 + d
- II) 3(b + c + d) = 20 3a

Options :

39448424845. ^{**} 1
39448424846. ✓ 2
39448424847. ^{**} 3
39448424848. ^{**} 4

Question Number : 13 Question Id : 3944846462 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0 What is the integer m?

పూర్ణసంఖ్య m విలువ ఎంత?

- I) $m^4 = 256$
- II) (m+2)(m-1) = 10

Options :

39448424849. ^{**} 1
39448424850. ^{**} 2
39448424851. ✓ 3
39448424852. ^{**} 4

Question Number : 14 Question Id : 3944846463 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

What is the length of the train?

రైలు పొడవేంత ?

- Its average speed is 72 kmph
 దాని సగటు వేగం గంటకు 72 కి.మీ
- It takes 15 seconds to cross an electric pole
 ఒక విద్యుత్ స్తంభాన్ని అది 15 సెకనులలో దాటగలదు.

Options :

39448424853. 🎽 1

39448424854. 🎽 2

39448424855. 🖋 3

39448424856. 🎽 4

Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Is 14 a factor of n + 7?

n +7 కు 14 ఒక కారణాంకమా?

- I) n is even
 n ಒ š స ර స ර කු
- II) n is divisible by 7
 - n ను 7 నిశ్శేషంగా భాగిస్తుంది

Options :

39448424857. ✓ 1
39448424858. ¥ 2
39448424859. ¥ 3
39448424860. ¥ 4

Question Number : 16 Question Id : 3944846465 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

What is the area of the path around the circular park?

వృత్తాకారపు పార్కు చుట్టూ వెలుపల గల బాట వైశాల్యం ఎంత?

I) Circular park has area 961π sq. meters

వృత్తాకార పార్కు వైశాల్యం 961 πచ. మీటర్లు

II) The width of the path is $1\frac{1}{2}$ meters ಆ ಬಾಬ ವಡಲ್ಪು $1\frac{1}{2}$ ಮీಟರ್ಲು

Options :

39448424861. [♣] 1 39448424862. [♣] 2 39448424863. ✓ 3 39448424864. [♣] 4

Question Number : 17 Question Id : 3944846466 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

How is x related to z?

z తో x కు ఏవిధమైన సంబంధం కలదు

I) z is a son of y

y యొకకి కుమారుడు z

Options :

- 39448424865. 🍀 1
- 39448424866. 🏼 2
- 39448424867. 🏼 3
- 39448424868. ✔ 4

Question Number : 18 Question Id : 3944846467 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0 Is triangle PQR shown below an equilateral triangle ?

ఈ దిగువనీయబడిన త్రిభుజము సమబాహు త్రిభుజమా?



I) The co-ordinates of Q and R are (-4, 0) and (4, 0) respectively

Q,R ల నిరూపకాలు వరుసగా (-4, 0) మరియు (4, 0)

II) *P* is a point on the line $y = 4\sqrt{3}$

y = 4 √3 రేఖమై P ఒక బిందువు

Options:

39448424869. ¥ 1
39448424870. ¥ 2
39448424871. ✓ 3
39448424872. ¥ 4

Question Number : 19 Question Id : 3944846468 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0 If x and y are length and breadth of a rectangle, then what is the area of the rectangle? ఒక దీర్ఘ చతుర్(సం యొక్క పొడవు, వెడల్పులు x,y అయినప్పుడు, ఆ దీర్ఘ చతుర్(స వైశాల్యం ఎంత?

- I) x > 15 inches and y < 10 inches
 x>15 అంగుళాలు మరియు y < 10 అంగుళాలు
- II) The product of x and y is 120 sq. inches
 x, yల లబ్ధము 120 చ. అంగుళాలు

Options:

39448424873. ^{**} 1
39448424874. ✓ 2
39448424875. ^{**} 3
39448424876. ^{**} 4

Question Number : 20 Question Id : 3944846469 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0 In the figure shown below, the area of the $\triangle ABC$ is 8, Does the point (*a*, *b*) lie within the triangle?

ఈ దిగువనీయబడిన పటం లో ΔABC వైశాల్యం 8 చ.యూ. బిందువు (a,b) త్రిభుజం లోపల ఉంటుందా ?



I)
$$a < 2, b < 4$$

Options :

| Question Shuffling Allowed · | Ves |
|------------------------------|-----------|
| Sub-Section Id : | 394484653 |
| Sub-Section Number : | 2 |
| 39448424880. 🍀 4 | |
| 39448424879. 🍀 3 | |
| 39448424878. ✔ 2 | |
| 39448424877. 🎽 1 | |

Question Number : 21 Question Id : 3944846470 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0 Problem Solving సమస్యా సాధన

Sequence and Series అనుక్రమాలు, శ్రేణులు

EFK : GHO :: ____ : ____

- 1) BDF : EGL
- 2) CDH : EFK
- 3) DEL: KLW
- 4) LMY: KOY

Options :

- 39448424881. ✔ 1
- 39448424882. 🛎 2
- 39448424883. 🏼 3
- 39448424884. 🏼 4

Question Number : 22 Question Id : 3944846471 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

Problem Solving

సమస్యా సాధన

Sequence and Series అనుక్రమాలు, శ్రేణులు
2:49:12::___:__:

- 1) 6:64:16
- 2) 5:100:15
- 3) 4:121:14
- 4) 1:16:11

Options :

- 39448424885. 🇯 1
- 39448424886. ✔ 2
- 39448424887. 🏼 3
- 39448424888. 🏼 4

Question Number : 23 Question Id : 3944846472 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Problem Solving సమస్యా సాధన

Sequence and Series అనుక్రమాలు, శ్రేణులు

C, E, G, ____, M, Q, S, W

- 1) I
- 2) J
- 3) K
- 4) L

Options :

39448424889. ᄣ 1

39448424890. 🏼 2

39448424891. ✓ 3 39448424892. ¥ 4

Question Number : 24 Question Id : 3944846473 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Problem Solving సమస్యా సాధన

Sequence and Series అనుక్రమాలు, శ్రేణులు

APRIL : 64 :: JULY : _____

ఏ[බී ව් : 64 :: සංචි : _____

- 1) 216
- 2) 248
- 3) 343
- 4) 625

Options :

- 39448424893. 🎽 1
- 39448424894. 🏼 2
- 39448424895. 🖋 3
- 39448424896. 🏼 4

Question Number : 25 Question Id : 3944846474 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0 Problem Solving సమస్యా సాధన

Sequence and Series అనుక్రమాలు, శ్రేణులు

L X M : 12 X 13 :: W X U : ____

- 1) 18 X 20
- 2) 21 X 22
- 3) 22 X 25
- 4) 23 X 21

Options :

- 39448424897. 🏼 1
- 39448424898. 🛎 2
- 39448424899. * 3
- 39448424900. 🗸 4

Question Number : 26 Question Id : 3944846475 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

Problem Solving సమస్యా సాధన

Sequence and Series అనుక్రమాలు, శ్రేణులు PLAN : MIXK :: MAPLE : _____

- 1) HNOJX
- 2) HYNIC
- 3) JYNPC
- 4) JXMIB

Options :

- 39448424901. 🕷 1
- 39448424902. 🏼 2
- 39448424903. 🕷 3
- 39448424904. ✔ 4

Question Number : 27 Question Id : 3944846476 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Problem Solving సమస్యా సాధన

Sequence and Series అనుక్రమాలు, శ్రేణులు

DAER : READ :: _____ : PINK

- 1) PKIN
- 2) KINP
- 3) KNIP
- 4) PKNI

Options :

39448424905. ^{**} 1
39448424906. ^{**} 2
39448424907. ✓ 3
39448424908. ^{**} 4

Question Number : 28 Question Id : 3944846477 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Problem Solving సమస్యా సాధన

Sequence and Series అనుక్రమాలు, శ్రేణులు

11:1342::9:____

- 1) 729
- 2) 738
- 3) 879
- 4) 991

Options :

39448424909. ^{**} 1
39448424910. ✓ 2
39448424911. ^{**} 3
39448424912. ^{**} 4

Question Number : 29 Question Id : 3944846478 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0 Problem Solving సమస్యా సాధన

Sequence and Series అనుక్రమాలు, శ్రేణులు

MINOR : 69 :: MAJOR : _____

- 1) 57
- 2) 70
- 3) 68
- 4) 71

Options :

- 39448424913. ✔ 1
- 39448424914. 🏼 2
- 39448424915. ** 3
- 39448424916. 🏼 4

Question Number : 30 Question Id : 3944846479 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

Problem Solving సమస్యా సాధన

Sequence and Series అనుక్రమాలు, శ్రేణులు QOMK : IGEC :: XVTR : _____

- 1) PMLK
- 2) RSMJ
- 3) PNLJ
- 4) PMNK

Options :

| Ouestion Shuffling Allowed : | Yes |
|------------------------------|-----------|
| Sub-Section Id : | 394484654 |
| Sub-Section Number : | 3 |
| 39448424920. 🗱 4 | |
| 39448424919. 🖋 3 | |
| 39448424918. 🍀 2 | |
| 39448424917. 🍀 1 | |

Question Number : 31 Question Id : 3944846480 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Note : In questions numbered 31 to 35 pick the odd thing out. గమనిక : 31 నుండి 35 వరకు గల (పశ్నలలో సరిపోలనిది గుర్తించుము.

- 1) SORE
- 2) SOTLU
- 3) NORGAE
- 4) MEJNIAS

Options :

39448424921. *****39448424922. *****39448424923. **√**39448424924. *****

Question Number : 32 Question Id : 3944846481 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

Note : In questions numbered 31 to 35 pick the odd thing out. గమనిక : 31 నుండి 35 వరకు గల (పశ్మలలో సరిపోలనిది గుర్తించుము.

| 1) Pear | పియర్ |
|-----------|--------|
| 2) Apple | පබව් |
| 3) Litchi | වස්ධ |
| 4) Orange | నారింజ |

Options :

- 39448424925. 🎽 1
- 39448424926. 🛎 2
- 39448424927. 🕷 3
- 39448424928. ؇ 4

Question Number : 33 Question Id : 3944846482 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Note : In questions numbered 31 to 35 pick the odd thing out. గమనిక : 31 నుండి 35 వరకు గల (పశ్నలలో సరిపోలనిది గుర్తించుము.

- 1) 139
- 2) 337
- 3) 505
- 4) 721

Options :

39448424929. ✓ 1
39448424930. ※ 2
39448424931. ※ 3
39448424932. ※ 4

Question Number : 34 Question Id : 3944846483 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Note : In questions numbered 31 to 35 pick the odd thing out. గమనిక : 31 నుండి 35 వరకు గల ప్రశ్నలలో సరిపోలనిది గుర్తించుము.

- 1) 37
- 2) 47
- 3) 57
- 4) 67

Options :

39448424933. ***** 1 39448424934. ***** 2 39448424935. ✓ 3 39448424936. [♥] 4

Question Number : 35 Question Id : 3944846484 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Note : In questions numbered 31 to 35 pick the odd thing out. గమనిక : 31 నుండి 35 వరకు గల ప్రశ్నలలో సరిపోలనిది గుర్తించుము.

42, 49, 60, 73, 88, 109

- 1) 60
- 2) 88
- 3) 73
- 4) 49

Options :

- 39448424937. ** 1
- 39448424938. 🗸 2
- 39448424939. 🕷 3
- 39448424940. 🏼 4

| Sub-Section Number : | 4 |
|------------------------------|-----------|
| Sub-Section Id : | 394484655 |
| Question Shuffling Allowed : | Yes |

Question Number : 36 Question Id : 3944846485 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0 Note : Each of the questions from 36 to 45 follows a definite pattern, observe the same and fill in the blanks with suitable ones.

గమనిక:36 నుండి 45 వరకు గల ప్రశ్నలు ఒక ఖచ్చితమైన నియమాన్ని పాటిస్తున్నాయి. ఆ నియమాన్ని గమనించి సరియగు సమాధానాలతో ఖాళీలను పూరించండి.

| $66\frac{2}{3}$, | 75,80,83 <mark>1</mark> ,85 <mark>5</mark> , |
|-------------------|--|
| 1) | $99\frac{10}{11}$ |
| 2) | $88\frac{8}{9}$ |
| 3) | 90 |
| 4) | $87\frac{1}{2}$ |
| Option | s: |
| 394484 | 24941. ᄣ 1 |
| 394484 | 24942. ¥ 2 |

39448424943. * 3

39448424944. ؇ 4

Question Number : 37 Question Id : 3944846486 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Note : Each of the questions from 36 to 45 follows a definite pattern, observe the same and

fill in the blanks with suitable ones.

గమనిక:36 నుండి 45 వరకు గల ప్రశ్నలు ఒక ఖచ్చితమైన నియమాన్ని పాటిస్తున్నాయి. ఆ నియమాన్ని గమనించి సరియగు సమాధానాలతో ఖాళీలను పూరించండి. 16, 33, 65, 131, 261, _____

- 1) 521
- 2) 613
- 3) 523
- 4) 694

Options :

- 39448424945. 🎽 1
- 39448424946. ***** 239448424947. ✓ 3
- 39448424948. 🏼 4

Question Number : 38 Question Id : 3944846487 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Note : Each of the questions from 36 to 45 follows a definite pattern, observe the same and

fill in the blanks with suitable ones.

గమనిక:36 నుండి 45 వరకు గల ప్రశ్నలు ఒక ఖచ్చితమైన నియమాన్ని పాటిస్తున్నాయి. ఆ నియమాన్ని గమనించి సరియగు సమాధానాలతో ఖాళీలను పూరించండి.

7, 12, 22, 37, 57, ____, 112

- 1) 82
- 2) 87
- 3) 92
- 4) 105

Options:

39448424949. ✓ 1
39448424950. ※ 2
39448424951. ※ 3
39448424952. ※ 4

Question Number : 39 Question Id : 3944846488 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Note : Each of the questions from 36 to 45 follows a definite pattern, observe the same and

fill in the blanks with suitable ones.

గమనిక:36 నుండి 45 వరకు గల ప్రశ్నలు ఒక ఖచ్చితమైన నియమాన్ని పాటిస్తున్నాయి. ఆ నియమాన్ని గమనించి సరియగు సమాధానాలతో ఖాళీలను పూరించండి.

(5, 7, 6); (9, 11, 10); (13, 15, 14); (17, 19, 18); _____

- 1) (20, 21, 22)
- 2) (21, 20, 22)
- 3) (21, 23, 22)
- 4) (22, 26, 25)

Options :

- 39448424953. 🏁 1
- 39448424954. 🎽 2
- 39448424955. 🖋 3
- 39448424956. 🏼 4

Question Number : 40 Question Id : 3944846489 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0 Note : Each of the questions from 36 to 45 follows a definite pattern, observe the same and fill in the blanks with suitable ones.

గమనిక:36 నుండి 45 వరకు గల ప్రశ్నలు ఒక ఖచ్చితమైన నియమాన్ని పాటిస్తున్నాయి. ఆ నియమాన్ని గమనించి సరియగు సమాధానాలతో ఖాళీలను పూరించండి.

150150, 11550, 1050, 150, _____

- 1) 110
- 2) 90
- 3) 70
- 4) 30

Options :

- 39448424957. ᄣ 1
- 39448424958. 🏼 2

39448424959. 🏼 3

39448424960. ✔ 4

Question Number : 41 Question Id : 3944846490 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Note : Each of the questions from 36 to 45 follows a definite pattern, observe the same and

fill in the blanks with suitable ones.

గమనిక:36 నుండి 45 వరకు గల (పశ్నలు ఒక ఖచ్చితమైన నియమాన్ని పాటిస్తున్నాయి. ఆ నియమాన్ని గమనించి సరియగు సమాధానాలతో ఖాళీలను పూరించండి. 7, 19, 73, 361, ____, 15121

- 1) 2016
- 2) 1951
- 3) 2161
- 4) 2751

Options :

39448424961. ^{**} 1
39448424962. ^{**} 2
39448424963. ✓ 3
39448424964. ^{**} 4

Question Number : 42 Question Id : 3944846491 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Note : Each of the questions from 36 to 45 follows a definite pattern, observe the same and fill in the blanks with suitable ones.

గమనిక:36 నుండి 45 వరకు గల (పశ్నలు ఒక ఖచ్చితమైన నియమాన్ని పాటిస్తున్నాయి. ఆ నియమాన్ని గమనించి సరియగు సమాధానాలతో ఖాళీలను పూరించండి. BAT, _____, JSB, _____,

1) FWX, NOF

2) EVX, MOE

3) FVX, NOE

4) EWY, MOE

Options :

39448424965. ✔ 1

39448424966. 🏼 2

39448424967. 🛎 3

39448424968. 🏁 4

Question Number : 43 Question Id : 3944846492 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Note : Each of the questions from 36 to 45 follows a definite pattern, observe the same and

fill in the blanks with suitable ones.

గమనిక:36 నుండి 45 వరకు గల (ప్రశ్నలు ఒక ఖచ్చితమైన నియమాన్ని పాటిస్తున్నాయి. ఆ నియమాన్ని గమనించి సరియగు సమాధానాలతో ఖాళీలను పూరించండి.

196, 16, 144, 36, 100, _____

- 1) 64
- 2) 72
- 3) 96
- 4) 112

Options:

39448424969. ✓ 1
39448424970. ¥ 2
39448424971. ¥ 3
39448424972. ¥ 4

Question Number : 44 Question Id : 3944846493 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Note : Each of the questions from 36 to 45 follows a definite pattern, observe the same and

fill in the blanks with suitable ones.

గమనిక:36 నుండి 45 వరకు గల ప్రశ్నలు ఒక ఖచ్చితమైన నియమాన్ని పాటిస్తున్నాయి. ఆ నియమాన్ని గమనించి సరియగు సమాధానాలతో ఖాళీలను పూరించండి.

6, 24, 120, 336, _____

- 1) 1320
- 2) 944
- 3) 720
- 4) 552

Options :

39448424973. ✔ 1

39448424974. 🛎 2

39448424975. 🏼 3

39448424976. 🏼 4

Question Number : 45 Question Id : 3944846494 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Note : Each of the questions from 36 to 45 follows a definite pattern, observe the same and

fill in the blanks with suitable ones.

గమనిక:36 నుండి 45 వరకు గల (పశ్నలు ఒక ఖచ్చితమైన నియమాన్ని పాటిస్తున్నాయి. ఆ నియమాన్ని గమనించి సరియగు సమాధానాలతో ఖాళీలను పూరించండి.

6, 24, 60, _____

- 1) 80
- 2) 100
- 3) 120
- 4) 140

Options:

- 39448424977. 🏼 1
- 39448424978. ** 2
- 39448424979. 🗸 3
- 39448424980. 🕷 4

| Sub-Section Number : | 5 |
|------------------------------|-----------|
| Sub-Section Id : | 394484656 |
| Question Shuffling Allowed : | Yes |

Question Id : 3944846495 Question Type : COMPREHENSION Sub Question Shuffling Allowed : Yes Group Comprehension Questions : No

Question Numbers : (46 to 48)

| (b) | Data Analysis | (Marks : 10) |
|-----|------------------|-----------------|
| | దత్తాంశ విశ్లేషణ | (మార్కులు : 10) |

The following table indicates the tax paid by 5 companies A, B, C, D, E in the months November 2019 to March 2020 (in thousands of rupees). Based on the information given in the table answer the questions from 46 to 48.

ఈ క్రింది పట్టికలో A, B, C, D, E అనే 5 కంపెనీలు నవంబర్, 2019 నుండి మార్చి 2020 వరకు కట్టిన పన్ను (వేల రూపాయలలో) ఇవ్వబడినది.

ఈ సమాచారం ఆధారంగా 46 నుండి 48 వరకు గల ప్రశ్నలకు సమాధానాలిమ్ము.

| Month | Months | | | | |
|--------------------------|--------------------|----------------------|------------------|----------------------|-----------------|
| నెల
Company
కంపెనీ | November
నవంబర్ | December
డిసెంబర్ | January
జనవరి | February
ఫిట్రవరి | March
మార్చి |
| Α | 174 | 1 86 | 147 | 158 | 193 |
| В | 89 | 76 | 92 | 105 | 122 |
| С | 201 | 212 | 219 | 198 | 225 |
| D | 65 | 71 | 78 | 83 | 92 |
| E | 39 | 42 | 46 | 52 | 61 |

Sub questions

Question Number : 46 Question Id : 3944846496 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0 For which company, the tax paid in March has highest percentage increase over the

month of November

నవంబరుతో పోల్చినపుడు ఏ కంపెనీ మార్చి లో కట్టిన పన్నులో అత్యధిక పెరుగుదల శాతంను కలిగియున్నది?

- 1) B
- 2) C
- 3) D
- 4) E

Options :

- 39448424981. 🍀 1
- 39448424982. 🍀 2
- 39448424983. 🏼 3
- 39448424984. 🗸 4

Question Number : 47 Question Id : 3944846497 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0 In which month company 'D' recorded highest increase in the tax paid over the previous month?

ఏ నెలలో కంపెనీ D , దానికి ముందున్న నెలలో కట్టిన పన్ను కన్నా అత్యధిక పన్ను పెరుగుదలను నమోదు చేసింది ?

- 1) December
- 2) January
- 3) February
- 4) March

Options :

- 39448424985. 🇯 1
- 39448424986. 🏼 2
- 39448424987. 🏼 3
- 39448424988. ✔ 4

Question Number : 48 Question Id : 3944846498 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0 The percentage decrease in the tax paid by company A in January over the month of

November, corrected to two decimal places is

నవంబరు నెలతో పోల్చినపుడు, జనవరి లో కంపెని A కట్టిన పన్నులో తగ్గుదల శాతము, రెండుదశాంశ స్థానాలకు సవరించినపుడు

- 1) 15.63
- 2) 15.57
- 3) 15.52
- 4) 15.50

Options:

- 39448424989. 🍀 1
- 39448424990. 🏼 2
- 39448424991. 🖋 3
- 39448424992. 🏼 4

| Sub-Section Number : | 6 |
|------------------------------|-----------|
| Sub-Section Id : | 394484657 |
| Question Shuffling Allowed : | Yes |

Question Id : 3944846499 Question Type : COMPREHENSION Sub Question Shuffling Allowed : Yes Group Comprehension Questions : No

Question Numbers : (49 to 53)

| (b) Data Analysis | (Marks : 10) |
|-------------------|-----------------|
| దత్తాంశ విశ్లేషణ | (మార్కులు : 10) |

The following Pie Chart depicts the data on the number of students graduating from different branches of engineering in an year from a particular state. Based on this data answer the questions from 49 to 53.

ఒక రాష్టంలో ఒక సంవత్సరంలో వివిధ ఇంజనీరింగ్ విభాగాలలో పట్ట భద్రులవుతున్న విద్యార్థుల సంఖ్యకు సంబంధించిన సమాచారాన్ని క్రింది పీ చిత్రం చూపుతుంది. ఈ సమాచారం ఆధారంగా 49 నుండి 53 వరకు గల ప్రశ్నలకు సమాధానాలిమ్ము.



A : Computers Engg B: Mechanical Engg C : Electronics Engg D : Communicaton Engg కంప్యూటర్ ఇంజినీరింగు మెకానికల్ ఇంగినీరింగు ఎల్క్వానిక్స్ ఇంజనీరింగ్ కమ్యూనికేషన్ ఇంజనీరింగ్ సివిల్ ఇంజనీరింగ్

Sub questions

E : Civil Engg

Question Number : 49 Question Id : 3944846500 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0 If the total number of students graduating is 27,000 then the number of students graduating from Civil Engineering is

మొత్తం పట్ట భద్రులవుతున్న విద్యార్థుల సంఖ్య 27000 అయినపుడు, సివిల్ ఇంజనీరింగ్ లో పట్టభద్రులవుతున్న విద్యార్థులు సంఖ్య

- 1) 2800
- 2) 2500
- 3) 1950
- 4) 1800

Options:

39448424993. *****39448424994. *****39448424995. *****39448424996. *****

Question Number : 50 Question Id : 3944846501 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0 The total number of graduates from Computer Engineering and Civil Engineering is equal to the number of graduates from which of the following two branches of Engineering?

ఏ రెండు ఇంజినీరింగు విభాగాల్లో పట్టభద్రులవుతున్న విద్యార్తులు సంఖ్య అనేది కంప్యూటర్ ఇంజినీరింగు, సివిల్ ఇంజనీరింగ్ అనే రెండు విభాగాల్లో మొత్తం పట్టభద్రులవుతున్న విద్యార్థులు సంఖ్యకు సమానం?

- 1) Electronics and Communications
 - ఎల్క్రానిక్స్ మరియు కమ్యూనికేషన్స్
- 2) Electronics and Civil

ఎల్కళ్జానిక్స్ మరియు సివిల్

- Computer and Communications
 కంప్యూటర్ మరియు కమ్యూనికేషన్స్
- 4) Communication and Civil కమ్యూనికేషన్స్ మరియు సివిల్

Options:

39448424997. ✔ 1

39448424998. 🎽 2

39448424999. 🏼 3

39448425000. 🛎 4

Question Number : 51 Question Id : 3944846502 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0 If the number of the graduates from all the branches is 21000 then the difference between the maximum number of graduates and the minimum number of graduates in all the branches is

అన్ని విభాగాల్లో కలిపి 21000 మంది పట్టభద్రులయితే అన్ని విభాగాలు కలిపి అత్యధికంగా పట్టభద్రులవుతున్న విద్యార్థుల సంఖ్య కు మరియు అత్యల్పంగా పట్టభద్రులవుతున్న విద్యార్థుల సంఖ్య కుగల భేదం?

- 1) 6320
- 2) 5600
- 3) 4850
- 4) 4480

Options:

39448425001. ^{**} 1
39448425002. ✓ 2
39448425003. ^{**} 3
39448425004. ^{**} 4

Question Number : 52 Question Id : 3944846503 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0 What is the percentage of Mechanical Engineers graduating in the year ?

ఆ సంవత్సరములో మెకానికల్ ఇంజనీరింగు లో పట్టభద్రులవుతున్న విద్యార్థుల శాతం?

- 1) 15
- 2) 18
- 3) 20
- 4) 25

Options:

39448425005. ^{**} 1
39448425006. ^{**} 2
39448425007. ✓ 3
39448425008. ^{**} 4

Question Number : 53 Question Id : 3944846504 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0 What is the ratio of the graduating students from Mechanical to Electronics Engineering?

మెకానికల్ ఇంజనీరింగు లో పట్టభద్రులవుతున్న విద్యార్థులకు, ఎల్కక్టానిక్స్ లో పట్టభద్రులవుతున్న విద్యార్థులకు గల నిష్పత్తి ఎంత?

- 1) 4:1
- 2) 4:3
- 3) 3:2
- 4) 2:3

Options :

- 39448425009. 🕷 1
- 39448425010. 🏼 2
- 39448425011. 🕷 3
- 39448425012. 🗸 4

| Sub-Section Number : | 7 |
|------------------------------|-----------|
| Sub-Section Id : | 394484658 |
| Question Shuffling Allowed : | Yes |

Question Id : 3944846505 Question Type : COMPREHENSION Sub Question Shuffling Allowed :

Yes Group Comprehension Questions : No

Question Numbers : (54 to 55)

| (b) Data Analysis | (Marks : 10) |
|-------------------|-----------------|
| దత్తాంశ విశ్లేషణ | (మార్కులు : 10) |

In a college of strength 1200 students, the number of students who read news papers A, B, C are given in the Venn diagram below. Using it answer questions 54 and 55.

1200 మంది విద్యార్థులను కల్గిన ఒక కళాశాలలో A, B, C అనే వార్తా పత్రికలను చదివే విద్యార్థుల సంఖ్య ను ఈ క్రింది వెన్ చిత్రము సూచిస్తుంది. ఈ దత్తాంశాన్ని ఉపయోగించి 54 మరియు 55 ప్రశన్లకు సమాధానములు గుర్తించుము.



Sub questions

Question Number : 54 Question Id : 3944846506 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0 The number of students who read either paper B or paper C, but do not read paper A

is

పుతిక Bలేదా C ని చదువుతూ, పుతిక A ను చదవని విద్యార్థుల సంఖ్య ?

- 1) 760
- 2) 670
- 3) 550
- 4) 610

Options :

39448425013. ¥ 1
39448425014. ¥ 2
39448425015. ✓ 3
39448425016. ¥ 4

Question Number : 55 Question Id : 3944846507 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The number of students who do not read any of these three papers A, B, C is

మూడు పత్రికలు A,B,C లలో దేనిని కూడా చదవని విద్యార్థుల సంఖ్య

- 1) 80
- 2) 100
- 3) 140
- 4) 200

Options :

| 39448425017. 🏶 1 | |
|------------------------------|-----------|
| 39448425018. 💙 2 | |
| 39448425019. 🏶 3 | |
| 39448425020. 🏶 4 | |
| Sub-Section Number : | 8 |
| Sub-Section Id : | 394484659 |
| Question Shuffling Allowed : | Yes |

Question Id : 3944846508 Question Type : COMPREHENSION Sub Question Shuffling Allowed : Yes Group Comprehension Questions : No

Question Numbers : (56 to 60)

| (c) | Coding and Decoding Problems | |
|-----|------------------------------|--|
| | కోడింగ్, డీకోడింగ్ సమస్యలు | |

(Marks: 10) (మార్కులు : 10) A code designed for certain letters in English alphabet by replacing the letters with certain symbols and natural numbers according to the following rules:

ఆంగ్ల వర్ణమాలలోని కొన్ని అక్షరాలను, కొన్ని గుర్తులు మరియు కొన్ని సంఖ్యలతోను క్రింది నియమాలకు లోబడి కోడ్ చేయబడినవి.

 If only two vowels or only two consonants come together in a word, then they are replaced by the symbols corresponding to their successors letters in the code;

ఒక పదంలోని కేవలం రెండు అచ్చులు లేదా కేవలం రెండు హల్లులు వరుసగా వచ్చినట్లైతే వాటిని వాటి తరువాతి అక్షరపు కోడ్ తో కోడ్ చేయాలి

 ii) If the first and last letters are vowels in a word, then they are interchanged with the corresponding symbols

ఒక పదంలోని మొదటి, చివరి అక్షరాలు గనక అచ్చులైతే వాటికి సంబంధించిన గుర్తులను పరస్పరం మార్చి కోడ్ చేయాలి

Based on this answer the questions from 56 to 60

ఈ సమాచారం ఆధారంగా 56 నుండి 60వరకు గల (పశ్న లకు సమాధానాలిమ్ము

| Letter | Α | С | D | E | G | L | М | 0 | Р | R | S | Т | Y |
|--------|---|---|---|---|---|---|---|---|---|---|----|---|---|
| Code | 1 | * | # | 2 | % | £ | @ | 3 | & | Z | \$ | ? | + |

Sub questions

Question Number : 56 Question Id : 3944846509 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0 What is the code for the word OMEGA?

OMEGA కు కోడ్ పదం ఏమిటి?

- 1) 1@2%3
- 2) 3@2%1
- 3) 1%2@3
- 4) 3#%£1

Options:

- 39448425021. ✔ 1
- 39448425022. 🏼 2
- 39448425023. 🛎 3
- 39448425024. 🏼 4

Question Number : 57 Question Id : 3944846510 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

What is the code for the word PACE ?

PACE కు కోడ్ పదం ఏమిటి?

- 1) &\$*1
- 2) &1*2
- 3) +@#*
- 4) @21£

Options:

- 39448425025. 🏼 1
- 39448425026. ✔ 2
- 39448425027. 🕷 3

Question Number : 58 Question Id : 3944846511 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0 What is the code for the word CARRY ?

CARRY పదానికి కోడ్ పదం ఏమిటి?

- 1) \$2**?
- 2) #1££?
- 3) *1\$\$+
- 4) ?1##+

Options :

- 39448425029. 🏼 1
- 39448425030. ** 2
- 39448425031. 🖋 3
- 39448425032. 🛎 4

Question Number : 59 Question Id : 3944846512 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0 What is the code for the word DELTA?

పదం DELTA కు కోడ్ ఏమిటి?

- 1) #%£12
- 2) 2\$#?1
- 3) #2@+1
- 4) #2£?1

Options :

39448425033. ^{**} 1
39448425034. ^{**} 2
39448425035. ✓ 3
39448425036. ^{**} 4

Question Number : 60 Question Id : 3944846513 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

What is the code for the word STREET?

STREET అనే పదానికి కోడ్ ఏది?

- 1) \$?Z%%?
- \$Z%??#
- 3) \$#++%
- 4) \$*Z&&?

Options :

39448425037. ✔ 1

39448425038. 🕷 2

| 39448425040. * 4 | |
|------------------------------|-----------|
| Sub-Section Number : | 9 |
| Sub-Section Id : | 394484660 |
| Question Shuffling Allowed : | Yes |

Question Number : 61 Question Id : 3944846514 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

| (c) Coding and Decoding Problems | (Marks: 10) | | | |
|----------------------------------|-----------------|--|--|--|
| కోడింగ్, డికోడింగ్ సమస్యలు | (మార్కులు : 10) | | | |

In a certain code language, if the word RECTANGLE is coded as TGEVCPING, then

how is the word RHOMBUS is coded

ఒకానొక కోడ్ లో RECTANGLE ను TGEVCPING గా కోడ్ చేయబడినది.

అప్పుడు, RHOMBUS అనే పదం యొక్క కోడ్ పదం

1) TJOQDWV

39448425039. ** 3

- 2) TJQNDWU
- 3) TJQODWU
- 4) TJQOEWU

Options :

- 39448425041. ᄣ 1
- 39448425042. 🛎 2
- 39448425043. 🖋 3
- 39448425044. 🛎 4
Question Number : 62 Question Id : 3944846515 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

| (c) Coding and Decoding Problems | (Marks: 10) |
|----------------------------------|-----------------|
| కోడింగ్, డికోడింగ్ సమస్యలు | (మార్కులు : 10) |

If SPIKE is coded as TOJJD, then the code for CROWD is

SPIKE ను TOJJD గా కోడ్ చేయబడినప్పుడు CROWD యొక్క కోడ్

- 1) DQPVE
- 2) DSPXE
- 3) BSNVC
- 4) BQOUD

Options :

- 39448425045. ✔ 1
- 39448425046. 🗱 2
- 39448425047. 🕷 3
- 39448425048. 🏼 4

Question Number : 63 Question Id : 3944846516 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

| (c) Coding and Decoding Problems | (Marks: 10) |
|----------------------------------|-----------------|
| కోడింగ్, డికోడింగ్ సమస్యలు | (మార్కులు : 10) |

In a certain code the word MISTER is coded as UFSNJT and word PARENT is coded as FOUQBS, then in the same code language, the word SQUARE is coded as

ఒకానొక కోడ్ లో MISTER అనే పదాన్ని UFSNJT గాను, PARENT అనే పదాన్ని FOUQBS గాను కోడ్ చేయబడినపుడు, అదే కోడ్ లో SQUARE అనే పదం ఈ క్రింది విధంగా కోడ్ చేయబడింది.

- 1) TRVBSF
- 2) BSTFRV
- 3) BSFTRV
- 4) TRBVSF

Options :

39448425049. * 1
39448425050. * 2
39448425051. ✓ 3
39448425052. * 4

Question Number : 64 Question Id : 3944846517 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

| (c) Coding and Decoding Problems | (Marks: 10) |
|----------------------------------|-----------------|
| కోడింగ్, డికోడింగ్ సమస్యలు | (మార్కులు : 10) |

If SAGE is coded as TEHI and MOUSE is coded as NUATI then ROSE is coded as

SAGE ను TEHI గాను, MOUSE ను NUATI గాను కోడ్ చేయబడినపుడు, ROSE అనే పదం ఈ క్రింది విధంగా కోడ్ చేయబడింది.

- 1) SUTI
- 2) SUTO
- 3) SUTU
- 4) SUTA

Options :

- 39448425053. ✔ 1
- 39448425054. 🏼 2
- 39448425055. 🛎 3
- 39448425056. 🍀 4

Question Number : 65 Question Id : 3944846518 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

| (c) Coding and Decoding Problems | (Marks: 10) | |
|----------------------------------|-----------------|--|
| కోడింగ్, డికోడింగ్ సమస్యలు | (మార్కులు : 10) | |

If DECK is coded as WVXP and MUSIC is coded as NFHRX then DART is coded

as

DECK ను WVXP గాను మరియు MUSIC ను NFHRX గాను కోడ్ చేయబడినపుడు, DART ఈ క్రింది విధంగా కోడ్ చేస్తారు.

- 1) WZIH
- 2) WZIG
- 3) WZIK
- 4) YZIG

Options :

| Question Shuffling Allowed : | Yes |
|------------------------------|-----------|
| Sub-Section Id : | 394484661 |
| Sub-Section Number : | 10 |
| 39448425060. * 4 | |
| 39448425059. * 3 | |
| 39448425058. ✔ 2 | |
| 39448425057. * 1 | |

Question Number : 66 Question Id : 3944846519 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

| (d) Date, Time & Arrangement Problems | (Marks : 10) |
|---------------------------------------|-----------------|
| తేదీ, సమయం, అమరికల సమస్యలు | (మార్కులు : 10) |

21-07-1999 was Wednesday. What would have been the day of the week

on 21-07-1947?

21-07-1999, బుధవారం అయ్యేను. అయితే, 21-07-1947 అనేది వారంలో ఏ రోజు అయిఉండెను ?

- 1) Monday సోమవారం
- 2) Sunday පේධනර්ර
- 3) Tuesday మంగళవారం
- 4) Saturday శనివారం

Options :

39448425061. ✓ 1
39448425062. ¥ 2
39448425063. ¥ 3
39448425064. ¥ 4

Question Number : 67 Question Id : 3944846520 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0 (d) Date, Time & Arrangement Problems (Marks : 10) తేదీ, సమయం, అమరికల సమస్యలు (మార్కులు : 10) At what time between 2 pm and 3 pm will the two hands of a clock be at 150⁰ angle to each other ?

ఒక గడియారంలో మ.2 గం. మరియు మ.3 గం. మధ్యలో ఏ సమయంలో రెండు ముల్లులు ఒక దానికొకటి 150° కోణంలో ఉంటాయి ?

| 1) $36\frac{1}{11}$ minutes past 2 pm | 2గంటల 36 <u>1</u> నిమిషాలు |
|---------------------------------------|---------------------------------------|
| 2) $38\frac{2}{15}$ minutes past 2 pm | 2గంటల 38 <u>²</u> నిమిషాలు |
| 3) $37\frac{1}{15}$ minutes past 2 pm | 2గంటల 37 <u>1</u> నిమిషాలు |
| 4) $38\frac{2}{11}$ minutes past 2pm | 2గంటల 38 <u>²</u> నిమిషాలు |

Options :

39448425065. * 1
39448425066. * 2
39448425067. * 3
39448425068.

Question Number : 68 Question Id : 3944846521 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

| (d) Date, Time & Arrangement Problems | (Marks : 10) |
|---------------------------------------|-----------------|
| తేదీ, సమయం, అమరికల సమస్యలు | (మార్కులు : 10) |

At 3.40, the hour hand and the minute hand of a clock form an angle of

ఒక గడియారంలో ఉదయం 3 గంటల 40 నిముషాల కు, గంటల ముల్లు మరియు నిమిషాల ముల్లుల మధ్య కనిష కోణం

- 1) 120⁰
- 2) 125⁰
- 3) 130⁰
- 4) 135⁰

Options:

- 39448425069. ^{**} 1
 39448425070. ^{**} 2
 39448425071. ✓ 3
- 39448425072. 🏁 4

Question Number : 69 Question Id : 3944846522 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0 (d) Date, Time & Arrangement Problems (Marks : 10) తేదీ, సమయం, అమరికల సమస్యలు (మార్కులు : 10) A is mother of B. B is a daughter of C. D is father of C. How is D related to A?

Bయొక్క అమ్మ A, C యొక్క కూతురుB, C యొక్క నాన్న D అయితే, A తోD ఏ విధమైన సంబంధాన్ని కల్గి ఉంది?

| 1) Grand father | తాత | |
|--------------------|---------|--|
| 2) Father-in-law | మామ | |
| 3) Grand mother | అమ్మమ్మ | |
| 4) Daughter-in-law | కోడలు | |

Options :

39448425073. ^{**} 1
39448425074. ✓ 2
39448425075. ^{**} 3
39448425076. ^{**} 4

Question Number : 70 Question Id : 3944846523 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

| (d) Date, Time & Arrangement Problems | (Marks : 10) |
|---------------------------------------|-----------------|
| తేదీ, సమయం, అమరికల సమస్యలు | (మార్కులు : 10) |

Kabir left for Patna from Ranchi at 8.30 am. He travelled at the speed of 60 kmph for 3 hours 15 minutes. After that he reduced the speed to 20 kmph. If the distance between the two cities is 205 km at what time did Kabir arrived Patna?

కబీరు ఉ. 8. 30కు రాంచీ నుంచి పాట్నాకు బయలుదేరాడు. అతడు 3గంటల 15 నిమిషాలు గంటకు 60 కి.మీ. వేగంతో ప్రయాణించెను. ఆ తరుగాత, అతడు తన వేగాన్ని గంటకు 20 కి.మీ.కు తగ్గించెను. ఆ రెండు నగరాల మధ్య దూరం 205 కి.మీ. అయితే, కబీరు పాట్నా చేరుకున్న సమయం ఎంత ?

- 1) 12.15 pm
- 2) 12.45 pm
- 3) 1.15 pm
- 4) 1.30 pm

Options :

- 39448425077. ✓ 1
 39448425078. ¥ 2
 39448425079. ¥ 3
- 39448425080. 🔻 4

Question Number : 71 Question Id : 3944846524 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

| Correct Marks : 1 Wrong Marks : 0 | | | | | |
|-----------------------------------|---|---|--|--|--|
| | - | - | | | |

| (d) Date, Time & Arrangement Problems | (Marks : 10) |
|---------------------------------------|-----------------|
| తేదీ, సమయం, అమరికల సమస్యలు | (మార్కులు : 10) |

A person comes for an interview at 10.10 am which was 30 minutes before scheduled time, which in fact was already delayed by 35 minutes. Then the time at which the interviews started is

నిర్దేశిత సమయం కన్న 30 నిమిషాలముందుగా ఉ.10.10 గంటలకు ఒక వ్యక్తి హాజరైనాడు. కాని ఆ మౌఖిక పరీక్ష నిర్దేశిత సమయం కన్నా 35 నిమిషాలు ఆలస్యంగా (పారంభమయినది. అపుడు మౌఖిక పరీక్ష (పారంభమైన సమయం

- 2) 9.35 am \$\begin{aligned} \phi.9.35 & \end{aligned} \end
- 3) 9.55 am 億.9.55

Options :

39448425081. ***** 1 39448425082. ***** 2 39448425083. ***** 3

39448425084. ✔ 4

Question Number : 72 Question Id : 3944846525 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

| (d) Date, Time & Arrangement Problems | (Marks : 10) |
|---------------------------------------|-----------------|
| తేదీ, సమయం, అమరికల సమస్యలు | (మార్కులు : 10) |

Four bells A, B, C & D ring regularly at intervals of 25 minutes, 35 minutes, 40 minutes and 80 minutes respectively. If all the bells rang together at 10 am on Sunday when will they ring again simultaneously?

నాల్గు గంటలు A, B, C, మరియు Dలు వరుసగా 25 నిమిషాలు, 35 నిమిషాలు, 40 నిమిషాలు మరియు 80 నిమిషాల అంతరముతో (క్రమంగా (మోగుతాయి. ఆదివారం ఉ. 10 గంటలకు అన్నీ ఒకేసారి (మోగితే, మళ్ళీ అవన్నీ ఒకే సారి (మోగేదెప్పుడు?

- 1) Monday సోమవారం
- 2) Tuesday మంగళవారం
- 3) Wednesday బාధవారం
- 4) Thursday గురువారం

Options :

39448425085. ^{**} 1
39448425086. ✓ 2
39448425087. ^{**} 3
39448425088. ^{**} 4

Question Number : 73 Question Id : 3944846526 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

(d) Date, Time & Arrangement Problems (Marks : 10)

తేదీ, సమయం, అమరికల సమస్యలు (మార్కులు : 10)

For the integers m, n define

 $m \alpha n = m + 2n$, $m \beta n = 2m + n$, and $m \gamma n = m^2 + n^2$ then $((-5)\alpha 6)\beta((-2)\gamma(-3)) =$

పూర్జాంకాలు m,n లకు $m \alpha n = m + 2n$, $m \beta n = 2m + n$, మరియు $m \gamma n = m^2 + n^2 \pi$ నిర్వచిస్తే, అపుడు $((-5)\alpha 6)\beta((-2)\gamma(-3)) =$

1) 33

- 2) 30
- 3) 27

4) 24

Options:

- 39448425089. 🎽 1
- 39448425090. 🕷 2
- 39448425091. 🖋 3
- 39448425092. 🏼 4

Question Number : 74 Question Id : 3944846527 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

| (d) Date, Time & Arrangement Problems | (Marks : 10) |
|---|---|
| తేదీ, సమయం, అమరికల సమస్యలు | (మార్కులు : 10) |
| For $a, b, \in N$ and $b > 1$ define * by $a * b = a (1 + a)$ | $\frac{1}{b} + \frac{1}{b^2} + \cdots \Big)$ |
| Then $(2*3)*2 =$ | |
| $a, b, \in N$ మరియు $b > 1$ కు $*$ ను $a * b = a (1 + a)$ | $\frac{1}{b} + \frac{1}{b^2} + \cdots \bigg)$ |
| గా నిర్వచిస్తే, అపుడు (2*3)*2 = | |

- 1) 12
- 2) 8
- 3) 6
- 4) 3

Options :

- 39448425093. ** 1
- 39448425094. ** 2
- 39448425095. ✔ 3
- 39448425096. 🏼 4

Question Number : 75 Question Id : 3944846528 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

| (d) Date, Time & Arrangement Problems | (Marks : 10) |
|---------------------------------------|-----------------|
| తేదీ, సమయం, అమరికల సమస్యలు | (మార్కులు : 10) |

If $a \otimes b = (a - b - 1)^2$, and $a \oplus b = \frac{ab}{3}$ then $(2 \otimes 5) \oplus 9 =$ $a \otimes b = (a - b - 1)^2$, మరియు $a \oplus b = \frac{ab}{3}$ అయితే, అపుడు $(2 \otimes 5) \oplus 9 =$

- 1) $\frac{16}{3}$
- 2) 32
- 3) $\frac{64}{3}$
- 4) 48

Options :

- 39448425097. 🍀 1
- 39448425098. 🏼 2
- 39448425099. 🏼 3
- 39448425100. ✔ 4

Mathematical Ability

| Section Id : | 39448495 | |
|---|-----------|--|
| Section Number : | 2 | |
| Section type : | Online | |
| Mandatory or Optional : | Mandatory | |
| Number of Questions : | 75 | |
| Number of Questions to be attempted : | 75 | |
| Section Marks : | 75 | |
| Enable Mark as Answered Mark for Review and | Vos | |
| Clear Response : | 163 | |

| Sub-Section Number : | 1 |
|------------------------------|-----------|
| Sub-Section Id : | 394484662 |
| Question Shuffling Allowed : | Yes |

Question Number : 76 Question Id : 3944846529 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

Arithmetical Ability అంకగణిత సామర్థ్యత

If
$$\left(\sqrt[3]{\frac{3}{2}}\right)^x = \left(\frac{9}{4}\right)^{2x-7}$$
, then $x =$

$$\left(\sqrt[3]{\frac{3}{2}}\right)^x = \left(\frac{9}{4}\right)^{2x-7}$$
 అయితే, x =

1)
$$\frac{7}{3}$$

2)
$$\frac{21}{11}$$

3)
$$\frac{14}{3}$$

4)
$$\frac{42}{11}$$

Options :

39448425101. 🏼 1

39448425102. 🏼 2

- 39448425103. 🏼 3
- 39448425104. ✔ 4

Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Arithmetical Ability అంకగణిత సామర్థ్యత

$$\begin{cases} 4 - \left\{ x^2 + \left(3 - \frac{1}{x^2}\right)^{-1} \right\}^{-1} \\ 1 \right\}^{-1} = \\ 1 \right) \frac{3x^4}{12x^4 - 3x^2 + 1} \\ 2 \right) \frac{3x^4}{12x^2 + 1} \\ 3 \right) \frac{3x^2}{12x^2 + 3x + 1} \\ 4 \right) \frac{3x^2}{12x^4 + 3x^2 - 1} \end{cases}$$

Options :

39448425105. ✓ 1
39448425106. ¥ 2
39448425107. ¥ 3
39448425108. ¥ 4

Question Number : 78 Question Id : 3944846531 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0 Arithmetical Ability అంకగణిత సామర్థ్యత 28 litres of a mixture contains milk and water in the ratio of 3 : 4. If 8 litres of pure milk is added to this mixture, then the ratio of water to milk in the resulting mixture is

28 లీటర్ల ఒక మిశ్రమంలో 3 : 4 నిష్పత్తిలో పాలు, నీళ్లు కలిగి ఉన్నాయి. ఆ మిశ్రమానికి 8 లీటర్ల పాలను కలిపితే, అపుడు ఆ మిశ్రమంలో నీళ్లు, పాల నిష్పత్తి

- 1) 4:7
- 2) 4:5
- 3) 4:3
- 4) 4:9

Options:

39448425109. ¥ 1
39448425110. ✓ 2
39448425111. ¥ 3
39448425112. ¥ 4

Question Number : 79 Question Id : 3944846532 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

At a certain party the ratio of gents to ladies was 4 : 3. After some time 6 men and 4 women left the party and the ratio of men to women was 21 : 16. How many people were present in the party initially?

ఒక పార్టీలో మగవారు, ఆడవారి నిష్పత్తి 4 : 3. కొంత సేపటి తరువాత 6 గురు మగవారు, 4గురు ఆడవారు పార్టీని వదిలి వెళ్లగా అపుడు ఆ పార్టీలో మిగిలిన మగవారు, ఆడవారి నిష్పత్తి 21 : 16 అయ్యింది. అపుడు ఆ పార్టీలో మొదటగా ((పారంభంలో) ఎంతమంది హాజరై ఉండిరి?

- 1) 82
- 2) 84
- 3) 80
- 4) 86

Options :

39448425113. ^{**} 1
39448425114. ✓ 2
39448425115. ^{**} 3
39448425116. ^{**} 4

Question Number : 80 Question Id : 3944846533 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The smallest number among

$$x = 3\sqrt{7} - \sqrt{61}$$
, $y = 6 - \sqrt{34}$, $z = 5 - \sqrt{23}$ and $w = 2\sqrt{3} - \sqrt{10}$ is

 $x = 3\sqrt{7} - \sqrt{61}, y = 6 - \sqrt{34}, z = 5 - \sqrt{23}$ మరియు $w = 2\sqrt{3} - \sqrt{10}$ లలో కనిష సంఖ్య

- 1) x
- 2) y
- 3) z
- 4) w

Options :

39448425117. * 1 39448425118. * 2 39448425119. * 3 39448425120. ~ 4

Question Number : 81 Question Id : 3944846534 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

If $\left(\frac{a}{b}\right)^{x-1} = \left(\frac{b}{a}\right)^{x-3}$, then the value of x is $\left(\frac{a}{b}\right)^{x-1} = \left(\frac{b}{a}\right)^{x-3}$ అయితే, x విలువ 1) $\frac{1}{2}$ 2) 1 3) 2 4) $\frac{7}{2}$

Options :

39448425121. ^{**} 1
39448425122. ^{**} 2
39448425123. ✓ 3

39448425124. 🏼 4

Question Number : 82 Question Id : 3944846535 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The least values of a and b if (7a342b) is divisible by 88 are

88 చే (7a342b) అనేది నిశ్శేషంగా భాగింపబడేట్లుగా a, b ల కనిష్ట విలువలు

- 1) a = 6; b=4
- 2) a = 4; b = 6
- 3) a =6; b =6
- 4) a = 4; b = 4

Options:

39448425125. *****39448425126. *****39448425127. *****39448425128. *****

Question Number : 83 Question Id : 3944846536 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

When a number is divided by 783 it leaves a remainder 48. What will be the

remainder if the same number is divided by 29?

ఒక సంఖ్య 783 చే భాగించగా వచ్చు శేషం 48 మరియు అదే సంఖ్యను 29చే భాగిస్తే వచ్చే శేషం ఎంత?

- 1) 17
- 2) 18
- 3) 19
- 4) 23

Options :

| 39448425129. ᄣ 1 |
|------------------|
| 39448425130. ᄣ 2 |
| 39448425131. ✔ 3 |
| 39448425132. 🛎 4 |

Question Number : 84 Question Id : 3944846537 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

If the GCD of two positive integers is 29 and their sum is 174, then their difference is

రెండు ధన పూర్ణాంకాల గ.సా.భా. 29 మరియు వాటి మొత్తం 174 అయినచో, వాటి భేదం

- 1) 58
- 2) 116
- 3) 87
- 4) 145

Options:

- 39448425133. [♣] 1
 39448425134. ✓ 2
 39448425135. [♣] 3
- 39448425136. 🛎 4

Question Number : 85 Question Id : 3944846538 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0 Arithmetical Ability

అంకగణిత సామర్థ్యత

The LCM of two numbers is 20 times their HCF and the sum of their LCM and HCF is 2520. If the smaller of those numbers is 480, the ratio between the smaller and the bigger number is

రెండు సంఖ్యల క.సా.గు. వాటి గ.సా.భా.కు 20 రెట్లు మరియు వాటి క.సా.గు., గ.సా.భా. ల మొత్తం 2520. వాటిలో చిన్న సంఖ్య 480 అయితే చిన్న సంఖ్యకు, పెద్దసంఖ్యకు గల నిష్పత్తి

- 1) 2:3
- 2) 3:4
- 3) 4:5
- 4) 5:6

Options :

39448425137. ^{**} 1
39448425138. ^{**} 2
39448425139. ✓ 3
39448425140. ^{**} 4

Question Number : 86 Question Id : 3944846539 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

A person spent $\frac{2}{7}$ of his salary on house rent and $\frac{3}{5}$ of the remaining on food and cloths. Rest he saved. If the amount he spent on food and cloths is Rs.16500, then the amount he saved is (in rupees)

- 1) 11000
- 2) 16500
- 3) 13500
- 4) 5500

Options :

39448425141. ✓ 1
39448425142. ¥ 2
39448425143. ¥ 3
39448425144. ¥ 4

Question Number : 87 Question Id : 3944846540 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

If we put $\frac{7}{9}$, $\frac{6}{8}$, $\frac{5}{6}$, $\frac{4}{5}$ in descending order, then the difference between first and

second number is

7/9, ⁶/8, ⁵/6, ⁴/5 లను అవరోహణ క్రమంలో రాయగా వచ్చు మొదటి మరియు రెండవ సంఖ్యల భేదం

1) $\frac{1}{36}$

2)
$$\frac{1}{12}$$

3)
$$\frac{1}{30}$$

4)
$$\frac{1}{24}$$

Options :

39448425145. ***** 1 39448425146. ***** 2

39448425147. ✔ 3

39448425148. 🏼 4

Question Number : 88 Question Id : 3944846541 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

What is the difference between the largest and smallest of the following

rational numbers ?

క్రింది అకరణీయ సంఖ్యలలో గరిష్ఠ, కనిష్ఠ సంఖ్యల భేదం ఎంత?

 $\frac{3}{4}, \frac{13}{16}, \frac{5}{7}, \frac{97}{104}$

1) $\frac{53}{728}$

- 2) $\frac{159}{728}$
- 3) 319 1456

4)
$$\frac{349}{1456}$$

Options:

39448425149. ***** 1
39448425150. ✓ 2
39448425151. ***** 3
39448425152. ***** 4

Question Number : 89 Question Id : 3944846542 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

Arithmetical Ability

అంకగణిత సామర్థ్యత

If $p = \sqrt[3]{2}$, $q = \sqrt[2]{3}$, $r = \sqrt[4]{5}$ and $s = \sqrt[6]{7}$, then which one of the following

ordering is true?

 $p = \sqrt[3]{2}, q = \sqrt[2]{3}, r = \sqrt[4]{5}$ మరియు s = $\sqrt[6]{7}$ అయితే, క్రింది వాటిలో ఏ క్రమం

నిజం?

- 1) p > r > s
- 2) q > r > s
- 3) q < r < p
- 4) r < s < p

Options:

39448425153. ¥ 1
39448425154. ✓ 2
39448425155. ¥ 3
39448425156. ¥ 4

Question Number : 90 Question Id : 3944846543 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

If $23\frac{1}{3}\%$ of $37\frac{2}{7}\%$ of x is 29, then x = x $\overline{\text{OWS}}$, $37\frac{2}{7}\%$ $\overline{\text{OWS}}$, $23\frac{1}{3}\%$ $\otimes\overline{\text{AC}}$ 29 \otimes $\overline{\text{OWS}}$, x = x

1)
$$\frac{1}{3}$$

2) $3\frac{1}{3}$
3) $33\frac{1}{3}$
4) $333\frac{1}{3}$

Options :

39448425157. *****39448425158. *****39448425159. *****39448425160. *****

Question Number : 91 Question Id : 3944846544 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

If the numerator of a fraction is increased by 20% and the denominator is decreased by 10% the fraction becomes $\frac{16}{21}$. What was the original fraction ? ఒక భిన్నము యొక్క లవమును 20% పెంచి మరియు హారాన్ని 10% తగ్గించినపుడు ఆ భిన్నము $\frac{16}{21}$ అయినది. అపుడు అసలు భిన్నము ఎంత ఉండెను?

1) $\frac{6}{7}$ 2) $\frac{5}{7}$ 3) $\frac{4}{7}$ 4) $\frac{2}{7}$

Options :

39448425161. ¥ 1
39448425162. ¥ 2
39448425163. ✓ 3
39448425164. ¥ 4

Question Number : 92 Question Id : 3944846545 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

A man bought a horse and a carriage for Rs.3000. He sold the horse at a gain of 20% and the carriage at a loss of 10%, there by gaining 2% on the whole.

Then the cost of the horse is (in rupees)

ఒక వ్యక్తి ఒక గుఱ్ఱాన్ని మరియు గుఱ్ఱపు బగ్గీని రూ. 3000 లకు కొన్నాడు. గుఱ్ఱాన్ని 20% లాభానికి, బగ్గీని 10%నష్టానికి అమ్మినపుడు అతనికి మొత్తంమీద 2% లాభం వచ్చింది. అప్పుడు గుఱ్ఱాన్ని కొన్న వెల (రూ.లలో)

- 1) 1200
- 2) 1700
- 3) 1750
- 4) 1500

Options :

39448425165. ✓ 1
39448425166. ¥ 2
39448425167. ¥ 3
39448425168. ¥ 4

Question Number : 93 Question Id : 3944846546 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

By selling an article for Rs.4525 a merchant gets a loss of $9\frac{1}{2}$ %. In order to get a profit of $7\frac{1}{2}$ %, the selling price of the article in rupees is ఒక వస్తువును రూ. 4545 కు అమ్మడం ద్వారా ఒక వర్తకునికి $9\frac{1}{2}$ % నష్టం వచ్చింది. $7\frac{1}{2}$ % లాభం పొందడానికి ఆ వస్తువును అమ్మవలసిన ధర (రూ.లలో)

- 1) 5250
- 2) 5300
- 3) 5325
- 4) 5375

Options :

39448425169. *****39448425170. *****39448425171. *****39448425172. *****

Question Number : 94 Question Id : 3944846547 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Three persons *A*, *B*, *C* entered into a business with a total capital of Rs.250000. *A* invests Rs.20000 more than *B* and *B* invests Rs.25000 more than *C*. If at the end of the year, there is a profit of Rs.70000, then *B*'s share in the profit in rupees is

ముగ్గురు వ్యక్తులు A, B, C కలిసి రూ. 250000 మూల ధనంలో ఒక వ్యాపారాన్ని (ప్రారంభించిరి. Bకన్నా A రూ. 20000లను మరియు C కన్నా B రూ. 25000 లను అధికంగా పెట్టబడిగా పెట్టిరి. సంవత్సరాంత లాభం రూ. 70000లు అయినపుడు, ఈ లాభం లో B వాటా (రూ. లలో)

- 1) 29400
- 2) 27800
- 3) 16800
- 4) 23800

Options :

- 39448425173. 🎽 1
- 39448425174. 🎽 2
- 39448425175. 🏼 3
- 39448425176. ✔ 4

Question Number : 95 Question Id : 3944846548 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0 Three persons A, B, C started a partnership business with the understanding that A would invest 100% of the capital where as B and C run the business for 4 and 6 months respectively. At the end of 10 months A got 50% of the total profit of Rs.4 lakhs. Then the share of the profit of C (rupees in lakhs) is

ముగ్గురు వ్యక్తులు A, B, Cలు ఒక ఉమ్మడి వ్యాపారాన్ని ఈ విధంగా ఒక అవగాహనతో (పారంభించిరి. ెపెట్టబడి మొత్తం 100%, A సమకూర్పుతాడు, కాగా B మరియు C లు వరుసగా 4 మరియు 6 నెలలు వ్యాపారాన్ని నడిపెదరు. 10 నెలల చివర వచ్చిన లాభం రూ.4 లక్షలలో A అనే వ్యక్తి 50% తన వాటాగా పొందెను. లాభంలో C వాటా (రూ. లక్షలలో)

- 1) 2.0
- 2) 1.8
- 3) 1.5
- 4) 1.2

Options :

39448425177. ***** 1
39448425178. ***** 2
39448425179. ***** 3
39448425180. ✓ 4

Question Number : 96 Question Id : 3944846549 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

Arithmetical Ability అంకగణిత సామర్థ్యత

Pipe 'A' can fill a tank in 5 hours, but due to a tiny hole at the bottom it took 8 hours to fill the tank. Then the time, in hours, for the full tank of water to be drained through the tiny hole is (in hours)

ఒక తొట్టెను గొట్టం A, 5 గంటలలో నింపగలదు. కానీ ఆ తొట్టెకు అడుగు భాగాన చిన్న రంద్రం వుండడం వల్ల 8 గంటలలో నింపుతుంది. అయితే మొత్తం తొట్టెలో నీరు ఆ చిన్న రంద్రం గుండా (ఖాళీ) పారడానికి పట్టే సమయం (గంటలలో)

- 1) $10\frac{3}{4}$
- 2) 11 1/4
- 3) $13\frac{1}{3}$
- 4) $14\frac{2}{3}$

Options:

39448425181. ^{**} 1
39448425182. ^{**} 2
39448425183. ✓ 3
39448425184. ^{**} 4

Question Number : 97 Question Id : 3944846550 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0 Pipe A fills an empty tank in 4 hours and pipe B in 6 hours. If the two pipes are opened for one hour each alternatively with pipe A being opened first, then the tank will be filled (in hours) is

ఒక ఖాళీ తొట్టెను గొట్టం A, 4 గంటలలో మరియు గొట్టం B, 6 గంటలలో నింపగలవు. ఆ రెండు గొట్టాలను ఒకదాని తర్వాత మరొకటి ఏకాంతరంగాA తో మొదలు పెట్టి (పతీ గొట్టాన్ని ఒక గంట తెరిస్తే ఆ తొట్టె నిండే సమయం (గంటలలో)

1) $2\frac{3}{4}$

- 2) $3\frac{1}{2}$
- 3) $4\frac{2}{3}$
- 4) $5\frac{1}{4}$

Options:

39448425185. ¥ 1
39448425186. ¥ 2
39448425187. ✓ 3
39448425188. ¥ 4

Question Number : 98 Question Id : 3944846551 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0
Arithmetical Ability

అంకగణిత సామర్థ్యత

If a train of 240 meters long crosses a bridge of length 180 meters in 20

seconds, then the speed of the train (in kmph) is

180 మీ. పొడవు గల ఒక వంతెనను 240మీ. పొడవుగల ఒక రైలు 20 సెకన్లలో దాటినచో రైలు వేగం (గంటకు కి.మీ.లలో)

- 1) 75.6
- 2) 70.8
- 3) 65.2
- 4) 60.5

Options:

39448425189. ✓ 1
39448425190. ¥ 2
39448425191. ¥ 3
39448425192. ¥ 4

Question Number : 99 Question Id : 3944846552 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

Arithmetical Ability అంకగణిత సామర్థ్యత If a train takes 20 seconds to cross a platform of length 35 meters, the speed of

the train (in kmph) is

35 మీటర్ల పొడవు గల ఒక ప్లాట్ఫామ్ ను దాటడానికి ఒక రైలు 20 సెకన్లు తీసుకొంటే, దాని వేగం (గంటకు కి.మీ.లలో)

- 1) 6.1
- 2) 6.3
- 3) 6.5
- 4) 6.7

Options:

39448425193. ^{**} 1
39448425194. ✓ 2
39448425195. ^{**} 3
39448425196. ^{**} 4

Question Number : 100 Question Id : 3944846553 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

Arithmetical Ability అంకగణిత సామర్థ్యత A person-A can finish a piece of work in 20 days and another person-B in 30 days. With the help of another person-C they completed the work in 6 days. Then the number of days in which C alone can complete that work is

A అనే వ్యక్తి ఒక పనిని 20 రోజుల్లోనూ, B అనే మరో వ్యక్తి అదే పనిని 30 రోజుల్లోనూ పూర్తి చేయగలరు. వీరిద్దరూ కలిసి మరొక వ్యక్తి C సహాయంతో ఆ పనిని కేవలం 6 రోజుల్లోనే పూర్తి చేసిరి. అపుడు C ఒక్కడే ఆ పనిని పూర్తి చేయుటకు పట్ట రోజుల సంఖ్య

- 1) 15
- 2) 12
- 3) 10
- 4) 8

Options :

- 39448425197. ᄣ 1
- 39448425198. ✔ 2
- 39448425199. 🎽 3
- 39448425200. 🏼 4

Question Number : 101 Question Id : 3944846554 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

Arithmetical Ability అంకగణిత సామర్థ్యత

Two persons A and B together can finish a piece of work in 12 days, while B and C can together finish the same piece of work in 16 days. If A, B, C work together, they can finish it in 8 days. Then the number of days required for C alone to compete the work is

A మరియు Bఅనే ఇద్దరు వ్యక్తులు కలిసి పనిలో ఒక భాగాన్ని 12 రోజులలో పూర్తి చేయగలరు. అదే పనిని B మరియు C అనే వ్యక్తులు కలిసి 16 రోజులలో పూర్తి చేయగలరు. A, B మరియు C లు కలిసి ఆ పనిని 8 రోజులలో పూర్తి చేయగలరు. అయితే, C ఒక్కరే ఆ పనిని పూర్తి చేయుటకు కావలసిన రోజుల సంఖ్య:

- 1) 18
- 2) 20
- 3) 22
- 4) 24

Options :

- 39448425201. ᄣ 1
- 39448425202. 🏼 2
- 39448425203. 🏼 3
- 39448425204. ✔ 4

Question Number : 102 Question Id : 3944846555 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0 Arithmetical Ability

అంకగణిత సామర్థ్యత

The area of a square is 196 sq.cm. whose side is half of the radius of a circle. The circumference of the circle is equal to the breadth of a rectangle. If the perimeter of rectangle is 712 cm, the length (in cm) of the rectangle is

ఒక చతుర్గసం వైశాల్యం 196 సెం. మీ². మరియు దాని భుజం ఒక వృత్తం యొక్క వ్యాసార్థంలో సగము ఉంటుంది. ఆ వృత్తం చుట్టుకొలత ఒక దీర్ఘ చతుర్గసం వెడల్పుకు సమానము మరియు ఆ దీర్ఘ చతుర్గసం యొక్క చుట్ట కొలత 712 సెం. మీ. అయితే, ఆ దీర్ఘ చతుర్గసం యొక్క పొడవు. (సెం. మీ. లలో)

- 1) 160
- 2) 170
- 3) 180
- 4) 192

Options :

- 39448425205. ᄣ 1
- 39448425206. 🎽 2
- 39448425207. 🖋 3
- 39448425208. 🛎 4

Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Arithmetical Ability అంకగణిత సామర్వత

A window is in the shape of a rectangle surmounted by a semi circle on the width of the rectangle. If 12 cm, 8 cm are the sides of the rectangle, then the area of the window (in cm^2) is

ఒక కిటికీ ఒక దీర్ఘ చతుర్సం (వెడల్పు) పై అర్ధవృత్తం బోర్లించినట్లున్నది. దీర్ఘచతుర్సం యొక్క పొడవు మరియు వెడల్పులు వరుసగా 12 సెం. మీ. మరియు 8 సెం. మీ. అయితే, ఆ కిటికీ వైశాల్యం (చ. సెం. మీ. లలో)

- 1) $4(12 + \pi)$
- 2) $6(12 + \pi)$
- 3) $8(12 + \pi)$
- 4) $10(12 + \pi)$

Options :

- 39448425209. 🎽 1
- 39448425210. 🎽 2
- 39448425211. ✔ 3
- 39448425212. 🏼 4

Question Number : 104 Question Id : 3944846557 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Arithmetical Ability అంకగణిత సామర్థ్యత

120 boys take a dip simultaneously into a swimming pool of length 80m and breadth 30 m. If the average displacement of water spilled over by one boy is 5 m³, then the raise in the water level (in m³) of that swimming pool will be

80మీ. పొడవు, 30 ఈ. వెడల్పుతో ఉన్న ఒక ఈత కొలనులోకి 120 బాలురు ఒకేసారి మునక వేసిరి. ఒక బాలుడు మునక వేయడం వల్ల ైపకి ఉబికిన సగటు నీటి మట్టం 5 మీ³. అయినచో, ఆ ఈత కొలనులో పెరిగిన నీటి మట్టం (మీ³.లలో)

- 1) 0.25
- 2) 0.4
- 3) 0.5
- 4) 1

Options :

39448425213. ✔ 1

39448425214. 🎽 2

39448425215. ***** 3 39448425216. ***** 4

Question Number : 105 Question Id : 3944846558 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0 <u>Arithmetical Ability</u> පෙරජාතීම సామ**్య**త

Volume of a right circular cone having base radius 70 cm and curved surface

area 40040 cm² is (in cm³)

భూవ్యాసార్థం 70 సెం. మీ. మరియు ఉపరితల వైశాల్యం 40040 సెం. మీ². కలిగిన లంబవర్తుల శంఖువు ఘనపరిమాణం (సెం. మీ.³ లలో)

- 1) 823400
- 2) 824000
- 3) 840000
- 4) 862400

Options :

39448425217. ᄣ 1

39448425218. 🛎 2

39448425219. ¥ 3 39448425220. **√** 4

Question Number : 106 Question Id : 3944846559 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0 <u>Arithmetical Ability</u> అంకగణిత సామర్థ్యత

A spherical ball, when immersed in a cylinder of base radius 7 cms., raises the level of water in the cylinder by 2 cms. Then the radius of the ball (in cm)

7 సెం. మీ. భూవ్యాసార్ధం గా గల ఒక స్తూపంలో ఒక గోళాకార బంతిని ముంచటం వలన ఆ స్తూపంలోని నీటి మట్టం 2 సెం. మీ. పెరిగినది. అపుడు, ఆ బంతి వ్యాసార్థం (సెం. మీ. లలో)



4)
$$\frac{\sqrt{95}}{3}$$

Options :

39448425221. ^{**} 1
39448425222. ✓ 2
39448425223. ^{**} 3

Question Number : 107 Question Id : 3944846560 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0 <u>Arithmetical Ability</u> පෙරජාතීම තැකාරුමෙ

A cuboid of dimension 16 cm x 12cm x 8 cm is cut into 24 equal small cubes.

Then the length of the side of each small cube in cm, is

16 సెం. మీ.x సెం. మీ.x 8 సెం. మీ.కొలతలను కలిగిన దీర్ఘఘనం ను 24 చిన్నవైన ఘనాలుగా విభజించిరి. ఇపుడు ఆ ఘనం యొక్క భుజం పొడవు (సెం. మీ. లలో)

- 1) 8
- 2) 6
- 3) 5
- 4) 4

Options:

- 39448425225. 🎽 1
- 39448425226. 🎽 2
- 39448425227. 🍀 3
- 39448425228. ✔ 4

Question Number : 108 Question Id : 3944846561 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

Arithmetical Ability అంకగణిత సామర్థ్యత

The sum of the dimensions of a cuboid is 13 cm and its diagonal is $5\sqrt{3}$ cm.

Its surface area (in cm²) is

ఒక దీర్ఘ ఘనపు కొలతల మొత్తం 13 ెసెం. మీ. మరియు దాని వికర్ణం 5 √3

ెసెం. మీ. అపుడు దాని సంపూర్ణతల వైశాల్యం (సెం. మీ². లలో)

- 1) 64
- 2) 72
- 3) 84
- 4) 94

Options:

39448425229. * 1 39448425230. * 2 39448425231. * 3 39448425232. * 4

Question Number : 109 Question Id : 3944846562 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

Arithmetical Ability

అంకగణిత సామర్థ్యత

 $(465)_7 + (535)_7 =$

- 1) (1403)7
- 2) (1333)7
- 3) (1304)7
- 4) (1503)7

Options:

- 39448425233. * 1
- 39448425234. ✔ 2
- 39448425235. 🏼 3
- 39448425236. 🏼 4

Question Number : 110 Question Id : 3944846563 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

Arithmetical Ability అంకగణిత సామర్థ్యత (465)₇ in Binary system is

(465)7 అనే సంఖ్య ద్విసంఖ్యా మానములో

- 1) (11110111)₂
- 2) (11010011)₂
- 3) (11110011)₂
- 4) (11100011)₂

| Options : | |
|------------------------------|-----------|
| 39448425237. 🏶 1 | |
| 39448425238. 🏶 2 | |
| 39448425239. ✔ 3 | |
| 39448425240. 🏶 4 | |
| Sub-Section Number : | 2 |
| Sub-Section Id : | 394484663 |
| Question Shuffling Allowed : | Yes |

Question Number : 111 Question Id : 3944846564 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The negation of
$$(p \rightarrow q) \rightarrow r$$
 is
 $(p \rightarrow q) \rightarrow r$ నకు వ్యతిరేక ప్రవచనం
1) $(p \rightarrow r) \land (q \rightarrow r)$
2) $(\sim p \rightarrow r) \land (q \rightarrow r)$
3) $(p \rightarrow r) \land (\sim q \rightarrow r)$
4) $(\sim p \rightarrow r) \land (\sim q \rightarrow r)$

Options :

39448425241. ^{**} 1
39448425242. ✓ 2
39448425243. ^{**} 3

39448425244. 🏼 4

Question Number : 112 Question Id : 3944846565 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

If p and q are two statements, then which of the following represents a tautology?

```
p,q రెండు ప్రవచనాలు అయినపుడు, ఈ క్రింది వాటిలో నిత్య సత్యాన్ని
సూచించునది ఏది?
```

- 1) $(p \lor q) \land (\sim p) \to q$
- 2) $(p \lor q) \lor p \to q$
- 3) $p \land q$ $\lor p \rightarrow q$
- 4) $(p \land q) \land (\sim p)$

Options :

39448425245. ✓ 1
39448425246. ※ 2
39448425247. ※ 3
39448425248. ※ 4

Question Number : 113 Question Id : 3944846566 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

If a set A has 8 elements, B has 6 elements and A U B has 10 elements, then

the number of all subsets of $A \cap B$ is

ఒక సమితి Aలో 8 మూలకాలు ఇంకో సమితి B లో 6 మూలకాలు మరియు A U B లో 10 మూలకాలు ఉంటె, A∩B కు ఉండే ఉపసమితిల సంఖ్య

- 1) 4
- 2) 8
- 3) 16
- 4) 32

Options:

39448425249. ^{**} 1
39448425250. ^{**} 2
39448425251. ✓ 3

39448425252. 🏼 4

Question Number : 114 Question Id : 3944846567 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

If A has six elements, then the number of relations on A that are not

symmetric is

ఒక సమితి Aలో 6 మూలకాలుంటే A పై ఉండే సౌఫవం కాని సంబంధాల

సంఖ్య

- 1) 26-2
- 2) $2^{36} 2^{21}$
- 3) $2^{18} 2^6$
- 4) $2^{36} 2^{6}$

Options:

39448425253. [♣] 1
39448425254. ✓ 2
39448425255. [♣] 3

39448425256. ** 4

Question Number : 115 Question Id : 3944846568 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The function $f: N \to N$ defined by f(x) = 2x + 7 for all $n \in N$, then f is ప్రతి $n \in N$ కు ప్రమేయం $f: N \to N$ ను f(x) = 2x + 7 గా నిర్వచిస్తే fఅనేది

1) one-one but not onto

అన్వేకం అవుతూ సంగ్రస్తం కాదు

2) onto but not one-one

సంగ్రస్తం అవుతూ అన్వేకం కాదుS

3) both one-one and onto

అన్వేకం మరియు సంగ్రస్తం

4) neither one-one nor onto

రెండూ అన్వేకం, సంగ్రస్తం కాదు

Options :

39448425257. ✔ 1

39448425258. 🏼 2

39448425259. 🕷 3

39448425260. 🛎 4

Question Number : 116 Question Id : 3944846569 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

If a line passing through the points (3, -5) and (7, 1) make intercepts *a*, *b* on

the coordinate axes, then $a^2 + b^2 =$

బిందువులు (3, -5) మరియు (7, 1) ల గుండా పోయే ఒక సరళరేఖ అక్షాలపై

a, b అంతర ఖండాలనేర్పరిస్తే, $a^2 + b^2 =$

1)
$$\frac{3729}{36}$$

2) $\frac{4117}{36}$
3) $\frac{4359}{36}$
4) $\frac{4693}{36}$

Options :

39448425261. 🎽 1

39448425262. ** 2

39448425263. 🕷 3

39448425264. 🗸 4

Question Number : 117 Question Id : 3944846570 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The perpendicular distance from origin to the line passing through the point

(15, -5) and making an angle 135° with positive x-axis is

(15, -5) గుండా పోతూ ధనాత్మక x-అక్షంతో 135° కోణం చేయు సరళరేఖకు

మూలబిందువునుండి గల లంబ దూరం

- 1) 3√2
- 2) 4√2
- 3) 5√2
- 4) 6√2

Options:

39448425265. 🏼 1

39448425266. 🏁 2

39448425267. 🖋 3

39448425268. 🏁 4

Question Number : 118 Question Id : 3944846571 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

If
$$\sin \theta = -\frac{1}{2}$$
 and $\theta \epsilon \left[\frac{\pi}{2}, \frac{3\pi}{2}\right]$, then 4 $\theta =$
 $\sin \theta = -\frac{1}{2}$ మరియు $\theta \epsilon \left[\frac{\pi}{2}, \frac{3\pi}{2}\right]$ అయినప్పుడు, 4 $\theta =$

1)
$$\frac{-2\pi}{3}$$

2) $\frac{2\pi}{3}$
3) $\frac{10\pi}{3}$
4) $\frac{14\pi}{3}$

Options :

- 39448425269. ** 1
- 39448425270. 🎽 2
- 39448425271. 🏼 3
- 39448425272. ✔ 4

Question Number : 119 Question Id : 3944846572 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

| sin150 ⁰ -5cos300 ⁰ | ⁰ +7 tan 225 ⁰ |
|---|--------------------------------------|
|---|--------------------------------------|

tan 135⁰+3 sin 210⁰

- 1) -2
- 2) 1
- 3) 3/2
- 4) 5/2

Options :

39448425273. ✓ 1
39448425274. ¥ 2
39448425275. ¥ 3
39448425276. ¥ 4

Question Number : 120 Question Id : 3944846573 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

=

Correct Marks : 1 Wrong Marks : 0

$$\sin^2(\theta - 45)^0 + \sin^2(\theta + 15)^0 - \sin^2(\theta - 15)^0 =$$

1) $\frac{1}{4}$

- 2) $\frac{1}{2}$
- 3) 1
- 4) 0

Options :

- 39448425277. 1

 39448425278. ✓ 2
- 39448425279. 🛎 3
- 39448425280. 🏼 4

Question Number : 121 Question Id : 3944846574 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

From the top of a building of height 20m, the angles of depression of the top and bottom of a tower are 30° , 60° respectively. Then the height of the tower, in meters, is

20 మీ. ఎత్తుగల ఒక భవంతి పైనుండి ఒక స్తంభం యొక్క పై భాగానికి, అడుగు భాగానికి నిమ్మ కోణాలు వరుసగా 30°, 60°. అపుడు, ఆ స్తంభం ఎత్తు (మీ.లలో)

1) $15\frac{1}{3}$ 2) $13\frac{1}{3}$ 3) $11\frac{1}{3}$ 4) $9\frac{1}{2}$

Options :

- 39448425281. 🎽 1
- 39448425282. ✔ 2
- 39448425283. 🏼 3
- 39448425284. 🕷 4

Question Number : 122 Question Id : 3944846575 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

If the sum and product of the roots of the equation $ax^2 - 5x + c = 0$ are equal to 10 each, then the value of a and c respectively are

ax² – 5x + c = 0 అనే సమీకరణం యొక్క మూలాల మొత్తము మరియు లబ్దము ఒక్కోటి 10 నకు సమానం, అయినపుడు, a మరియు c ల విలువలు వరుసగా

- 1) $\frac{1}{2}$, 5
- 2) $\frac{1}{2}$, 3
- 3) $\frac{3}{2}$, 1
- 4) $\frac{1}{3}$, 2

Options :

39448425285. ✓ 1
39448425286. ¥ 2
39448425287. ¥ 3
39448425288. ¥ 4

Question Number : 123 Question Id : 3944846576 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

If one root of the equation $3x^2 - 8x + 2k + 1 = 0$ is seven times the other,

then the value of k

 $3x^2 - 8x + 2k + 1 = 0$ అనే సమీకరణపు ఒకమూలం, ఇంకొక మూలానికి

ఏడు రెట్లు అయినపుడు k విలువ

- 1) $\frac{2}{3}$
- 2) $\frac{1}{3}$
- -/ 3
- 3) 2
- 4) 3

Options :

39448425289. ✓ 1
39448425290. ¥ 2
39448425291. ¥ 3
39448425292. ¥ 4

Question Number : 124 Question Id : 3944846577 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

If $a \neq b, x^2 + ax + b$ and $x^2 + bx + a$ have a common factor, then $a \neq b$ కి $x^2 + ax + b$ మరియు $x^2 + bx + a$ లు ఒక ఉమ్మడి కారణాంకమును కలిగి ఉన్నట్లయితే, అప్పడు

1) a + b + 1 = 0

- 2) a b 1 = 0
- 3) a b + 1 = 0
- 4) a b + ab = 0

Options:

39448425293. ✓ 1
39448425294. ¥ 2
39448425295. ¥ 3
39448425296. ¥ 4

Question Number : 125 Question Id : 3944846578 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks: 1 Wrong Marks: 0

A number was divided successively by 4, 5 and 6. The remainders were respectively 2, 3 and 4. The number is

ఒక సంఖ్యను వరుసగా 4, 5 మరియు 6 లచే భాగించిరి. అపుడు శేషాలు వరుసగా 2, 3 మరియు 4 గా వచ్చాయి. ఆ సంఖ్య ఎంత?

- 1) 214
- 2) 476
- 3) 954
- 4) 1908

Options:

- 39448425297. ✔ 1
- 39448425298. 🏼 2
- 39448425299. 🎽 3
- 39448425300. 🎽 4

Question Number : 126 Question Id : 3944846579 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

If
$$\frac{x+y}{xy} = \frac{5}{18}$$
 and $\frac{x-y}{xy} = \frac{1}{18}$, then $2x + 3y = \frac{x+y}{xy} = \frac{5}{18}$ and $\frac{x-y}{xy} = \frac{1}{18}$, where $x + 3y = \frac{5}{18}$ and $\frac{x-y}{xy} = \frac{1}{18}$, where $x + 3y = \frac{5}{18}$ and $\frac{x-y}{xy} = \frac{1}{18}$.

- 1) 36
- 2) 32
- 3) 28
- 4) 18

Options :

- 39448425301. ✔ 1
- 39448425302. 🎽 2
- 39448425303. 🏼 3
- 39448425304. 🏼 4

Question Number : 127 Question Id : 3944846580 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

If x + y = a, y + z = b, z + x = c then x - 2y + z = c

x + y = a, y + z = b, z + x = c అయినపుడు, x - 2y + z =

- 1) 2a b c
- 2) 2b a c
- 3) 2c a b
- 4) 2a + b c

Options :

- 39448425305. ***** 1 39448425306. ***** 2
- 39448425307. 🖋 3
- 39448425308. 🔻 4

Question Number : 128 Question Id : 3944846581 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

If 9 times the 9th term of an Arithmetic Progression is equal to 13 times the 13th term, then the 22nd term of the Arithmetic Progression is ఒక అంక్మశేఢి లో 9వ పదానికి 9 రెట్లు అనేది 13వ పదానికి 13రెట్లకు

సమానమైతే, ఆ అంక(శేఢిలో 22వ పదం

- 1) 0
- 2) 22
- 3) 220
- 4) 198

Options:

39448425309. ✓ 1
39448425310. ¥ 2
39448425311. ¥ 3
39448425312. ¥ 4

Question Number : 129 Question Id : 3944846582 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

If the third term of Geometric Progression is 4, then, the product of its first 5 terms is

ఒక గుణ(శేఢి లోని 3వ పదం 4 అయినపుడు ఆ గుణ(శేఢిలోని మొదటి 5 పదాల లబ్దం

- 1) 4^3
- 2) 4⁴
- 3) 4⁵
- 4) 4⁶

Options :

```
39448425313. <sup>**</sup> 1
39448425314. <sup>**</sup> 2
39448425315. ✓ 3
39448425316. <sup>**</sup> 4
```

Question Number : 130 Question Id : 3944846583 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

If the coefficients of 2^{nd} , 3^{rd} and the 4^{th} terms in the expansion of $(1 + x)^n$ are in Arithmetic Progression. Then the value of *n* is $(1 + x)^n$ యొక్క విస్తరణలో 2వ, 3వ మరియు 4వ పదాల గుణకాలు అంక(శేఢిలో ఉంటే, *n* విలువ

1) 2

2) 7

3) 11

4) 14

Options :

39448425317. 🎽 1

39448425318. ✔ 2

39448425319. 🎽 3

39448425320. 🕷 4

Question Number : 131 Question Id : 3944846584 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

For $0 \le r \le 10$, if $C_r = 10_{C_r}$ then $1.c_1 + 2.c_2 + 3.c_3 + \dots + 10.c_{10} =$

 $0 \le r \le 10$ కు $C_r = 10_{C_r}$ అయినపుడు $1.c_1 + 2.c_2 + 3.c_3 + \dots + 10^{-1}$

 $10. c_{10} =$

- 1) 1024
- 2) 2560
- 3) 5120
- 4) 10240

Options :

39448425321. ^{**} 1
39448425322. ^{**} 2
39448425323. ✓ 3
39448425324. ^{**} 4

Question Number : 132 Question Id : 3944846585 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

If the matrix
$$\begin{bmatrix} 7 & 1 & -3 \\ 4 & 2 & x \\ 1 & -1 & 5 \end{bmatrix}$$
 is singular, then $x = \begin{bmatrix} 7 & 1 & -3 \\ 4 & 2 & x \\ 1 & -1 & 5 \end{bmatrix}$ මನೆ ಮ್ ಡಿಕಿ ಅನ್ ಧಾರಣಂ ಅಯಿತೆ, $x = 1$) $\frac{17}{2}$
2) $\frac{-17}{2}$
3) $\frac{19}{2}$
4) $\frac{-19}{2}$

Options :

39448425325. ^{**} 1
39448425326. ✓ 2
39448425327. ^{**} 3
39448425328. ^{**} 4

Question Number : 133 Question Id : 3944846586 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

If x_1 and x_2 , $x_1 > x_2$ are the pair of values of x satisfying the matrix equation

$$\begin{bmatrix} 1 & x & 1 \end{bmatrix} \begin{bmatrix} 1 & 3 & 2 \\ 2 & 5 & 1 \\ 15 & 3 & 2 \end{bmatrix} \begin{bmatrix} 1 \\ 2 \\ x \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix}, \text{ then } \frac{x_1}{x_2} =$$

మాత్రిక సమీకరణం
$$\begin{bmatrix} 1 & x & 1 \end{bmatrix} \begin{bmatrix} 1 & 3 & 2 \\ 2 & 5 & 1 \\ 15 & 3 & 2 \end{bmatrix} \begin{bmatrix} 1 \\ 2 \\ x \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix}$$
, ను తృప్తి పరిచే
x యొక్క ఒక జత విలువలు x_1 మరియు x_2 , $x_1 > x_2$ అయితే, అపుడు
 $\frac{x_1}{x_2} =$
1) $\frac{1}{5}$
2) $\frac{1}{6}$
3) $\frac{1}{7}$

4)
$$\frac{2}{5}$$

Options :

- 39448425329. 🏼 1
- 39448425330. 🏼 2
- 39448425331. ✔ 3
- 39448425332. 🏼 4
Question Number : 134 Question Id : 3944846587 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

(ii) Algebraic and Geometrical Ability బీజీయ, జ్యామితీయ సామర్థ్యత

 $\lim_{x\to 0}\frac{1-\cos 5x}{4x^2}=$

- 1) $\frac{5}{4}$ 2) $\frac{25}{4}$
- 3) $\frac{25}{16}$
- 4) $\frac{25}{8}$

Options:

- 39448425333. 🍍 1
- 39448425334. 🏼 2
- 39448425335. 🏼 3
- 39448425336. 🗸 4

Question Number : 135 Question Id : 3944846588 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

If
$$y = \sqrt{x} + \frac{1}{\sqrt{x}}$$
, then $\frac{dy}{dx}$ at $x = 1$ is equal to
 $y = \sqrt{x} + \frac{1}{\sqrt{x}}$ అయినపుడు, $x = 1$ వద్ద $\frac{dy}{dx}$ విలువ

$$2)\frac{1}{2}$$

3)
$$\frac{1}{\sqrt{2}}$$

4) 0

Options:

39448425337. *****39448425338. *****39448425339. *****39448425340. *****

Question Number : 136 Question Id : 3944846589 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The equation of the line passing through the point (1, 2) and perpendicular to the line x + y + 1 = 0 is x + y + 1 = 0 రేఖకు లంబంగా ఉంటూ (1, 2) బిందువు గుండా పోవు సరళరేఖ సమీకరణం

1) y - x + 1 = 02) y - x - 1 = 0

- 3) y x + 2 = 0
- 4) y x 2 = 0

Options :

39448425341. [★] 1
39448425342. ✓ 2
39448425343. [★] 3
39448425344. [★] 4

Question Number : 137 Question Id : 3944846590 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

ABCD is a trapezium with AB and CD as its parallel sides. If the diagonals AC and BD intersect in E and CE : EA = 3 : 2, then AB : CD =

AB మరియు CDలు సమాంతర భుజాలుగా ABCD ఒక సమలంబ చతుర్భుజం. AC మరియు BDవికర్ణాలు Eవద్ద ఖండించుకుంటూ CE : EA = 3 : 2 అయితే AB : CD =

- 1) 1:2
- 2) 2:3
- 3) 3:4
- 4) 4:5

Options :

39448425345. ***** 1
39448425346. ✓ 2
39448425347. ***** 3
39448425348. ***** 4

Question Number : 138 Question Id : 3944846591 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The equation of a circle with origin as centre and passing through the vertices of an equilateral triangle whose median is of length 3a is

మధ్యగతం పొడవు 3a గా గల ఒక సమబాహు త్రిభుజం శీర్షాల గుండా పోతూ మూల బిందువును కేంద్రం గాగల వృత్తం సమీకరణం

1) $x^{2} + y^{2} = 9a^{2}$ 2) $x^{2} + y^{2} = 16a^{2}$ 3) $x^{2} + y^{2} = 4a^{2}$ 4) $x^{2} + y^{2} = a^{2}$

Options :

39448425349. ¥ 1
39448425350. ¥ 2
39448425351. ✓ 3
39448425352. ¥ 4

Question Number : 139 Question Id : 3944846592 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

If A(3, -7), B(-2, 5) and the point C(*x*, *y*) is on the line segment AB between A and B such that AC = 8, then 3x + 2y =

A (3, -7), B(-2, 5) మరియు C (x, y) అనే బిందువు, A మరియు Bల మధ్యలో AB అనే రేఖా ఖండము పై AC = 8 అయ్యేటట్లంటే అప్పుడు 3x + 2y =

- 1) 4
- 2) 3
- 3) 2
- 4) 1

Options:

39448425353. * 1

39448425354. 🏼 2

39448425355. 🏼 3

39448425356. ✔ 4

Question Number : 140 Question Id : 3944846593 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

If a line makes unequal intercepts on x, y axis with the sum 12 and if it passes through the point (2, 4), then the perpendicular distance from origin to the line is

12 ను మొత్తంగా ఒక సరళ రేఖ x, y అక్షాలపై సమానం కానీ అంతర ఖండాలనేర్పరుస్తూ, బిందువు(2, 4) గుండా పోతుంటే మూల బిందువు నుండి ఆ రేఖకు లంబదూరం

1)
$$\frac{2}{\sqrt{5}}$$

Options :

| Question Shuffling Allowed : | Yes |
|------------------------------|-----------|
| Sub-Section Id : | 394484664 |
| Sub-Section Number : | 3 |
| 39448425360. 🏶 4 | |
| 39448425359. 🖋 3 | |
| 39448425358. 🏶 2 | |
| 39448425357. * 1 | |

Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Statistical Ability సాంఖ్యకశా(స్త్ర సామర్థ్యత

If the arithmetic mean of the series $a_1, a_2, \dots a_n$ is A and the arithmetic mean of

the series $b_1, b_2, \dots b_n$ is B, then the arithmetic mean of the series

 $a_1 + b_1, a_2 + b_2, \dots, a_n + b_n$ is

a1, a2, ... an అనే శ్రేఢి యొక్క అంకమధ్యమం A మరియు b1, b2, ... bn అనే శ్రేఢి యొక్క అంకమధ్యమం B అయినపుడు, a1 + b1, a2 + b2, ..., an + bn అనే శ్రేఢి యొక్క అంకమధ్యమం

1) A+B
 2) A+B
 3) 2(A+B)

4) $\frac{A+B}{n}$

Options :

- 39448425361. 🏼 1
- 39448425362. ✔ 2
- 39448425363. 🕷 3
- 39448425364. 🛎 4

Question Number : 142 Question Id : 3944846595 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Statistical Ability సాంఖ్యకశాగ్రు సామర్థ్యత

The median of the first 41 even natural numbers is

మొదటి 41 సరి సహజ సంఖ్యల మధ్యగతము

- 1) 40
- 2) 41
- 3) 42
- 4) 44

Options:

- 39448425365. ***** 1 39448425366. ***** 2
- 39448425367. 🖋 3
- 39448425368. 🍀 4

Question Number : 143 Question Id : 3944846596 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0 Arithmetic Mean of the following frequency distribution is

క్రింది పౌనఃపున్య విభజన యొక్క అంకమధ్యమం

| Height ఎత్తు
(in cms) | 52 - 55 | 55 - 58 | 58 - 61 | 61 – 64 |
|--------------------------|---------|---------|---------|---------|
| Frequency
పౌనఃపున్యం | 15 | 20 | 25 | 10 |

- 1) 58.25
- 2) 57.78
- 3) 59.25
- 4) 60.00

Options :

- 39448425369. 🏼 1
- 39448425370. 🗸 2
- 39448425371. 🛎 3
- 39448425372. 🏼 4

Question Number : 144 Question Id : 3944846597 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The variance of the data 151, 152, 153, ..., 175 is

151, 152, 153, ... , 175 అనే దత్రాంశపు విస్తృతి

- 1) 202
- 2) 52
- 3) 172
- 4) 32

Options:

39448425373. ^{**} 1
39448425374. ✓ 2
39448425375. ^{**} 3
39448425376. ^{**} 4

Question Number : 145 Question Id : 3944846598 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

If σ is the standard deviation of $x_1, x_2, x_3, \dots, x_n$ then the standard deviation of the observations $5x_1 - 11, 5x_2 - 11, 5x_3 - 11, \dots 5x_n - 11$ is

- 1) 5(σ -11)
- 2) 5σ-11
- 3) 5o
- 4) σ

Options :

39448425377. ***** 1
39448425378. ***** 2
39448425379. ✓ 3
39448425380. ***** 4

Question Number : 146 Question Id : 3944846599 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

In a data with 12 observations, the coefficient of rank correlation is zero, then

$$\sum_{i=1}^{12} d_i^2 =$$

12 పరిశీలనల దత్తాంశం యొక్క కోటి సహసంబంధ గుణకం సున్నా

అయితే, అపుడు

$$\sum_{i=1}^{12} d_i^2 =$$

- 1) 286
- 2) 215
- 3) 143
- 4) 72

Options :

- 39448425381. ✓ 1
 39448425382. ¥ 2
- 39448425383. 🏼 3
- 39448425384. 🏼 4

Question Number : 147 Question Id : 3944846600 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

If a number is selected at random from the first 120 natural numbers, then the probability that it is a multiple of 6 or 8 is

మొదటి 120 సహజ సంఖ్యలనుండి ఒక సంఖ్యను యాదృచ్చికంగా ఎన్నుకుంటే అది 6 లేదా 8 యొక్క గుణిజం అయ్యే, సంభావ్యత

1) $\frac{1}{40}$

2) $\frac{1}{24}$

3) $\frac{1}{12}$

4) $\frac{1}{4}$

Options:

- 39448425385. 🍍 1
- 39448425386. 🏼 2
- 39448425387. 🏼 3
- 39448425388. ✔ 4

Question Number : 148 Question Id : 3944846601 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

When 5 boys and 6 girls sit in a row at random, the probability that no two boys sit together is

5గురు బాలురు మరియు 6గురు బాలికలు యాదృచ్చికంగా ఒక వరుసలో కూర్చుంటే, ఏ ఇద్దరు బాలురు కలిసి కూర్చోకుండా ఉండటానికి అయ్యే సంభావ్యత

- 1) $\frac{1}{42}$
- 2) $\frac{1}{242}$
- 3) $\frac{1}{22}$
- 4) $\frac{1}{462}$

Options :

- 39448425389. ***** 1 39448425390. ***** 2
- 39448425391. 🗸 3
- 39448425392. 🛎 4

Question Number : 149 Question Id : 3944846602 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

When two persons are selected at random from 15 persons who sat around a table, the probability that the selected persons are not adjacent to each other is ఒక గుండని బల్ల చుట్టూ కూర్చున్న 15మంది వ్యక్తుల నుండి ఇద్దరు వ్యక్తులను యాదృచ్చికంగా ఎన్నుకుంటే, వారివురు ప్రక్క ప్రక్కనే లేకుండుటకు సంభావ్యత

1)
$$\frac{6}{7}$$

2) $\frac{13}{14!}$
3) $\frac{{}^{15}C_2}{14!}$

4) $\frac{1}{7}$

Options :

39448425393. ✔ 1

39448425394. ** 2

39448425395. 🏼 3

39448425396. 🏼 4

Question Number : 150 Question Id : 3944846603 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Out of the four digit numbers with distinct digits formed by using the digits 1, 2, 3, 4, 5. A number is chosen at random. Then the probability that the chosen number is odd is

1, 2, 3, 4, 5 అనే అంకెలనుపయోగించి విభిన్న అంకెలుండే 4 అంకెల సంఖ్యను ఏర్పరచి అందులోని ఒక సంఖ్యను యాదృచ్చికంగా ఎంపిక చేసినపుడు, అది బేసి సంఖ్య అయ్యే సంభావ్యత

1)
$$\frac{3}{5}$$

2) $\frac{61}{120}$
3) $\frac{59}{120}$
4) $\frac{2}{5}$

Options :

- 39448425397. ✔ 1
- 39448425398. 🏼 2
- 39448425399. 🏼 3
- 39448425400. 🕷 4

Communication Ability

| Section Id : | 39448496 |
|------------------|----------|
| Section Number : | 3 |
| Section type : | Online |

| Mandatory or Optional : | Mandatory |
|---|-----------|
| Number of Questions : | 38 |
| Number of Questions to be attempted : | 38 |
| Section Marks : | 50 |
| Enable Mark as Answered Mark for Review and | Voc |
| Clear Response : | 105 |
| Sub-Section Number : | 1 |
| Sub-Section Id : | 394484665 |
| Question Shuffling Allowed : | Yes |

Question Number : 151 Question Id : 3944846604 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Choose the correct word/correct meaning of the word/Fill in the blanks with correct word / verb/phrase/preposition.

Insipid

- 1) rigid
- 2) tasteless
- 3) horrid
- 4) stupendous

Options :

- 39448425401. 🛎 1
- 39448425402. ✔ 2
- 39448425403. 🗱 3
- 39448425404. 🛎 4

Question Number : 152 Question Id : 3944846605 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Choose the correct word/correct meaning of the word/Fill in the blanks with correct word / verb/phrase/preposition.

Sedulous

- 1) careless
- 2) incredible
- 3) diligent
- 4) callous

Options :

- 39448425405. 🏼 1
- 39448425406. 🏼 2
- 39448425407. 🖋 3
- 39448425408. 🕷 4

Question Number : 153 Question Id : 3944846606 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Prowess

- 1) shyness
- 2) anxiousness
- 3) aggression
- 4) skill

Options :

- 39448425409. ***** 1 39448425410. ***** 2
- 39448425411. * 3
- 39448425412. ✔ 4

Question Number : 154 Question Id : 3944846607 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Choose the correct word/correct meaning of the word/Fill in the blanks with correct word / verb/phrase/preposition.

Deplete

- 1) drain
- 2) delete
- 3) recede
- 4) compromise

Options:

39448425413. ✓ 1
39448425414. ¥ 2
39448425415. ¥ 3
39448425416. ¥ 4

Question Number : 155 Question Id : 3944846608 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Choose the correct word/correct meaning of the word/Fill in the blanks with correct word / verb/phrase/preposition.

Gluttony

- 1) insanity
- 2) overeating
- 3) profundity
- 4) felony

Options:

- 39448425417. [♣] 139448425418. ✓ 2
- 39448425419. 🏼 3
- 39448425420. 🏼 4

Question Number : 156 Question Id : 3944846609 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Brazen

- 1) bold
- 2) crazy
- 3) sleepy
- 4) false

| Options : | |
|------------------------------|-----------|
| 39448425421. ✔ 1 | |
| 39448425422. 🏶 2 | |
| 39448425423. 🏶 3 | |
| 39448425424. 🏶 4 | |
| Sub-Section Number : | 2 |
| Sub-Section Id : | 394484666 |
| Question Shuffling Allowed : | Yes |

Question Number : 157 Question Id : 3944846610 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

One who lacks professional skill or enterprise is ______.

- 1) ignoramus
- 2) illiterate
- 3) amateur
- 4) expert

Options :

- 39448425425. ***** 1 39448425426. ***** 2
- 39448425427. 🖋 3
- 39448425428. 🏼 4

Question Number : 158 Question Id : 3944846611 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Choose the correct word/correct meaning of the word/Fill in the blanks with correct word / verb/phrase/preposition.

A statement or proposition on which an abstractly defined structure is based is called _____.

- 1) idiom
- 2) deletion
- 3) addition
- 4) axiom

Options :

39448425429. ***** 1 39448425430. ***** 2

Question Number : 159 Question Id : 3944846612 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Choose the correct word/correct meaning of the word/Fill in the blanks with correct word / verb/phrase/preposition.

Tigers are known for their _____.

- 1) docility
- 2) ferocity
- 3) magnanimity
- 4) vegetarianism

Options :

39448425433. [★] 1 39448425434. ✓ 2

39448425435. * 3

39448425436. 🕷 4

Question Number : 160 Question Id : 3944846613 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The horse is running ______.

- 1) fastly
- 2) fast
- 3) slow
- 4) brisk

Options : 39448425437. * 1 39448425438. ✓ 2 39448425439. * 3 39448425440. * 4 Sub-Section Number : 3 394484667

| | 554 |
|------------------------------|-----|
| Question Shuffling Allowed : | Yes |

Question Number : 161 Question Id : 3944846614 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

They have been living in Pune since 2000. What is the part of speech of 'since' ?

- 1) conjunction
- 2) adjective
- 3) preposition
- 4) adverb

Options :

- 39448425441. ᄣ 1
- 39448425442. 🏼 2
- 39448425443. 🖋 3
- 39448425444. 🏼 4

Question Number : 162 Question Id : 3944846615 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Choose the correct word/correct meaning of the word/Fill in the blanks with correct word / verb/phrase/preposition.

From his expression it was _____ that he did not know the answer to the question put by the

interviewer.

- 1) incident
- 2) antecedent
- 3) evident
- 4) precedent

Options :

39448425445. * 1
39448425446. * 2
39448425447. ✓ 3
39448425448. * 4

Question Number : 163 Question Id : 3944846616 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Choose the correct word/correct meaning of the word/Fill in the blanks with correct word / verb/phrase/preposition.

bits is equal to one byte.

- 1) Twelve
- 2) Fourteen
- 3) Nine
- 4) Eight

Options:

- 39448425449. 🏼 1
- 39448425450. 🏼 2
- 39448425451. 🏼 3
- 39448425452. ✔ 4

Question Number : 164 Question Id : 3944846617 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Digital signals used in _____ have discreet values.

- 1) ISBN
- 2) ISDN
- 3) ICCD
- 4) http

Options:

39448425453. ^{**} 1
39448425454. ✓ 2
39448425455. ^{**} 3
39448425456. ^{**} 4

Question Number : 165 Question Id : 3944846618 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Choose the correct word/correct meaning of the word/Fill in the blanks with correct word / verb/phrase/preposition.

Simplex is _____.

- 1) data transferred in more directions than one
- 2) not transferring any data at all
- 3) making data transfer more and more complicated
- 4) data transferred in one direction only

Options :

39448425457. ***** 1 39448425458. ***** 2

Question Number : 166 Question Id : 3944846619 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Choose the correct word/correct meaning of the word/Fill in the blanks with correct word / verb/phrase/preposition.

C.H.D.L. stands for _____.

- 1) Computer Hardware Data Link
- 2) Computer Hardware Description Language
- 3) Computer Hardware Description Link
- 4) Computer Hardware Data Language

Options :

39448425461. ᄣ 1

39448425462. ✔ 2

39448425463. 🇯 3

39448425464. 🏼 4

Question Number : 167 Question Id : 3944846620 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

_ is used by computer to move data between RAM and CPU.

- 1) Cache
- 2) Modem
- 3) Mouse
- 4) Software

Options :

- 39448425465. ✓ 1
 39448425466. [¥] 2
- 39448425467. * 3
- 39448425468. 🛎 4

Question Number : 168 Question Id : 3944846621 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Choose the correct word/correct meaning of the word/Fill in the blanks with correct word / verb/phrase/preposition.

The graphic rating scale method assesses an individual on the basis of ______.

- 1) work and personal traits
- 2) personal traits but not work
- 3) work but not personal traits
- 4) competence other than work or personal traits

Options :

39448425469. ** 1
39448425470. ✓ 2
39448425471. ** 3
39448425472. ** 4

Question Number : 169 Question Id : 3944846622 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Choose the correct word/correct meaning of the word/Fill in the blanks with correct word / verb/phrase/preposition.

Laissez-Faire leadership involves

- 1) giving freedom to the group
- 2) giving control to the leader
- 3) denying freedom to the group
- 4) control by an external agency of both the leader and the group

Options :

- 39448425473. ✔ 1
- 39448425474. 🏼 2
- 39448425475. 🏼 3
- 39448425476. 🏼 4

Question Number : 170 Question Id : 3944846623 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Esprit de corps implies _____.

- 1) Loyalty of a group to the member, not vice versa
- 2) No loyalty of a member to the group
- 3) No rule, no regulation for any member
- 4) Loyalty of a member to the group

Options :

| Question Shuffling Allowed : | Vos |
|------------------------------|-----------|
| Sub-Section Id : | 394484668 |
| Sub-Section Number : | 4 |
| 39448425480. ✔ 4 | |
| 39448425479. 🏶 3 | |
| 39448425478. 🏶 2 | |
| 39448425477. 🏶 1 | |

Question Number : 171 Question Id : 3944846624 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

A : "We cannot discount the possibility of further strikes."

B: "You are always a pessimist."

According to 'B', 'A' is

- 1) wrong
- 2) right
- 3) doubtful
- 4) cynical

Options:

- 39448425481. ***** 1 39448425482. ***** 2
- 39448425483. ✔ 3
- 39448425484. 🏼 4

Question Number : 172 Question Id : 3944846625 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

My dog was <u>run over by a car</u>.

The underlined phrase means

- 1) was knocked down
- 2) overtaken
- 3) overflowed
- 4) defeated

Options :

39448425485. ✓ 1
39448425486. ¥ 2
39448425487. ¥ 3
39448425488. ¥ 4

Question Number : 173 Question Id : 3944846626 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Choose the correct word/correct meaning of the word/Fill in the blanks with correct word / verb/phrase/preposition.

The Manager threw cold water over the project that the Engineer had prepared.

Underlined idiom means:

- 1) accepted
- 2) discouraged
- 3) reclined
- 4) encouraged

Options :

39448425489. ^{**} 1
39448425490. ✓ 2
39448425491. ^{**} 3
39448425492. ^{**} 4

Question Number : 174 Question Id : 3944846627 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Choose the correct word/correct meaning of the word/Fill in the blanks with correct word / verb/phrase/preposition.

A : Have you prepared the presentation?

B: Yes, but I don't want to show my hand just yet.

'B' Means that he _____.

- 1) will not reveal his plan of action
- 2) refuses to do it later
- 3) cannot fight with anyone
- 4) is unable to do the work

Options :

- 39448425493. 🗸 1
- 39448425494. ** 2
- 39448425495. 🏼 3
- 39448425496. 🕷 4

Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Choose the correct word/correct meaning of the word/Fill in the blanks with correct word / verb/phrase/preposition.

Change the following into active voice:

"Our house is being painted."

- 1) They paint our house.
- 2) They have are painted our house.
- 3) They are painting our house.
- 4) We paint our house.

Options :

39448425497. ^{**} 1
39448425498. ^{**} 2
39448425499. ✓ 3
39448425500. ^{**} 4

Question Number : 176 Question Id : 3944846629 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0
The work seemed impossible but somehow Krishna ______ cleverly in the end.

- 1) pulled it out
- 2) pulled it on
- 3) pulled it up
- 4) pulled it away

Options :

39448425501. ✓ 1 39448425502. ¥ 2

39448425503. 🕷 3

39448425504. 🕷 4

Question Number : 177 Question Id : 3944846630 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Choose the correct word/correct meaning of the word/Fill in the blanks with correct word / verb/phrase/preposition.

A : They started arguing over a piece of land.

B: It has been a bone of contention between them for long.

B means that the piece of land was

- 1) reputed
- 2) deputed
- 3) disputed
- 4) deserted

Options :

| Question Shuffling Allowed : | Yes |
|------------------------------|-----------|
| Sub-Section Id : | 394484669 |
| Sub-Section Number : | 5 |
| 39448425508. * 4 | |
| 39448425507. 🖋 3 | |
| 39448425506. ** 2 | |
| 39448425505. * 1 | |

Question Number : 178 Question Id : 3944846631 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Choose the correct word/correct meaning of the word/Fill in the blanks with correct word / verb/phrase/preposition.

- A : I thought he was a gentleman.
- B: True, he is accustomed to backbiting.

B means that the person in question is in the habit of ______.

- 1) ignoring people openly
- 2) criticizing people in their absence
- 3) praising people
- 4) backing people without hesitation

Options :

39448425509. ^{**} 1
39448425510. ✓ 2
39448425511. ^{**} 3

Question Number : 179 Question Id : 3944846632 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Choose the correct word/correct meaning of the word/Fill in the blanks with correct word / verb/phrase/preposition.

Rainy season has _____, and the days are getting cool.

- 1) set down
- 2) set in
- 3) set on
- 4) set off

Options :

39448425513. ^{**} 1
39448425514. ✓ 2
39448425515. ^{**} 3
39448425516. ^{**} 4

Question Number : 180 Question Id : 3944846633 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Choose the correct word/correct meaning of the word/Fill in the blanks with correct word / verb/phrase/preposition.

Indolence means

- 1) rage
- 2) laziness
- 3) rudeness
- 4) gratification

Options :

39448425517. ^{**} 1
39448425518. ✓ 2
39448425519. ^{**} 3
39448425520. ^{**} 4

Question Number : 181 Question Id : 3944846634 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

Choose the correct word/correct meaning of the word/Fill in the blanks with correct word / verb/phrase/preposition.

Mohan was advised to abstain _____eating sugar.

- 1) in
- 2) by
- 3) from
- 4) of

Options:

39448425521. ^{**} 1
39448425522. ^{**} 2
39448425523. ✓ 3
39448425524. ^{**} 4

Question Number : 182 Question Id : 3944846635 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Choose the correct word/correct meaning of the word/Fill in the blanks with correct word / verb/phrase/preposition.

Everyone in this world is accountable to God _____ one's actions.

- 1) about
- 2) for
- 3) by
- 4) on

Options:

39448425525. ^{**} 1 39448425526. ✓ 2 39448425527. ^{**} 3 39448425528. ^{**} 4

Question Number : 183 Question Id : 3944846636 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Choose the correct word/correct meaning of the word/Fill in the blanks with correct word / verb/phrase/preposition.

The prisoner was_____.

- 1) hung
- 2) hanged
- 3) hunged
- 4) hang

Options :

39448425529. ¥ 1
39448425530. ✓ 2
39448425531. ¥ 3
39448425532. ¥ 4

Question Number : 184 Question Id : 3944846637 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Choose the correct word/correct meaning of the word/Fill in the blanks with correct word / verb/phrase/preposition.

She _____ the offer of promotion.

- 1) turned up
- 2) turned over
- 3) turned to
- 4) turned down

Options :

39448425533. * 1 39448425534. * 2 39448425535. * 3 39448425536. * 4

Question Number : 185 Question Id : 3944846638 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0 Choose the correct word/correct meaning of the word/Fill in the blanks with correct word / verb/phrase/preposition.

He made a ______ discovery for which he was honoured.

- 1) sentimental
- 2) sensational
- 3) sensual
- 4) sensuous

Options :

| Question Shuffling Allowed : | Yes |
|------------------------------|-----------|
| Sub-Section Id : | 394484670 |
| Sub-Section Number : | 6 |
| 39448425540. 🏶 4 | |
| 39448425539. * 3 | |
| 39448425538. ✔ 2 | |
| 39448425537. 🏶 1 | |

Question Id : 3944846639 Question Type : COMPREHENSION Sub Question Shuffling Allowed : Yes Group Comprehension Questions : No

Question Numbers : (186 to 190)

Read the following passage and answer the questions.

Literature is rightly called 'the brain of humanity'. Just as the brain preserves every experience or sensation and judges a fresh experience or sensation in the light of the acquired knowledge or experience so humanity at large has a record of its past in literature. Its present conditions, problems and circumstances can best be examined and understood for it is a record available through literature. Literature is fundamentally an expression of life through the medium of language. It is the storehouse of individual human experience and also of experiences of the human race in general. It does not simply record human deeds and actions nor does it concern itself much with man and his social, political and economic activities. It is concerned chiefly with man's inner life – our passions, emotions and feelings. A description of outward human life is just the means and not the end in literature. Man's outer life is studied and examined to understand him thoroughly and fully. Hence literature is concerned with human thinking and feeling – how we think and solve our problems – ethical, moral, emotional and spiritual.

Sub questions

Question Number : 186 Question Id : 3944846640 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0 Why is literature called the 'brain of humanity'?

- 1) It is recreative
- 2) It is imaginative
- 3) It is factual
- 4) It preserves the past and present of humanity

Options :

39448425541. 🏼 1

39448425542. 🏼 2

39448425543. 🏼 3

39448425544. ؇ 4

Question Number : 187 Question Id : 3944846641 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

What is literature fundamentally?

- 1) Expression of language
- 2) Expression of life
- 3) Expression of experiences
- 4) Expression of knowledge

Options:

39448425545. ^{**} 1
39448425546. ✓ 2
39448425547. ^{**} 3
39448425548. ^{**} 4

Question Number : 188 Question Id : 3944846642 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

What is 'acquired knowledge'?

- 1) Knowledge through the experiences of the human race
- 2) Knowledge through books
- 3) Knowledge through teachers
- 4) Knowledge based on political activities

Options :

39448425549. ✔ 1

39448425550. * 2

39448425551. 🏼 3

39448425552. 🎽 4

Question Number : 189 Question Id : 3944846643 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0 What is the major concern of literature?

- 1) Economic activities
- 2) Social activities
- 3) Human deeds
- 4) Man's inner life

Options:

39448425553. *****39448425554. *****39448425555. *****39448425556. **√**

Question Number : 190 Question Id : 3944846644 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Literature is a storehouse of _____.

- 1) human necessities
- 2) material benefits
- 3) human experiences
- 4) vocabulary

Options :

| Question Shuffling Allowed : | Yes |
|------------------------------|-----------|
| Sub-Section Id : | 394484671 |
| Sub-Section Number : | 7 |
| 39448425560. * 4 | |
| 39448425559. 🖋 3 | |
| 39448425558. ** 2 | |
| 39448425557. * 1 | |

Question Id : 3944846645 Question Type : COMPREHENSION Sub Question Shuffling Allowed : Yes Group Comprehension Questions : No Question Numbers : (191 to 195)

Read the following passage and answer the questions.

Losers let it happen. Winners make it happen. Life is a do-it-yourself project. Whatever you give credence in your thinking will likely come to pass. Learn to develop two critical abilities; the ability to live with uncertainty, and the ability to delay immediate gratification in favour of long-range goals. Losers try to escape from their fears with activities that are tension-relieving. Winners are motivated by their desires towards activities that are goal-achieving. Choose your responses to what occurs. Learn from your mistakes, rather than repeat them. Spend time taking action in the present rather than fearing what may happen in the future. And be different, if it means taking the calculated risk. The greatest risk in life is to wait for and depend on others for your security. The greatest security is to plan and act, and take the risk that will ultimately make you independent.

Sub questions

Question Number : 191 Question Id : 3944846646 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

What does the term 'losers' mean ?

- 1) Losers are active
- 2) Losers do not act
- 3) Losers let it happen
- 4) Losers prefer to complain

Options :

39448425561. ▲ 1 39448425562. **✓** 2

39448425563. ** 3

39448425564. 🏼 4

Question Number : 192 Question Id : 3944846647 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

How do 'winners make it happen' ?

- 1) Winners have positive self-determination
- 2) Winners remain passive
- 3) Winners hate losers
- 4) Winners depend on others for their success

Options :

39448425565. ✓ 1
39448425566. ¥ 2
39448425567. ¥ 3
39448425568. ¥ 4

Question Number : 193 Question Id : 3944846648 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

What is essential for success?

- 1) Impatience
- 2) Patience and mental equilibrium
- 3) Greed and intolerance
- 4) An impulsive nature

Options :

39448425569. ** 1

39448425572. 🛎 4

Question Number : 194 Question Id : 3944846649 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0 How do losers try to escape from their fear?

- 1) By ignoring the problem
- 2) By putting the blame on fate
- 3) By waiting for their luck to change
- 4) By distracting themselves with tension-relieving activities

Options :

39448425573. *****39448425574. *****39448425575. *****39448425576. *****

Question Number : 195 Question Id : 3944846650 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

How can one achieve success?

- 1) By planning and working towards long-range goals
- 2) By not taking calculated risks
- 3) By making mistakes
- 4) By hasty actions

Options :

39448425577. ✔ 1

39448425578. 🎽 2

| Question Shuffling Allowed : | Yes |
|------------------------------|-----------|
| Sub-Section Id : | 394484672 |
| Sub-Section Number : | 8 |
| 39448425580. 🍀 4 | |
| 39448425579. 🍀 3 | |

Question Id : 3944846651 Question Type : COMPREHENSION Sub Question Shuffling Allowed : Yes Group Comprehension Questions : No

Question Numbers : (196 to 200)

Read the following passage and answer the questions.

A list of articles lost by railway travellers and now on sale at a great London station has been published, and many people who read it have been astonished at the absent-mindedness of their fellows. If statistical records were available on the subject, however, I doubt whether it would be found that absent-mindedness is common. It is the efficiency rather than the inefficiency of human memory that compels my wonder. Modern man remembers even telephone numbers. He remembers the addresses of his friends. He remembers the dates of good vintages.

He remembers appointments for lunch and dinner. His memory is crowded with the names of actors and actresses and cricketers and footballers and murderers. He can tell you what the weather was like in a long-past August and the name of the provincial hotel at which he had a vile meal during the summer. In his ordinary life, again, he remembers almost everything that he is expected to remember. How many men in all London forget a single item of their clothing when dressing in the morning? Not one in a hundred. Perhaps not one in ten thousand. How many of them forget to shut the front door when leaving the house? Scarcely more. And so it goes on through the day, almost everybody remembering to do the right things at the right moment till it is time to go to bed, and then the ordinary man seldom forgets to turn off the lights before going upstairs.

As for leaving articles in trains and in taxies, I am no great delinquent in such matters. I can remember almost anything except books and walking-sticks and I can often remember even books. Walking-sticks I find it quite impossible to keep.

Sub questions

Question Number : 196 Question Id : 3944846652 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0 The essayist is astonished about _____.

- 1) the loss of articles by passengers in the railway station
- 2) the efficiency of human memory
- 3) forgetfulness
- 4) absent-mindedness

Options :

39448425581. ^{**} 1
39448425582. ✓ 2
39448425583. ^{**} 3
39448425584. ^{**} 4

Question Number : 197 Question Id : 3944846653 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

"Modern man remembers even telephone numbers". From this statement what does the author

suggest?

- 1) It is difficult to remember telephone numbers
- 2) Modern man remembers only telephone numbers and nothing else
- 3) Modern man is poor in memory
- 4) Modern man remembers unimportant things but forgets important things.

Options:

39448425585. * 1
39448425586. * 2
39448425587. * 3

Question Number : 198 Question Id : 3944846654 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

The word "Scarcely more" in the context of the passage means

- 1) Not more than one in hundred
- 2) More than one in ten thousand
- 3) Not more than one in ten thousand
- 4) all of them

Options :

39448425589. ¥ 1
39448425590. ¥ 2
39448425591. ✓ 3
39448425592. ¥ 4

Question Number : 199 Question Id : 3944846655 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

"I am no great delinquent in such matters" means

- 1) I do not forget books and walking sticks
- 2) I do not lose many of my articles in trains and taxies.
- 3) I lose all my articles in trains and taxies
- 4) I remember every article I carry in trains and taxies

39448425593. ^{**} 1
39448425594. ✓ 2
39448425595. ^{**} 3
39448425596. ^{**} 4

Question Number : 200 Question Id : 3944846656 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Option Orientation : Vertical Correct Marks : 1 Wrong Marks : 0

The word "seldom" means

- 1) random
- 2) often
- 3) frequently
- 4) rarely

Options :

- 39448425597. 🏼 1
- 39448425598. 🛎 2
- 39448425599. 🏼 3
- 39448425600. ✔ 4