EAMCET (E) – 2022

(Engineering and Agriculture Common Entrance Test)



Booklet No.: 69874

MODEL TEST



CENTRE FOR EDUCATIONAL DEVELOPMENT OF MINORITIES OSMANIA UNIVERSITY (Sponsored by Minorities Welfare Department, Government of Telangana) Nizam College Campus, Gunfoundry, Hyderabad – 500001.

MATHS

1. If
$$f(x)=3x-5$$
 then $f^{-1}(x)=$
1) $x+5$ 2) $x+4$ 3) $\frac{x+5}{3}$ 4) $\frac{x+4}{3}$
2. Let $X = \left\{ \begin{pmatrix} a \\ c \\ d \end{pmatrix} : a, b, c, d \in R \right\}$ Define f: $X \to R$ by $f(A) = \det(A)$, $\forall A \in X$. Then, f is
1) One – one but not onto 2) Onto but not one – one
3) One – one & onto 4) Neither one – one nor onto
3. For all positive integers k, if the greatest divisor of $25^{k} + 12k - 1$ is d, then $4\sqrt{d} = 1$
1) 36 2) 8 3) 20 4) 24
4. The equations $x-y+2z=4$, $3x+y+4z=6$, $x+y+z=1$, have
1) No solution 2) Unique solution
3) Infinitely many solutions
4) More than one but finite number of solutions
5. If $k > 1$, & the determinant of the matrix A^2 , where $A = \begin{bmatrix} k & k\alpha & \alpha \\ 0 & \alpha & k\alpha \\ 0 & 0 & k \end{bmatrix}$ is k^2 then $|\alpha| = 1$
1) k 2) k^2 3) $1/k$ 4) $1/k^2$
6. $A(x) = \begin{bmatrix} x+1 & 2x+1 & 3x+1 \\ 3x+1 & x+1 & 2x+1 \end{bmatrix}$ then $\int_{0}^{1} A(x) dx = 1$
1) -15 2) $\frac{-15}{2}$ 3) -30 4) -5
7. If rank of $\begin{bmatrix} x & x & x \\ x & x^2 & x \\ x & x & x+1 \end{bmatrix}$ is 1, then
1) $x = 0$ (or) $x = 1$ 2) $x = 1$ 3) $x = 0$ 4) $x \neq 0$
8. $\frac{1t}{x-\alpha} (\frac{1+x)^{-\alpha_3}-1}{1+x^{-\alpha_3}-1} = 1$
1) α 2) e 3) e^4 4) e^2
10. If $y = \sqrt{\tan x + \sqrt{\tan x} + \sqrt{\tan x} \dots \cos \cos \cos \cos \frac{dy}{dx}} = 1$
1) $e^{-2x} x^2 x^2 (2y-1) 3)(2y-1) \cdot \sec^2 x$ 4)(2y-1)/sec^2 x 1) -1 2) -2 3) 1 4) 0

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12. If
$$y = 7an^{-1} \left[\frac{5\cos x - 12\sin x}{12\cos x + 5\sin x} \right]$$
, then $\frac{dy}{dx} =$
1) 1 2) -1 3) -2 4) $\frac{1}{2}$
13. The subtament, ordinate and subnormal to the parabola $y^2 = 4ax$ at a point (different from the origin) are in
1) A.P. 2) G.P. 3) H.P. 4) none
14. Find the maximum area of a rectangle, which can be inscribed in a circle of radius 5 cm.
1)5 2) 10 3) 25 4) 50
15. Let f(x) be continuous on [0, 6] & differentiable on [0, 6]. Let f(0) = 12 & f(6) = -4. If
 $g(x) = \frac{f(x)}{x+1}$, then for some Lagrange's constant $c \in (0, 6), g'(c) =$
1) $-\frac{44}{3}$ 2) $-\frac{22}{21}$ 3) $\frac{32}{21}$ 4) $-\frac{44}{21}$
16. If $\int \frac{x^4}{x^4+1} dx = Ax^3 + Bx + C Tan^4x + then the descending order of A, B, C is
1) A, B, C 2) B, C, A 3) C, A, B 4) C, B, A
17. $\int \frac{dx}{x^4+2x+2} = f(x) + c \Rightarrow f(x) = -$
1) $tan^4(x+1)$ 2) 2 tan^4(x+1) 3) - tan^4(x+1) 4) 3 tan^4(x+1)$
18. If $\int \frac{e^{x}-1}{(e^x+1)} dx = f(x) + c$ Then $f(x) = -$
1) $2\log(\log \sinh x) + c$ 4) $\log(\log(e^x + e^x) + c)$
19. $\int \frac{dx}{x(x^4+1)} =$
1) $\frac{1}{4} \log \left(\frac{x^4+1}{x^4}\right) + C$ 2) $\frac{1}{4} \log \left(\frac{x^4}{x^4+1}\right) + C$
20. $\int_{0}^{\frac{\pi}{9}} e^{-3x} \sin 4x dx =$
1) 3π 2) $3\pi/256$ 3) $3\pi/128$ 4) $4\pi/128$
22. $\int_{0}^{\frac{\pi^4}{9}} \sin^2 x \cos^4 x dx =$
1) 3π 2) $3\pi/256$ 3) $3\pi/128$ 4) $4\pi/128$
23. The D.E. of family of parabolas having vertices at origin and foci on y-axis is -
1) $\frac{1}{19} \frac{10}{24}$ 2) $\frac{10g^27}{24}$
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- 24. The solution of $cosy + (xsiny 1) \frac{dy}{dx} = 0$ is 1) tany - secy = cx 2) tany + secy = cx 3) xsecy + tany = c 4) xsecy = yany + c
- 25. The solution of the differential equations $3xy'-3y+(x^2-y^2)^{1/2}=0$, satisfying the condition y(1)=1 is

1)
$$3\cos^{-1}\left(\frac{y}{x}\right) = In|x|$$

2) $3\cos\left(\frac{y}{x}\right) = In|x|$
3) $3\cos^{-1}\left(\frac{y}{x}\right) = 2In|x|$
4) $3\sin^{-1}\left(\frac{y}{x}\right) = In|x|$

26. Match the following.

1) 5

I. If
$$\frac{3x}{(x-6)(x+k)} = \frac{2}{x-6} + \frac{1}{x+k}$$
 then k= a)0
II. If $\frac{3x-6}{(x-6)(x+k)} = \frac{2}{x-6} + \frac{1}{x+k}$ then k= b)3
III. If $\frac{x-4}{x^2-5x-2k} = \frac{2}{x-2} - \frac{1}{x+k}$, then k= c)-1
IV. If $\frac{3x^3-2x^2-1}{x^4+x^2+1} = \frac{Ax+B}{x^2+x+1} + \frac{Cx+D}{x^2+kx+1}$ then k= d)-3
1)c,d,b,a 2)b,a,d,c 3)c,a,b,d 4)c,b,a,d

27. The median of the following frequency distribution is

	Xi	8	5	6	10	9	4	7	
	\mathbf{f}_{i}	6	4	5	8	9	6	4	
2	2)6				3)	7			4) 8

- 28.
 If the roots of 24x³-26x²+9x-1=0 are in H.P then the roots are ______

 1)1/2,1/3,1/4
 2)1,1/3,1/5
 3)1,0,-2
 4)1,1,-2
- 29. If one root of the equation $x^3 9x^2 + 26x 24 = 0$ is twice the other. Then, the sum of the cubes of those two roots is 1) 72 2) 253 3) 9 4) 9/64
- 30.If A = {-1, 2} & B = {1, -2} are two points & P is a variable point such that the area of
 ΔPAB is always one, then the equation of the locus of P is
1) $4x^2 + 4xy + y^2 = 1$
3) $x^2 6xy + 22x 66y 23 = 0$ 2) $x^2 + 10xy + 25y^2 34x 170y = 0$
4) $16x^2 24xy + 9y^2 62x + 34y + 46 = 0$
- 31. The transformed equation of $3x^2+3y^2+2xy = 2$ when the coordinate axes are rotated through an angle of 45^0 is 1) $X^2+2Y^2 = 1$ 2) $2X^2+Y^2 = 1$ 3) $X^2+Y^2 = 1$ 4) $X^2+3Y^2 = 1$
- 32. The equation of the straight, line passing through origin and inclined at angle 45^{0} to the line y = 2x+7 1)3x+y=0 2) x+3y=0 3) x+y=0 4) x - y = 0
- 33. If the area of the triangle formed by the st.lines x=0,y=0,3x+4y=a,(a>0) is one, then a= 1) $5\sqrt{6}$ 2) $4\sqrt{6}$ 3) $3\sqrt{6}$ 4) $2\sqrt{6}$
- 34. If p & q are the perpendicular distances from the origin to the straight lines $x \sec \theta y \csc \theta = a$ & $x \cos \theta + y \sin \theta = a \cos 2\theta$ 1) $4p^2 + q^2 = a^2$ 2) $p^2 + q^2 = a^2$ 3) $p^2 + 2q^2 = a^2$ 4) $4p^2 + q^2 = 2a^2$

- 35. If the two pairs of lines $2x^2+6xy+y^2=0$ and $4x^2+18xy+by^2=0$ are equally inclined , then b=_____
 - 1) 1 2)-1 3)2 4)-2
- 36. The equation of the line concurrent with the pair of lines $x^2+2xy-35y^2-4x+44y-12=0$ is 1) 5x+2y-8=0 2) 5x-2y-8=0 3) 5x+2y+8=0 4) 5x-2y+8=0
- 37. If the lines represented by $x^2 2hxy y^2 = 0$ are rotated about (0, 0) through an angle α one in clockwise direction & the other in the counter clockwise direction, then the combined equation of the bisectors of the angle between the lines thus obtained is 1) $x^2 - y^2 + hxy = 0$ 2) $x^2 - 2hxy + y^2 = 0$ 3) $hx^2 - hy^2 + 2xy = 0$ 4) $hx^2 + hy^2 - xy = 0$
- 38.The polar of (2, 3) w. r. t $x^2 + y^2 + 6x + 8y 96 = 0$ is
1) 5x + 7y 48 = 02) 5x + 7y + 78 = 03) 5x + 7y + 48 = 04) 5x + 7y 78 = 0
- 39. The equation of the circle through (1,0) and (0,1) and having smallest possible radius is 1) $x^2+y^2-x-y=0$ 3) $x^2+y^2+x+y=0$ 4) $x^2+y^2+2x-2y-62=0$
- 40. Consider the circle $x^2+y^2-6x+4y=12$. The equation of a tangent to this circle that is parallel to the line 4x + 3y + 5 = 0 is 1) 4x + 3y + 10 = 0 2) 4x + 3y - 9 = 0 3) 4x + 3y + 9 = 0 4) 4x + 3y - 31 = 0
- 41. The locus of the mid-point of the line segment joining the focus to a moving point on the parabola $y^2 = 4ax$ is a conic. The equation of the directrix of that conic is 1) y = a2) x = a3) y = 04) x = 0
- 42. The line x+y=6 is a normal to the parabola, $y^2=8x$ at the point 1)(18,-12) 2) (4,2) 3) (2,4) 4) (3,3)
- 43. The distance of a point on the ellipse $x^2/6+y^2/2=1$ from the centre is 2. The eccentric angle of the point is 1) $\pi/3$ 2) $\pi/5$ 3) $5\pi/4$ 4) $\pi/2$
- 44. If 4x + y + p = 0 (p > 0) is a tangent to the ellipse $x^2 + 3y^2 = 3 \& 16x + qy + 14 = 0$ (q > 0) is a normal to the ellipse $x^2 + 8y^2 = 33$, then p + q =1) 8 2) 5 3) 9 4) 6
- 45. The foci of the ellipse $\frac{x^2}{16} + \frac{y^2}{b^2} = 1$ & the hyperbola $\frac{x^2}{144} + \frac{y^2}{81} = \frac{1}{25}$ coinside, then the value of b² is 1) 5 2) 7 3) 9 4) 1
- 46. A and B are two possible events of an of an n experiment such that P(A)=0.3, P(AUB)=0.8, and P(B)=P. The value of p in order that A and B are independent is 1)2/10 2)3/10 3)2/7 4)5/7
- 47. The letters of the word "QUESTION" are arranged in a row at random. The probability that there are exactly two letters between Q & S is
 1) 1/14
 2) 5 / 7
 3) 1 / 7
 4) 5 / 28
- 48. In a battery manufacturing factory, machines P, Q & R manufacture 20%, 30% & 50% respectively of the total output. The changes that a defective battery is produced by these machines are 1%, 1.5% & 2% respectively. If a battery is selected as random from production, then the probability that it is defective is

	1) $\frac{69}{2000}$	2) $\frac{33}{2000}$	3) $\frac{1}{40}$	4) $\frac{29}{2000}$
49.	If a random variable then p=	X follows a Binomial	distribution with n=6	and if9P(X=4)=P(X=2),
	1)1/4	2)2/4	3)3/4	4)7/8
50.	If 3% of the electric that a sample of 100	bulbs manufactured bulbs has no defective	by a company are def bulb is	ective. The probability
	1)e ⁻³	2)1-e ⁻³	3)3e ⁻³	4)1+e ⁻³
51.	The number of 10 dig 1)46	it numbers that can be 2)C(10,2)	e formed by using the a 3)10!	digits 1 and 2 is 4)2 ¹⁰
52.	The number of ways may not be next to ear	in which 8 men be arr ach other is	anged round a table s	o that 2 particular men
	1)1440	2)5040	3)2520	4)3600
53.	If $\alpha \& \beta$ are the great	est divisors of n(n ² – 1	L) & 2n(n ² + 2) respect	ively for all $n \in N$ then
	up – 1) 18	2) 36	3) 27	4) 9
54.	If $\tan B = \frac{2\sin ASinC}{\sin(A+C)}$	then tanA, tanB, tan	C are in	
	1) A.P	2)G.P	3)H.P	4)A.G.P
55.	Match the following: List-I	List-II		
	1) sin18 ⁰	a) $\frac{\sqrt{10-2\sqrt{5}}}{4}$		
	2) $\cos 18^{\circ}$	b) $\frac{\sqrt{5+1}}{4}$		
	3) $\cos 36^{\circ}$	c) $\frac{\sqrt{5-1}}{4}$		
	4) sin36 ⁰	d) $\frac{\sqrt{10+2\sqrt{5}}}{4}$		
	1)1-d,2-a,3-c,4-b	2)1-a,2-b,3-d,4-c	3)1-b,2-c,3-a,4-d	4)1-c,2-d,3-b,4-a
$\frac{\cos}{\cos}$	$\frac{s^3 21^0 + \cos^3 39^0}{\cos 21^0 + \cos 39^0} =$			
56.	1)3/2	2)2/3	3)3/4	4)4/3
57.	The max.value of sin ⁶ 1) 1	x +cos ⁶ x is 2)3/4	3)1/4	4)3/2
58.	If $\log_{\cos x} \sin x + \log_{\sin x}$ 1) π	$x \cos x = 2$ then $x = 2$ ($\pi/3$	3) π/4	4) π/6
59.	$\frac{\tan^2(\tan^{-1}3) + \tan^3(1)}{\cot^2(\tan^{-1}1/5) + \cot^2(1)}$	$\frac{(\tan^{-1} 5)}{(\cot^{-1} 3)} =$		
	1) 17/67	2) -17/67	3) 67/17	4) -67/17

<i>x</i> =	$log\left(\frac{1}{y} + \sqrt{1 + \frac{1}{y^2}}\right) \Rightarrow$	<i>y</i> =				
00.	1) tanhx	2) cothx	3) sechx	4) cosechx		
61.	If a:b:c =7:8:9 then co 1)7:8:9	osA:cosB:cosC = 2) 14:16:18	3) 14: 11: 6	4) 14: 8:6		
62.	In a triangle ABC, C =	90°. Then $\frac{a^2 - b^2}{a^2 + b^2} =$				
	1) Sin(A + B)	2) sin(A – B)	3) cos(A + B)	4) cos(A – B)		
63.	Let ABC be an isoscel	es triangle with BC as i a^2	its base. Then $rr_1 =$			
	1) a^2	2) $\frac{u}{2}$	3) R ² sin ² A	4) R ² sin ² 2B		
64.	$\frac{1+\tan h\frac{x}{2}}{1-\tan h\frac{x}{2}} =$					
1)	e ^{-x}	2) <i>e^x</i>	3)2 <i>e^{x/2}</i>	4)2 <i>e</i> ^{-x/2}		
65.	The perimeter of the 1) $\sqrt{14}$	triangle formed by the 2) $3\sqrt{14}$	e points (2,5,3),(5,3,2), 3) 3√6	(3,2,5) is 4) 3√12		
66.	If the direction cosine angle between them	es of two lines are suc is	ch that $l + m + n = 0, l^2$	$+ m^2 - n^2 = 0$, then the		
	1) $\frac{\pi}{6}$	2) $\frac{\pi}{4}$	3) $\frac{\pi}{3}$	4) $\frac{\pi}{2}$		
67.	Intersection point on x+2y+3z-14=0 is	the line passing thro	ough (-1,-1,-1) with DR	:s (2,3,4) & the plane		
	1) (-3,-4,-5)	2)(-1,-2,-3)	3) (3,4,5)	4)(1,2,3)		
68.	Assertion (A): a, b, c, d are position vectors of 4 points such that $2a - 3b + 7c - 6d = 0 \Rightarrow$ a, b, c, d are coplanar. Reason (R): Vector equation of the plane passing through three points whose position vectors area, b, c is $r = (1 - x - y)a + xb + yc$. Which of the following is true? 1) Both (A) & (R) are true & (R) is the correct explanation of (A) 2) Both (A) & (R) are true, but (R) is not the correct explanation of (A) 3) (A) is true, but (R) is true 4) (A) is false, but (R) is true					
69.	If P, Q, R are the mid BQ =	– points of the sides	AB, BC & CA of $\triangle ABC$	respectively, then PC –		
	1) CP	2) PQ	3) BR	4) AR		
70.	The unit vector ortho with a and b is	gonal to a=2i+2j+k,b=	3i+4j-12k and forming	a right handed system		
	1)-28i+27j-2k	2)-28i+27j+2k	$3)\frac{281-27j-2k}{\sqrt{1517}}$	4) $\frac{-281+27j+2k}{\sqrt{1517}}$		
71.	Match the following I. The angle between II. The angle between III. The angle between IV. The angle between B=(1,-1,0),c=(-1,1,	n the vectors 2i+j-k,i-4 n the vectors i+2j-k,2i+ n a, b if a,b,a+b are un n AC, BD If A=(1,1,0), 0),D=(0,-1,1)	j-2k -j+k it vectors	a)π/6 b)π/4 c)π/3 d)π/2		

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	1) a,c,e,b e) 2π/3	2) d,c,e,b	3) c,a,b,d	4) d,e	e,c,a	
72.	If the vectors $\overline{i} - 2x\overline{j}$	$\overline{i} - 3y\overline{k} \& \overline{i} + 3x\overline{j} + 2$	$y\overline{k}$ are orthogonal to e	ach oth	ner, ther	n locus of
	the point (x, y) is 1) A circle	2) An ellipse	3) A parabola	4) A s	straight	line
73.	Conjugate of $\frac{2-i}{(1-2i)^2}$	$\frac{1}{2}$ is				
	1)2+I 3) (-2/25) — (11i/25)	4) 1+2i	2) (-2/25) + (11i/25)			
74.	Solve (x+1) ³ =8					_
	1) 1,20, 20 ²	2) 1,2ω,ω ² 3) 1	l, 2ω-1, 2ω ² -1		4) 1,2	.ω,2ω ² +1
75.	If sinA+sinB+sinC=0 & 1) cos(A+B+C)	& cosA+cosB+cosC=0 2) 2	then cos(A+B)+cos(B+C 3) 1	2)+cos((4) 0	C+A)=	
76.	The number of comp first quadrant is	lex roots of the equa	ation x ¹¹ -x ⁷ +x ⁴ -1=0 wh	ose arg	uments	lie in the
	1) 2	2) 3	3) 7	4) 9		
77.	I: The maximum valu II: The minimum valu 1)only I is true 3)both I and II are tru	e of c+2bx -x ² is c+b ² e of x ² +2bx+c is c-b ie	2 2 _. 2)only II is true 4)neither I nor II true	e.		
78.	Let α and β be the given below:	roots of the quadrat	ic equation $ax^2 + bx + bx$	<i>c</i> = 0.	Observe	e the lists
List I	0		List II			
	$a.\alpha = \beta \Longrightarrow$		A. $(ac^2)^{1/3} + (a^2c)^{1/3} +$	<i>b</i> = 0		
	$p.\alpha = 2p \rightarrow c \alpha = 3\beta $		b.20 - 900			
	$d \alpha = \beta^2 \rightarrow \beta^2$		D $3b^2 = 16ac$			
	u.u − p →		$F_{\rm h}^2 = 4ac$			
			F. $(ac^2)^{1/3} + (a^2c)^{1/3} =$	= b		
	The correct match of	List I from List II is				
		i	ii	iii	iv	
	i A)	ii F		iv	_	2)
	1) F	E	B	D	F	2)
	C 2)	D F	A	D	E	4)
	E	В	D	A	I	
79.	If the coefficient of p 1)p+q-2	th term of (1+x) ⁿ is p 2)p+q-4	and that of (p+1)th ter 3)p+q-1	m is q t 4)noı	:hen n=_ ne	_
80.	$x = 1 + \frac{3}{11} \times \frac{1}{6} + \frac{3 \times 7}{2!} \left($	$\left(\frac{1}{6}\right)^2 + \frac{3 \times 7 \times 11}{3!} \left(\frac{1}{6}\right)^3$	$+ \dots \Rightarrow x^4 =$			
	1) 81	2) 54	3) 27	4) 8		
PHYS	SICS					
81	Which of the following	ng is dimensionless				
	(1) Force / acceleratio	on	(2) velocity / acceler	ration		
	(3) volume / area		(4) energy / work			
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- 82. Given $\vec{F} = (4\hat{i} 10\hat{j})$ and $\vec{r} = (5\hat{i} 3\hat{j})$ then torque \vec{T} is (1) $-62\hat{j}$ (2) $62\hat{k}$ (3) $38\hat{i}$ (4) $-38\hat{k}$
- 83. A man throws balls with same speed vertically upwards one after the other at an interval of 2s. What should be the speed of throw so that more than two balls are in the sky at any time?
 (1) only with speed 19.6 m/s
 (2) more than 19.6 m/s
 - (1) only with speed 19.0 m/s(2) more than 19.0 m/s(3) at lease 9.8 m/s(4) any speed less than 19.6 m/s
- 84. A road is 10m wide. Its radius of curvature is 50m. The outer edge is above the lower edge by a distance of 1.5m. This road is most suited for the velocity. (1) 2.5m/s
 (2) 4.5 m/s
 (3) 6.5 m/s
 (4) 8.5 m/s
- 85. A ball is rolled off along the edge of table (horizontal) with velocity 4 m/s. If hits the ground after time 0.4 sec. Which one of the following statement is wrong?
 - (1) The height of the table is 0.8m
 - (2) If hits the ground at an angle of 60° with the vertical
 - (3) It covers a horizontal distance 1.6m from the table
 - (4) It hits the ground with vertical velocity 4 m/s
- 86. A block of mass 2kg is placed on the floor. The coefficient of static friction is 0.4A force F of 3N is applied on the block as shown in the fig. The force of friction between the block and the floor is (take $g = 10 \text{ m/s}^2$)

87. Liquid of density ρ flows along horizontal pipe of uniform area of cross section *a* with a velocity *v* through a right angled bend. What force should be applied to the bend to hold it in equilibrium?

(3) 4N

(4) 6N

(1)
$$2a\rho v^2$$
 (2) $\frac{a\rho v^2}{\sqrt{2}}$ (3) $\sqrt{2}a\rho v^2$ (4) $a\rho v^2$

- 88. A chain of length L and mass M is held on a frictionless table with $\left(\frac{1}{n}\right)^{\text{th}}$ part hanging over the edge. Work done in pulling the chain is directly proportional to (1) \sqrt{n} (2) n (3) n^{-3} (4) n^{-2}
- 89. For the same mass which of the following will have the largest moment of inertia about an axis passing through the centre of gravity and perpendicular to the plane of the body? (1) A disc of radius a (2) A ring of radius a
 (3) A square lamina of side a
 (4) Four identical rods forming square of side a
- 91. When an elastic material with Young's modulus *Y* is subjected to a stretching stress *S*, the elastic energy stored per unit volume of the material is

(1)
$$\frac{YS}{2}$$
 (2) $\frac{S^2Y}{2}$ (3) $\frac{S^2}{2Y}$ (4) $\frac{S}{2Y}$

92. A spherical soap bubble of radius 1cm is formed inside another soap bubble of radius 3cm. The radius of a single soap bubble which maintains the same pressure difference as inside the smaller and outside the larger soap bubble as

(1) 0.75 cm
(2) 0.75m
(3) 7.5 cm
(4) 7.5 m

93. A ball of mass m and radius r is released in Viscous liquid. The value of its terminal velocity is proportional to 1/

(1)
$$\frac{1}{r}$$
 only (2) $\frac{m}{r}$ (3) $\left(\frac{m}{r}\right)^{1/2}$ (4) m only

94. A vessel contains a mixture consisting of $m_1 = 7g$ nitrogen ($M_1 = 28$) and $m_2 = 11g$ of carbon dioxide (($M_2 = 44$) at temp T = 300K and pressure $P_0 = 1$ atm. The density of mixture is (2) 2.567 g per lit (3) 3.752 g per lit (1) 1.446 g per lit (4) 4.572 g per lit

95. Two thermally insulated vessels 1 and 2 are filled with air at temperature (T_1, T_2) , volume (V_1, V_2) and pressure (P_1, P_2) respectively. If the valve joining the two vessels is opened the temperature inside the vessel at equilibrium will be

(1)
$$T_1 + T_2$$

(2) $\frac{T_1 + T_2}{2}$
(3) $\frac{T_1 T_2 (P_1 V_1 + P_2 V_2)}{P_1 V_1 T_1 + P_2 V_2 T_2}$
(4) $T_1 T_2 (P_1 V_1 + P_2 V_2)$

- 96. A steel meter scale is to be ruled so that the millimetre intervals are accurate within about 5×10^{-5} mm at a certain temperature. The maximum temperature variation allowable during the ruling of the millimetre marks is (α for steel = 11 × 10⁻⁶ / °C) (4) 10°C (1) 8°C (2) 9°C (3) 4.5°C
- 97. What is the relationship between time of flight *T* and horizontal Range *R*?

(1)
$$R = \frac{gT}{\tan \theta}$$
 (2) $R = \frac{gT^2}{2\tan \theta}$ (3) $R = \frac{gT^2}{\tan \theta}$ (4) $R = \frac{gT}{2\tan \theta}$

- 98. When a pentavalent impurity is added in Ge crystal then what type of semiconductor is obtained? (3) intrinsic (4) none of these
 - (2) *n*-type (1) *p*-type
- 99. A thin metal plate M is inserted between the plates of a parallel plate capacitor as shown in the fig. The new capacitance in terms of initial capacitance C is



- A voltmeter having a resistance of 1800Ω is employed to measure the potential difference 100. across a 20 Ω resistor which is connected to the terminals of a dc power supply having an e.m.f. of 50V and an internal resistance of 20Ω . What is the percentage decrease in the potential difference across the 200 Ω resistor or as a result of connecting the voltmeter across it?
 - (2) 5% (3) 10% (4) 25% (1) 1%
- 101. An galvanometer has a resistance of 100Ω and full scale range 50μ A. It can be used as a voltmeter or an ammeter provided a resistance is connected to it. Choose the correct combination in the following.
 - (1) 50V range with $10k\Omega$ resistance in series
 - (2) 10V range with 200 k Ω resistance in series
 - (3) 5mA range with 2Ω resistance in parallel
 - (4) 10mA range with 2Ω resistance in parallel
- 102. A short conducting rod P of length 3.0cm is placed parallel to and near the centre of a long conducting rod Q of length 3.0m. Conductors P and Q carry currents of 3.0A and

4.0A respectively in the same direction. The two conductors are separated by a distance 2.0 cm in air. What is the force experienced by the long conductor Q? (1) 1.6×10^{-6} N (2) 2.6×10^{-6} N (3) 3.6×10^{-6} N (4) 4.6×10^{-6} N

103. A rectangular loop carrying a current i is situated near a long straight wire such that the wire is parallel to one of the sides of the loop. If a steady current I is established in the wire as shown in fig. the loop will be



- (1) Rotate about an axis parallel to the wire
- (2) Move away from the wire
- (3) Move towards the wire (4) Remains stationary

104.A rectangular coil of 20 turns and area of cross section 25 sqcm has a resistance of 100Ω .
If a magnetic filed which is perpendicular to the plane of coil changes at a rate of 1000
tesla per period *i.e.* second, the current in the coil is
(1) 1A(2) 50A(3) 0.5A(4) 5A

- 105.For a perfectly coupled coils, the coupling coefficient should be equal to
(1) one(2) zero(3) infinite(4) more than one
- 106. A 200μF capacitor in series with a 100Ω resistance is connected to a 240V, 50Hz supply. What is the maximum current in the circuit?
 (1) 1.4A
 (2) 3.4A
 (3) 4.4A
 (4) 2.4A
- 107. The efficiency of a transformer is 90%. The transformer is rated for output of 9000W. If the primary voltage is 1000V and resistance of primary is one ohm then the copper losses in the primary coil will be
 (1) 400W
 (2) 200W
 (3) 100W
 (4) 300W
- 108. In an experiment to find the focul length of a concave mirror a graph is drawn between the magnitudes of u and v. The group looks like



- 109. A person suffering from presbyobia should use as
 - (1) A concave lens
 - (2) A bifocal lens of which lower portion is convex
 - (3) A bifocal lens of which upper portion is convex
 - (4) A convex lens
- 110. In a reflecting astronomical telescope. If the objective (a spherical mirror) is replaced by a parabolic mirror of the same focal length and aperture, then

(1) the final image will be erect
(2) a large image will be obtained
(3) the telescope will gather more light
(4) spherical aberration will be absent

- 111. Which one of the following is a possible nuclear reaction? (1) ${}^{10}_{5}B+{}^{4}_{2}He \rightarrow {}^{13}_{7}N+{}^{1}_{1}H$ (2) ${}^{23}_{11}Na+{}^{1}_{1}H \rightarrow {}^{20}_{10}Ne+{}^{4}_{2}He$ (3) ${}^{239}_{93}Np \rightarrow {}^{239}_{94}Pu+{}_{-1}B^{0}+\overline{\nu}$ (4) ${}^{11}_{7}Np+{}^{1}_{1}H \rightarrow {}^{12}_{6}C_{-1}B^{0}+\overline{\nu}$
- 112. Which of the following doesnot increase regularly?
 (1) Mass number (2) Atomic number (3) Packing fraction (4) Binding energy
- 113. In a mass spectrometer used for measuring the masses of ions, the ions are initially accelerated by an electrical potential V and then made to describe semicircular paths of radius R using a magnetic field B. If V and B are kept constant the ratio $\left(\frac{\text{charge of the ion}}{1000 \text{ cm}^2}\right)$ will be proportional to

$$($$
 mass of the ion $)$

(1)
$$\frac{1}{R^2}$$
 (2) R^2 (3) R (4) $\frac{1}{R}$

114. A 5 watt source emits monochromatic light of wavelength 5000°A. When placed 0.5m away. It liberates photoelectrons from a photosensitive metallic surface. When the source is moved to a distance of 10m, the number of photoelectrons liberate will be reduced by a factor of

(1) 8
(2) 16
(3) 2
(4) 4

115. A radioactive substance has half-life of four months three-fourth of substances will decay in

- 116. Which of the statements is not true
 - (1) The resistance of intrinsic semiconductor decreases with increase of temperature
 - (2) Doping pure Si with trivalent impurities give p-type semiconductor
 - (3) The majority charge carriers in *n*-type semiconductors are holes
 - (4) A *p*-*n* junction can act as a semiconductor diode
- 117. The transfer ratio β of a transistor is 50. The input resistance of the transistor when used in the common emitter configuration is 1 k Ω . The peak value of the collector a.c. current for an ac input voltage of 0.01 V peak is
 - (1) $100\mu A$ (2) $0.01 \mu A$ (3) $0.25 \mu A$ (4) $500 \mu A$
- 118. Given below are four logic gates symbols. NAND, NOR and OR are respectively



- 119. An AND gate
 - (1) Is equivalent to a parallel switching current
 - (2) Is equivalent to a series switching current
 - (3) Has two outputs and one input
 - (4) Has two outputs and two inputs
- 120. The VHF band ranges from (1) 30 to 300 MHz (2) 30 to 3000 MHz (3) 20 to 2000 MHz (4) 30 to 300 MHz

CHEMISTRY

121.	Which o (1) Aque (2) Aque (3) Aque (4) Aque	f the for eous so eous so eous so eous so	ollowin olutions olutions olutions olutions	ag is a cor s of $Cu^+ a$ s of $Cu^{+2} a$ s of Fe^{2+} is s of MnO^-	rect stateme nd Zn ⁺² are and Zn ⁺² are s green in c 4 is colourl	ent colourless e colourles olour ess	S SS			
122.	Match th Column A) H_2SC B) H_2S_2C C) H_2S_2C D) H_2S_2C	ne colu – I) ₅)8)7)6	mn I w	ith colum	in II	Colum 1) Dithi 2) Caro 3) Oleu 4) Mars 5) Poly	n – II ionic a 's acio m shall a thionio	icid 1 cid c acid		
	The corr	ect ma	tch is	D		Δ	R	С	D	
	(1) 2	4	3	1		(2) 4	D 2	3	5	
	(3) 2	4	5	1		(4) 3	2	1	5	
123.	In oxidiz (1) ZnO-	zing roa +ZnSC	asting o 0 ₄ +SO ₂	of ZnS, pr (2) Zr	roducts are	(3) ZnC	0+SO ₂		(4) Zn+SC) ₂
124.	The cont (1) d^4 (in (3) d^3 (in	figurati strong weak	ion for g field l as well	which the igand) as strong	e 'spin only g field ligan	' magnetic (2) d ⁴ (in d) (4) d ⁵ (in	c mon n weal n stror	nent of k field l ng field	2.84BM is ligand) ligand)	
125.	The lanth (1) Zr an (2) Zr an (3) Zr an (4) Zr an	hanoid Id Y ha Id Nb ł Id Hf h Id Zn h	contra ave abo nave sin ave ab nave the	ction is reput the sar milar oxic out the sa e same ox	esponsible f ne radius lation state me radius idation stat	for the fact	t that			
126.	Of the fo (1) Nitro (3) Dinit	ollowin ous Oxi trogen	ng, whi ide Trioxic	ch has thr le	ee electron	bond in it (2) Nitr (4) Nitr	s struc ic Oxi ogen l	cture? de Pentoxi	de	
127.	The order (1) Cl_2O	er of sta 0 > <i>ClC</i>	ability $D_2 > Cl_2$	of oxides $O_6 > Cl_2 C$	of Chlorine D ₇	e (2) Cl ₂ e	$O_7 > C$	$Cl_2O_6 >$	$ClO_2 > Cl_2O$)
	(3) Cl_2O	$P > Cl_2 Cl_2$	$O_6 > Cl$	$O_2 > Cl_2 C$	D_7	(4) Cl_2	$O_7 > C$	$ClO_2 > C$	$Cl_2O > Cl_2O_6$	
128.	Which o (1) Phys (2) Phys (3) Activ (4) Entha	f the fo ical ad ical ad vation o alpy ch	ollowin sorptio sorptio energy nange o	ng is not c n decreas n is multi of physic of physica	orrect es in the ind layered al adsorption l adsorption	creases in on is very n is about 2	tempe high 20KJ/1	erature mol		
129.	Relative	loweri	ing of v	apour pro	essure is ma	aximum fo	or			
120	(1) 0.1m	glucos	se	(2) 0.2m	glucose	(3) 0.3r	n gluc	ose	(4) equal i	n all cases
130.	Arrange	the fol	llowing	; compou	nds in ordei	of decrea	ising a	cidity	011	
]		OH o					OH	
	Cl			CH₃		NO_2			OCH ₃	
	Ι			II		III			IV	

(1) II>IV>I>III (2) I>II>II>IV (3) III>I>IV (4) IV>III>I>II

131.	$\begin{array}{c} C_{6}H_{5}CH_{3} & \underline{Cro_{2}Cl_{2}}/c\\ H_{3}O^{+}\\ The conversion of A\\ (1) Cannizaro reaction$	$\begin{array}{ccc} \underbrace{CS_2} & \xrightarrow{OH^{\Theta}} & (B) \\ \hline \text{to B is called as} \\ on(2) & \text{Aldol condensativ} \end{array}$	on	
	(3) Clemmenson red	uction	(4) Etard reaction	
132.	The rate expression f	for a reaction is $\frac{dx}{dt} = K$	$[A]^{\frac{1}{2}}[B]^{\frac{3}{2}}$, the overall	order of the reaction is
	(1) 2	(2) $\frac{1}{2}$	$(3) \frac{3}{2}$	(4) 1
133.	$C_2H_5Cl \xrightarrow{KoH(aq)} A$	$1 \xrightarrow{Na} B \xrightarrow{C_2H_5Cl} C$	Identify 'C' in the abo	ove reaction
	(1) C_2H_5ONa	(2) $C_2 H_5 OH$	$(3) \ C_2 H_5 - O - C_2 H_5$	(4) $C_4 H_{10}$
134.	$A + CH_3MgI \rightarrow Add$	lition product — H-OH	CH_3CH_2OH . What is	'A'?
	(1) CH_3CHO		(2) <i>HCHO</i>	
	$(3) CH_3 - CH_2 - CH$	0	$(4) CH_3 - CO - CH_3$	
135.	Tollen's reagent can The reagent mainly of	be obtained by mixing	aqueous $AgNo_3$ with	aqueous NH ₃ Solution.
	(1) $\left[Ag\left(NH_3\right)_2\right]^+$	(2) <i>AgOH</i>	(3) <i>Ag</i>	(4) <i>CH</i> ₃ <i>CHO</i>
136.	The amine that does (1) Isopropyl amine (3) Tertiary butyl am	not form hydrogen bor ine	nd is (2) Neopentyl amine (4) N. N – Dimethyl	amino ethane
	(c) for any compression		(.) 1., 1. 2	
137.	100ml of 0.15M HC resulting solution	<i>l</i> solution is mixed with	n 100ml of 0.005m HC	l, what is the P ^{n} of the
	(1) 2.5	(2) 1.5	(3) 2	(4) 1
138.	Electrode potential d $Fe^{3+}(aq) + e^{-} \rightarrow Fe^{2}$	ata are given below $(aq); E^{\circ} = +0.77V$		
	$Br_2(aq) + 2e^- \rightarrow Br^-$	(aq); E' = -1.66V		
	$Br_2(aq) + 2e^- \rightarrow Br^-$	(aq); E = +1.08V	· . /	
	(1) Fe^{2+} is stronger	reducing agent than Br	-	
	(2) Fe^{2+} is stronger	reducing agent than Al		
	(3) Al is stronger red	ucing agent than Fe^{2+}		
	(4) Br [–] 1s stronger re	ducing agent than Al		
139.	Which of the following semiconductor?	ng elements on doping	, with germanium, take	s it a P-type
	(1) As	(2) Ga	(3) Bi	(4) Sb
140.	On mixing ethylaceta solution is	ate with aqueous sodiu	m chloride, the compos	sition of the resultant
	(1) $CH_{3}COOC_{2}H_{5} +$	NaCl	(2) $CH_{3}Cl + C_{2}H_{5}CC$	DONa
	(3) $CH_3COCl + C_2H$	$T_5OH + NaOH$	(4) $CH_3COONa + C_2$	H ₅ OH
141.	In the Hofmanns me (1) Acetyl chloride (3) Diethyl oxalate	thod for separation of 1	 1°, 2°, and 3° amines, t (2) Benzenesulphony (4) Nitrous acid 	he reagent used is 1 chloride

142.	The vitamin, which p membrane is	lays a role in transport	ation, of amino acids a	cross the cell
	(1) B_1	(2) B ₂	$(3) B_3$	(4) B_6
143.	Which of the following	ng polymers are therm	oplastic?	
	(1) Teflon	(2) Natural rubber	(3) Neoprene	(4) Polystyrene
144.	Assertion(A): In Hyd energy is emitted.	rogen atom which elec	etron drops from 2P orb	bital to 2S-orbital then
	Reason(R): In Hydro (1) Both A and R true	gen atom all the orbita e and R is the correct e	ls of a given shell are d xplanation of A	legenerate
	(2) Bothe A and R are (3) A is true but R is	e true and R is not the false	(4) A is false but R is	A true
145.	Study the following s I) Crystal radius is ap II) Covalent radius ar III) Vanderwaal's rad	tatements plicable for metal atom nd vander waals radius lius <crystal radius<co<="" td=""><td>ns is applicable to non-m valent radius.</td><td>etals</td></crystal>	ns is applicable to non-m valent radius.	etals
	(1) I, II and III	(2) II, III and IV	(3) I, II, III and IV	(4) II and III only
146.	BF ₃ and NF ₃ are cova (1) Atomic size of bo (2) BF ₃ is planar but 1 (3) Boron is a metal v	alent but BF ₃ molecule ron is smaller than tha NF ₃ is pyramidal while nitrogen is a gas	is non polar while NF3 t of nitrogen	3 is polar because
	(4) B-F bonds have n	o dipole moment while	e N-F bonds have dipol	e moment
147.	'X' litres of carbon r volume of CO ₂ forme (1) 22.414	nonoxide is present at ed is 11.207 litres at ST (2) 11.207	STP, It is completely o TP. What is the value o (3) 5.6035	xidized to CO ₂ . The f 'X' in litres? (4) 44.828
148.	Volume of O ₂ gas lib solution is	erated at STP by the de	ecomposition of 15ml of	of 20 volumes H ₂ O ₂
	(1) 150ml	(2) 300ml	(3) 200ml	(4) 250ml
149.	The following statem (1) Alkali metals are (2) The alkaline earth (3) The alkalie metals (4) The first ionization	ent is correct less electropositive that metals are denser and s are denser and harder n potential of alkali m	n alkaline earth metals hard than alkalimetals than alkaline earth me etals	tals
150.	Assertion: Potash alu Reason: In alum, Al^{3} (1) Both A and R are (2) Bothe A and R are	m is used in the purific ⁺ ion under goes hydro true and R is the corre e true and R is not the	cation of water lysis to form acidic sol ct explanation of A correct explanation of A	ution A
	(3) A is true but K is	Ialse	(4) A is false but K is	true
151.	SiCl ₄ is easily hydrol (1) Bonding in SiCl ₄ (3) Silicon can extend (4) Silicon can form l	ysed but C <i>Cl</i> ₄ is not. T is ionic 1 is coordination numb 1ydrogen bonds but ca	This is because (2) Silicon is non-mether ber beyond four but carl rbon cannot	tallic bon cannot
152.	Which of the followin (1) 1,2 dichloro 1-per	ng does not shows geo ntene	metrical isomesism (2) 1, 3 deichloro 2-p	entene
153.	(3) 1, 1 dichloro 1-peThe reaction conditio(1) Zn, alcohol	ntene n used for converting (2) KoH,alcohol	(4) 1, 4 dichloro 2-per1, 2-dibromoethane to a(3) KoH, water	ntene ethylene are (4) Na, alcohol
154.	Minamata disease is a (1) Methyl mercury	due to	(2) Methyl isocyanide	es

(3) Methyl isocyanate (4) Methyl magnesium chloride

- 155. Two elements X & Y have following electronic configurations $X = 1S^2 2S^2 2P^6 3S^2 3P^6 4S^2$ $Y = 1S^2 2S^2 2P^6 3S^2 3P^5$ The expected compound formed by combination of X and Y is (1) XY₂ (2) X₅Y₂ (3) X₂Y₅ (4) XY₅
- 156. Consider the following

$$\begin{array}{c} & & \\ & & \\ & & \\ & & \\ & & \\ & & \\$$

- 157. The following proportional are quantized in Bohrs model of atom

 Angular momentum
 Energy difference between successive orbits
 Radial distance between successive orbits
 Kinetic energy of electron in the orbits
 The correct answer is

 1, 2 and 3
 2, 3 and 4
 2 and 4
- 158. Match the following:

Colum	n – I			Column – II					
A) Inter	rnal en	ergy		1) State function					
B) Enth	alpy			2) Depends on mass of system					
C) Char	nge int	ernal e	energy	3) Difference between heat content of products an					
				reactants					
D) Cha	Change in enthalpy 4) In a cyclic process is zero								
				5) Is zero at constant volume					
The cor	rect m	atch is							
Α	В	С	D	Α	В	С	D		
(1) 5	2	3	4	(2) 4	1	2	5		
(3) 2	1	4	3	(4) 3	2	5	1		

159. In XeF₄ molecule, Xenon Undergoes

(1) $Sp^{3}d$ hybridization in its second excited state

(2) Sp^3d^2 hybridization in its second excited state

(3) Sp^3d^3 hybridization in its third excited state

(4) Sp³d hybridization in its fourth excited state

160. 100cc of O_2 diffuse in 100 minutes. Under similar conditions one litre of hydrogen diffuse in _____ minutes (1) 250 (2) 200 (3) 300 (4) 350