KGCET - 2K25
KSRM COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
KLM COLLEGE OF ENGINEERING FOR WOMEN, KADAPA
FOR ENGINEERING ASPIRANTS

SET-1

MATHS

1. If $f:R\to R$ *such that* $f(x+y)-kxy=f(x)+2y^2\ \forall x,y\in R$ *and* $f(1)=2$, $f(2)=8$ then $f(20)-f(10)=$
   1)600 2)300 3) 60 4)200
2. The maximum possible domain and the corresponding range for $f(x)=(-1)^x$ are
   1) $D_f=R, R_f=[-1,1]$ 2) $D_f=Z, R_f=\{-1,1\}$ 3) $D_f=Z, R_f=[-1,1]$ 4) $D_f=R, R_f=\{-1,1\}$
3. Sum of the series $S=1+\frac{1}{2}(1+2)+\frac{1}{3}(1+2+3)+\frac{1}{4}(1+2+3+4)....$*up to* 20 terms is
   1) 110 2) 111 3) 115 4)116
4. If $D=\begin{vmatrix}1 & 1 & 1\\ 1 & 1+x & 1\\ 1 & 1 & 1+y\end{vmatrix}$ *for* $x\neq 0, y\neq 0$ *then D is*
   1)divisible by neither x nor y 2) divisible by both x and y
   3) divisible x but not y 4) divisible by y but not x
5. Let P and Q be 3x3 matrices with $P\neq Q$. *If* $P^3=Q^3$ and $P^2Q=Q^2P$, then determinate of P^2+Q^2 is
   1)0 2) -1 3) -2 4) 1
6. If the system of equations $x=cy+bz, y=az+cx, z=bx+ay$ has a non -zero solutions then $a^2+b^2+c^2+2abc$ is
   1)0 2) 1 3) 2 4) 5
7. If $A=\begin{bmatrix}1 & -1\\ 2 & -1\end{bmatrix}, B=\begin{bmatrix}x & 1\\ y & -1\end{bmatrix}$ *and* $(A+B)^2=A^2+B^2$ then (x,y) is
   1) (1,4) 2)(2,1) 3) (3,3) 4) (0,1)
8. If I is the centre of a circle inscribed in a triangle ABC, then $|\overline{BC}|\overline{IA}+|\overline{CA}|\overline{IB}+|\overline{AB}|\overline{IC}$ is
   1) $\bar{0}$ 2) $\overline{IA}+\overline{IB}+\overline{IC}$ 3) $\frac{\overline{IA}+\overline{IB}+\overline{IC}}{3}$ 4) None
9. If $\bar{i}+2\bar{j}+3\bar{k}, 3\bar{i}+2\bar{j}+\bar{k}$ are sides of a parallelogram, then a unit vector parallel to one of the diagonals of a parallelogram is
   1) $\frac{\bar{i}+\bar{j}+\bar{k}}{\sqrt{3}}$ 2) $\frac{\bar{i}-\bar{j}+\bar{k}}{\sqrt{3}}$ 3) $\frac{\bar{i}+\bar{j}-\bar{k}}{\sqrt{3}}$ 4) $\frac{-\bar{i}+\bar{j}+\bar{k}}{\sqrt{3}}$
10. The angle between the lines $\bar{r}=(2\bar{i}-3\bar{j}+\bar{k})+\lambda(\bar{i}+4\bar{j}+3\bar{k})$ *and* $\bar{r}=(\bar{i}-\bar{j}+2\bar{k})+\mu(\bar{i}+2\bar{j}-3\bar{k})$ is
    1) $\cos^{-1}\left(\frac{9}{\sqrt{91}}\right)$ 2) $\cos^{-1}\left(\frac{7}{\sqrt{84}}\right)$ 3) $\frac{\pi}{3}$ 4) $\frac{\pi}{2}$
11. The perpendicular distance from $A(1,4,-2)$ to the line BC, where $B(2,1,-2)$ and $C(0,-5,1)$ is
    1) $\frac{\sqrt{26}}{7}$ 2) $\sqrt{\frac{26}{7}}$ 3) $\frac{2\sqrt{26}}{7}$ 4) $\frac{3\sqrt{26}}{7}$

12. Let $\bar{a},\bar{b},and\ \bar{c}$ be non zero vectors such that $\left(\bar{a}\times\bar{b}\right)\times\bar{c}=\frac{1}{3}\left|\bar{b}\right|\left|\bar{c}\right|\bar{a}$. If θ is the acute angle between the vectors $\bar{b}\ and\ \bar{c}$, then $\sin\theta$ is

1) $\frac{1}{3}$ 2) $\frac{2\sqrt{2}}{3}$ 3)2/3 4) $\frac{\sqrt{2}}{3}$

13. $\bar{a}.\overline{a^1}+b.\overline{b^1}+c.\overline{c^1}$ is

1) 0 2)1 3)2 4)3

14. If $0<\alpha,\beta<\frac{\pi}{4},\cos(\alpha+\beta)=\frac{4}{5},\sin(\alpha-\beta)=\frac{5}{13},$ then $\tan 2\alpha$ is

1) $\frac{33}{56}$ 2) $\frac{56}{33}$ 3) $\frac{16}{63}$ 4) $\frac{63}{16}$

15. $\tan^6\frac{\pi}{9}-33\tan^4\frac{\pi}{9}+27\tan^2\frac{\pi}{9}$ is

1)Tan$\frac{\pi}{3}$ 2) $\tan^2\frac{\pi}{3}$ 3) $\tan\frac{\pi}{6}$ 4) $\tan^2\frac{\pi}{6}$

16. If y = $\sec^2\theta+\cos^2\theta,\theta\neq 0,$ then

1)y =0 2) $y\leq 2$ 3)$y\geq$ -2 4)y>2

17. $\cos 2x+a\sin x=2a-7$ has a solution if

1) $a=0$ 2) $1\leq a\leq 2$ 3) $2\leq a\leq 6$ 4) $6\leq a\leq 8$

18. If a,b,c are +ve then $\tan^{-1}\sqrt{\frac{a(a+b+c)}{bc}}+\tan^{-1}\sqrt{\frac{b(a+b+c)}{ca}}+\tan^{-1}\sqrt{\frac{c(a+b+c)}{ab}}$ is

1)0 2) π 3) $\pi/2$ 4) $\pi/4$

19. If in a $\Delta ABC, r_3=r_1+r_2+r, then\ \angle A+\angle B$ is

1) 120^0 2) 100^0 3) 90^0 4) 80^0

20. The angles of a triangle are in the ratio $3:5:10$. Then the ratio of the smallest side to the greatest side is

1) $1:\sin 10^0$ 2) $1:2\sin 10^0$ 3) $1:\cos 10^0$ 4) $1:2\cos 10^0$

21. $0(0,0), A(4,0), B(0,6)$ are three points. If P is a point such that area of ΔPOB is twice the area of ΔPOA, then the locus is

1) $4x^2-6y^2=0$ 2) $3x^2-4y^2=0$ 3) $9x^2-16y^2=0$ 4) $4x^2-9y^2=0$

22 A line L has intercepts a and b on the coordinates axes. Keeping the origin fixed, the axes are rotated through a fixed angle. Then the same line has intercepts p and q on the new axes, then

1) $a^2+p^2=b^2+q^2$ 2) $a^2+b^2=p^2+q^2$ 3) $\frac{1}{a^2}+\frac{1}{b^2}=\frac{1}{p^2}+\frac{1}{q^2}$ 4) $\frac{1}{a^2}+\frac{1}{p^2}=\frac{1}{b^2}+\frac{1}{q^2}$

23. If a line l passes through $(k,2k),(3k,3k)\ and\ (3,1), k\neq 0$, then the distance from the origin to the line l is

1) $\frac{4}{\sqrt{5}}$ 2) $\frac{3}{\sqrt{5}}$ 3) $\frac{2}{\sqrt{5}}$ 4) $\frac{1}{\sqrt{5}}$

24. If p and q are the perpendicular distances from the origin to the straight lines

$x\sec\theta - y\cos ec\theta = a$ *and* $x\cos\theta + y\sin\theta = a\cos 2\theta$ then

1) $4p^2+q^2=a^2$ 2) $p^2+q^2=a^2$ 3) $p^2+2q^2=a^2$ 4) $4p^2+q^2=2a^2$

25. The number of lines that are parallel to $2x+6y-7=0$ and have an intercept 10 between the coordinate axes is

1) 1 2) 2 3) 4 4) infinitely many

26. If two lines represented by the equation $ax^3+bx^2y+cxy^2+dy^3=0$ are at right angles then $a^2+d^2+ac+bd$ is

1)-1 2) 0 3) 1 4) $ab+cd$

27. The circumcentre of the triangle formed by the points $(1,2,3),(2,3,1),(3,1,2)$ is

1) $(2,2,2)$ 2) $(1,1,1)$ 3) $(2,-2,1)$ 4) $(-1,2,2)$

28. If the direction cosines of two lines are such that $l+m+n=0,\ l^2+m^2-n^2=0$ then angle between them is

1) $\frac{\pi}{2}$ 2) $\frac{\pi}{3}$ 3) $\frac{\pi}{4}$ 4) $\frac{\pi}{6}$

29. The projection of the join of the two points $(1,4,5)(6,7,2)$ on the line whose d.r's are $(4,5,6)$

1) $\frac{13}{\sqrt{77}}$ 2) 7/6 3)21 4) 7/9

30. $\underset{x\to 0}{Lt}\ \frac{\tan\left[e^2\right]x^2-\tan\left[-e^2\right]x^2}{\sin^2 x}$ is

1) 0 2) 8 3) 15 4) 20

31. If $f(x)=\frac{(a^x-1)^3}{\sin(x\log a)\log(1+x^2\log a^2)}$ is continuous at x=0 then f(0) is

1)log a 2) 2 log a 3) $\log a^{-1}$ 4) $\log\sqrt{a}$

32. If $f(x)=\frac{1}{x^2-17x+66}$ *then* $f\left(\frac{2}{x-2}\right)$ is discontinuous at x=

1) $2,\frac{7}{3},\frac{25}{11}$ 2) $2,\frac{8}{3},\frac{24}{11}$ 3) $2,\frac{7}{3},\frac{24}{11}$ 4) None

33. If g is inverse of a function f and $f^1(x)=\frac{1}{1+x^5}$, then $g^1(x)$ is equal to

1) $\frac{1}{1+(g(x))^5}$ 2) $1+(g(x))^5$ 3) $1+x^5$ 4) $5x^4$

34. If $\sqrt{1-x^6}+\sqrt{1-y^6}=a^3(x^3-y^3)$ *then* $\frac{dy}{dx}$ is

1) $\frac{x^2}{y^2}\sqrt{\frac{1-x^6}{1-y^6}}$ 2) $\frac{y^2}{x^2}\sqrt{\frac{1-y^6}{1-x^6}}$ 3) $\frac{x^2}{y^2}\sqrt{\frac{1-y^2}{1-x^2}}$ 4) $\frac{y^2}{x^2}\sqrt{\frac{1-x^6}{1-y^6}}$

35. If $x=\cos\theta+\theta\sin\theta, y=\sin\theta-\theta\cos\theta$ then $\frac{d^2y}{dx^2}$ is

1) $\frac{\cos ec^3\theta}{\theta}$ 2) $\frac{s ce^3\theta}{\theta}$ 3) $\frac{\text{Tan}^3\theta}{\theta}$ 4) $\frac{\cot^3\theta}{\theta}$

36. The area of the triangle formed by the normal to the curve $x = e^{\sin y}$ *at* $(1,0)$ with the coordinate axes is

1) $\frac{1}{4}$ 2) $\frac{1}{2}$ 3) $\frac{3}{4}$ 4) 1

37. Gas is being pumped into a spherical balloon at the rate of $30\,ft^3/\min$ .Then the rate at which the radius increases when it reaches the value of 15ft is

1) $\frac{1}{30\pi}\,ft/\min$ 2) $\frac{1}{15\pi}\,ft/\min$ 3) $\frac{1}{20}\,ft/\min$ 4) $\frac{1}{25}\,ft/\min$

38. The condition that $f(x) = ax^3 + bx^2 + cx + d$ has no extreme value is

1) $b^2 = 4ac$ 2) $b^2 = 3ac$ 3) $b^2 < 3ac$ 4) $b^2 > 3ac$

39. The constant c of Lagrange's theorem for $f(x) = \frac{x}{x-1}\,in[2,4]$ is

1) 1 2) $\sqrt{3}$ 3) $\sqrt{3}+1$ 4) $\sqrt{3}+2$

40. The maximum area of the rectangle that can be inscribed in a circle of radius r is

1) πr^2 2) r^2 3) $\frac{\pi r^2}{4}$ 4) $2r^2$

41. $\text{Tan}(i\log\left(\frac{a-ib}{a+ib}\right)$ is

1)ab 2) $\frac{2ab}{a^2-b^2}$ 3) $\frac{a^2-b^2}{2ab}$ 4) $\frac{2ab}{a^2+b^2}$

42. The maximum value of $|z|$ when z satisfies the condition $\left|z+\frac{2}{z}\right| = 2$ is

1) $\sqrt{3}-1$ 2) $\sqrt{3}$ 3) $\sqrt{3}+1$ 4) $\sqrt{2}+\sqrt{3}$

43. The value of $amp(i\omega) + amp(i\omega^2)$ is

1)0 2) $\frac{\pi}{2}$ 3) π 4) $-\pi$

44. If $x_n = \cos\left(\frac{\pi}{2^n}\right) + i\sin\left(\frac{\pi}{2^n}\right), then \prod_{n=1}^{\infty} x_n$ is

1) -1 2) 1 3) $\frac{1}{\sqrt{2}}$ 4) $\frac{i}{\sqrt{2}}$

45. If $x^2+bx+a=0, ax^2+x+b=0$ have a common root and the first equation has equal roots, then $2a^2+b$ is

1)0 2) 1 3) -1 4) 2

46. The range of $\frac{x^2-2x+9}{x^2+2x+9}(x \in R)$ is

1) $(-\infty,0]\cup[1,\infty)$ 2) $\left[\frac{1}{2},2\right]$ 3) $(-\infty,-2/9)\cup(1,\infty)$ 4) $(-\infty,-6]\cup[-2,\infty)$

47. If α, β, γ are the roots of the equation $2x^3 - 3x^2 + 5x - 7 = 0$ *then* $\sum \alpha^2\beta^2$ is

1) $-\frac{17}{4}$ 2) $\frac{17}{4}$ 3) $\frac{-13}{4}$ 4) $\frac{13}{4}$

48. The sum of two roots of the equation $x^4 - x^3 - 16x^2 + 4x + 48 = 0$ is zero. If $\alpha, \beta, \gamma, \delta$ are the roots of this equation, then $\alpha^4 + \beta^4 + \gamma^4 + \delta^4$ is

1) 123 2) 369 3) 132 4) 396

49. All the numbers that can be formed, using the digits 1,2,3,4,5 are arranged in the increasing order of magnitude, then the rank of 35241 is

1)70 2) 135 3) 275 4) 584

50. The number of positive integral solutions of abc = 30 is

1) 30 2) 27 3) 8 4) 10

51. The greatest number of points of intersection of 8 lines and 4 circles is

1) 64 2) 92 3)104 4) 128

52. The term independent of x in $\left(\frac{x+1}{x^{2/3} - x^{1/3} + 1} - \frac{x-1}{x - x^{1/2}}\right)^{10}$ is

1) 210 2) 310 3) 4 4) 120

53. If $\alpha = \frac{5}{2!3} + \frac{5.7}{3!3^2} + \frac{5.7.9}{4!3^3} + ... + \infty$, *then* $\alpha^2 + 4\alpha$ *is*

1) 21 2) 23 3) 25 4) 27

54. If $\frac{x^4}{(x^2+1)(x-2)} = f(x) + \frac{Ax+B}{x^2+1} + \frac{C}{x-2}$, then $f(14) + 2A - B =$

1) 5C 2) 4C 3) 6C 4) 7C

55. Mean of 100 items is 49. It was discovered that three items which should have been 60,70,80, were wrongly read as 40,20,50 respectively, then the correct mean is

1) 48 2) 82.5 3) 50 4) 80

56. AM= 44, Median = 42 then mode is

1) 39 2) 36 3) 38 4) 40

57. There are 20 cards.10 of these cards have the letter 'I' printed on them and the other 10 cards have the letter 'T' printed on them. If three cards are picked up at random and kept in the same order, the probability of making ward IIT is

1)4/27 2) 5/38 3) 1/8 4) 9/80

58. Mr. A is called for 3 interviews, there are 5 candidates at the first interview,4 at the second and 6 at the third. If the selection of each candidate is equally likely, then the probability that A will be selected for atleast one post is

1) 1/2 2) 1/3 3)1/4 4)1/9

59. A box contains 24 identical balls of which 12 are white and 12 black. The balls are drawn at random from the box one at a time with replacement. Then the probability that a white ball is drawn for the 4^{th} time on 7^{th} draw is

1) 5/64 2) 27/32 3) 5/32 4) 1/2

60. At a telephone enquiry system the number of phone calls regarding relevant enquiry follow Poission

distribution with an average of 5 phone calls during 10minute time intervals the probability that there is at most one phone call during a 10-minute time period is

1)6/55 2) $6/e^5$ 3) $6/e^{-5}$ 4) 5/6

61. The length of the diameter of the circle which touches the X-axis at the point (1,0) and passes through the point (2,3) is

1) 6/5 2) 5/3 3) 10/3 4) 3/5

62. Two tangents are drawn from the origin to a circle with centre at (2,-1). If the equation of one of the tangents is 3x+y=0, then the equation of the other tangent is

1) $3x-y=0$ 2) $x+3y=0$ 3) $x-3y=0$ 4) $x+2y=0$

63. A circle passes through the point (3,4) and cuts the circle $x^2+y^2=a^2$ orthogonally, the locus of its centre is a straight line. If the distance of this straight line from the origin is 25, then a^2 is

1) 250 2) 225 3) 100 4) 25

64. The number of common tangents to the circles $x^2+y^2-8x+2y=0$ *and* $x^2+y^2-2x-16y+25=0$ is

1) 1 2) 2 3) 3 4) 4

65. If the circle $x^2+y^2+4x-6y+c=0$ bisects the circumference of the circle $x^2+y^2-6x+4y-12=0$ then c is

1) 16 2) 24 3) -42 4) -62

66. A circle of radius 4, drawn on a chord of the parabola $y^2=8x$ as diameter, touches the axis of the parabola. Then, the slope of the chord is

1)1/2 2) 3/4 3) 1 4) 2

67. If the lines $2x+3y+12=0$ *and* $x-y+4k=0$ are conjugate with respect to the parabola $y^2=8x$, then the value of K is

1)-3 2) 3 3) 2 4)-2

68. If the line $2x+5y=12$ intersects the elipse $4x^2+5y^2=20$ in two distinct points A and B, then the midpoint of AB is

1) (0,1) 2) (1,2) 3) (1,0) 4) (2,1)

69. In an ellipse the distance between the foci is 6 and its minor axis is 8. Then its eccentricity is

1)4/5 2) $1/\sqrt{52}$ 3) 3/5 4) 1/2

70. The equation of the chord joining two points (x_1,y_1) and (x_1,y_2) on the rectangular hyperbola $xy=c^2$ is

1) $\frac{x}{x_1+x_2}+\frac{y}{y_1+y_2}=1$ 2) $\frac{x}{x_1-x_2}+\frac{y}{y_1-y_2}=1$ 3) $\frac{x}{y_1+y_2}+\frac{y}{x_1+x_2}=1$ 4) $\frac{x}{y_1-y_2}+\frac{y}{x_1-x_2}=1$

71. The integral $\int\left(1+x-\frac{1}{x}\right)e^{x+\frac{1}{x}}dx$ is

1) $(x+1)e^{x+\frac{1}{x}}+c$ 2) $-xe^{x+\frac{1}{x}}+c$ 3) $(x-1)e^{x+\frac{1}{x}}+c$ 4) $x\,e^{x+\frac{1}{x}}+c$

72. If the integral $\int\frac{5\tan x}{\tan x-2}dx=x+a\log\left|\sin x-2\cos x\right|+k$ then a is

1)1 2) 2 3) -1 4) -2

73. $\int\frac{\sin^8 x-\cos^8 x}{1-2\sin^2 x\cos^2 x}dx=$

1) $\frac{1}{2}\sin 2x$ 2) $\frac{-1}{2}\sin 2x$ 3) $\frac{1}{2}\sin^2 2x$ 4) $-\sin^2 x$

74. If $\int f(x)dx = \psi(x)$ then $\int x^5 f\left(x^3\right)dx =$

1) $\frac{1}{3}x^3\psi(x^3) - \int x^2\psi(x^3)dx + c$ 2) $\frac{1}{3}\left[x^3\psi(x^3) - \int x^3\psi(x^3)dx\right] + c$

3) $\frac{1}{3}\left[x^3\psi(x^3) - \int x^2\psi(x^3)dx\right] + c$ 4) $\frac{1}{3}x^3\psi(x^3) - 3\int x^3\psi(x^3)dx + c$

75. If $I_1 = \int_0^1 2x^2dx, I_2 = \int_0^1 2^{x^3}dx, I_3 = \int_1^2 2^{x^2}dx$ and $I_4 = \int_1^2 2^{x^3}dx$ then

1) $I_1 > I_2$ 2) $I_2 > I_1$ 3) $I_3 > I_4$ 4)None

76. $\int_0^2 x^2[x]dx =$

1) 5/3 2) 7/3 3) 8/3 4) 4/3

77. The area bounded by the curves $y = |x| - 1$ *and* $y = -|x| + 1$ is

1) 1 2) 2 33) $2\sqrt{2}$ 4) 4

78. The differential equation of the family of parabolas with vertex at $(0,-1)$ and having axis along the y-axis is

1) $xy^1 + y + 1 = 0$ 2) $xy^1 - 2y - 2 = 0$ 3) $xy^1 - y - 1 = 0$ 4) $yy^1 + 2xy + 1 = 0$

79. The solution of $\tan y\frac{dy}{dx} = \sin(x+y) + \sin(x-y)$ is

1) $\sec y = 2\cos x + c$ 2) $\sec y = -2\cos x + c$ 3) $\tan y = -2\cos x + c$ 4) $\sec^2 y = -2\cos x + c$

80. $x^2y - x^3\frac{dy}{dx} = y^4\cos x$ *then* $x^3y^{-3} =$

1) $\sin x$ 2) $2\sin x + c$ 3) $3\sin x + c$ 4) $3\cos x + c$

PHYSICS

81. $\mu = A + \frac{B}{\lambda_1} + \frac{C}{\lambda_2}$ is dimensionally correct. The dimensions of A, B and C respectively. Where μ ,A,B,C are constant, λ is wave length of wave

1) no dimensions l, l^2 2) l^2 ,no dimensions, l 3) l, l^2 ,no dimensions 4) l ,no dimensions, l^2

82. If $\vec{P} = \hat{i} + 2\hat{j} + 6\hat{k}$ its direction cosines are

1) $\frac{1}{41}, \frac{2}{41}$ *and* $\frac{6}{41}$ 2) $\frac{1}{\sqrt{41}}$ *and* $\frac{6}{\sqrt{41}}$ 3) $\frac{3}{\sqrt{41}}, \frac{8}{\sqrt{41}}$ *and* $\frac{7}{\sqrt{41}}$ 4) 1, 2 *and* 6

83. If $S_n = 2 + 0.4n$ find initial velocity and acceleration

1) 2.2 units 2) 0.4 units 3) 2.1 units 4) 0.3 units

84. A missile is fired for maximum range with an initial velocity of $20ms^{-1}$,the range of the missile is $(g = 10m/s^2)$

1) 50 m 2) 60 Cm 3) 20 m 4) 40 m

85. A 60kg man is inside a lift which is moving up with an acceleration of $2.45ms^{-2}$. The apparent percentage change in weight is
1) 20% 2) 25% 3) 50% 4) 75%

86. A force of 150N produces an acceleration of $2ms^{-2}$ in a body and a force of 200N produces an acceleration of $3ms^{-2}$. The mass of the body and the coefficient of kinetic friction are
1) $50kg:0.1$ 2) $25kg:0.1$ 3) $50kg:0.5$ 4) $50kg:0.2$

87. A body starts from rest and moves with uniform acceleration. The ratios of kinetic energies at the end of $1^{st}, 2^{nd}, 3^{rd}$ seconds of its journey is
1) 1:8:27 2) 1:2:3 3) 1:4:9 4) 3:2:1

88. A plastic ball falling from a height 4.9m rebounds number of times. If total time for second collision is 2.4S,then e=
1) 0.3 2) 0.4 3) 0.7 4) 0.6

89. A stationary wheel starts rotating about is own axis at uniform angular, acceleration $8rad/s^2$. The time taken by it to complete 77 rotations is
1) 5.5sec 2) 7sec 3) 11sec 4) 14 sec

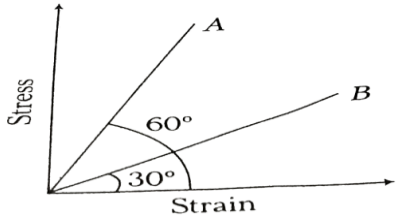
90. An electric motor exerts a constant torque 5Nm on a fly wheel, it is rotated at the rate of 4701 pm . The power of motor is
1) 110 watt 2) 150 watt 3) 220 watt 4) 300 watt

91. Intensity of gravitational field inside the hollow spherical shell is
1) Variable 2) minimum 3) maximum 4) zero

92. The displacement of a particle is SHM is $x = 3\sin(20\pi t) + 4\cos(20\pi t)cm$. Its amplitude of oscillation is
1) 3 cm 2) 4 cm 3) 5 cm 4) 25 cm

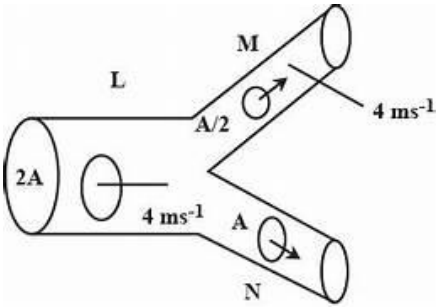
93. For a body is SHM the velocity is given by the relation $v = \sqrt{144 - 16x^2}ms^{-1}$.The maximum acceleration is
1) $12m/s^2$ 2) $16m/s^2$ 3) $36m/s^2$ 4) $48m/s^2$

94. The stress versus strain graphs for wires of two materials 'A' and B are as shown in the figure. If Y_A *and* Y_B are the young's moduli of the materials, then



1) $Y_8 = 2Y_A$ 2) $Y_A = Y_B$ 3) $Y_8 = 3Y_A$ 4) $Y_A = 3Y_B$

95. An incompressible liquid flows through a horizontal tube L,M,N as shown in the figure. Then the velocity 'V' of the liquid through the tube N is



1) $1ms^{-1}$ 2) $2ms^{-1}$ 3) $4.5ms^{-1}$ 4) $6ms^{-1}$

96. The viscos resistance of a tube to liquid flow is RR. Its resistance for a narrow tube of same length and 1/3 times radius is
1)R/3 2) 3R 3)27 R 4) 81 R

97. If two temperatures differ by 25 degree on Celsius scale, the difference of temperature on fahren heat scale is
1) 65^0 2) 45^0 3) 38^0 4) 25^0

98. Heat given to a system is 35 joules and work done by the system is 15 joules. The change in the internal energy of the system will be
1) $-50J$ 2) $20J$ 3) $30J$ 4) $50J$

99. The efficiency of a heat engine if the temperature of source 227^0c and that of sink is 27^0c nearly
1) 0.4 2) 0.5 3) 0.6 4) 0.7

100. The temperature at which the r.m.s speed of oxygen molecules equal to the r.m.s speed of carbon dioxide molecules at 23^0c
1) $+91.2^0c$ 2) -91.2^0c 3) 112.2^0c 4) -112.2^0c

101. When a string fixed at its two ends vibrates in 1 loop , 2 loops,3 loops and u loops, the frequencies are in the ratio
1) 1:3:5:7 2) 1:2:3:4 3) 1:5:9:13 4) 3:7:11:15

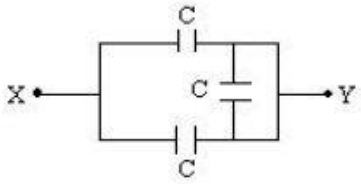
102. For a glass prision the angle of minimum deviation is equal to the angle of the prision. Then the angle of the prism is
1) 45^0 2) 30^0 3) 60^0 4) 90^0

103. The limit of resolution of micro scope, if the numerical aperture of microscope is 0.12 *and* the wavelength of light used is 600Nm is
1) $0.3\mu m$ 2) $1.2\mu m$ 3) $2.5\mu m$ 4) $3\mu m$

104. A proton of mass 'm' charge 'e' is released from rest in a uniform electric field of strength 'E'. The time taken by it to travel a distance 'd' in the field is
1) $\frac{\sqrt{2de}}{mE}$ 2) $\sqrt{\frac{2dm}{Ee}}$ 3) $\sqrt{\frac{2dE}{me}}$ 4) $\sqrt{\frac{2Ee}{dm}}$

105. A charge of 5 C is placed at the center of a spherical gaussian surface of radius 5 cm. The electric fill through the surface is $\frac{1}{E_0}$ times of
1) $0.1Nm^2/C^2$ 2) $0.5Nm^2/C^2$ 3) $1Nm^2/C^2$ 4) $5Nm^2/C^2$

106. The equivalent capacity between the points X and Y in the circuit with $C=1\mu F$

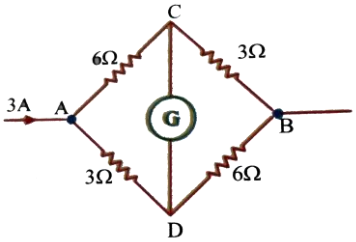


1) $2\mu F$ 2) $3\mu F$ 3) $1\mu F$ 4) $05\mu F$

107. The resistance of a wire is 2 Ω . If it is drawn in such a way that it experiences a longitudinal strain 200% Its new resistance is .

1) 4Ω 2) 8Ω 3) 16Ω 4) 18Ω

108. In the given circuit current through the galvanometer is



1)zero 2) flows from C to D 3) flow from D to C 4) in sufficient information

109. Two equal resistance are connected in the gaps of a meter bridge. If the resistance in the left gap is increased by 10%, the balancing point shift

1) 10% to right 2) 10% to left 3) 9.6% to right 4) 4.8% to right

110. The magnetic induction at distance of 0.1 m from a strong magnetic pole of strength 1200 Am is

1) $12\times10^{-3}T$ 2) $12\times10^{-4}T$ 3) $1.2\times10^{-3}T$ 4) $24\times10^{-3}T$

111. Two parallel conductors A and B separated by 5 cm any electric current of 6A and 2A in the same direction. The point between A and B where the field is zero at

1)0.25 cm from B 2) 1cm from B 3) 1.25cm from B 4) 3.75 cm from B

112. A cyclotron in which protons are accelerated has a flux density of 1.57T. The variation of frequency of electric field is (in Hz)

1) 4.8×10^{8} 2) 8.4×10^{8} 3) 2.5×10^{7} 4) 4.8×10^{6}

113. The peak voltage of 220volt AC mains(in volt) is

1) 155.6 2) 220.0 3) 311 4) 440.0

114. The de-Broglie wavelength of an electron and the wavelength of a photon are same. The ratio between the energy of the photon and the momentum of the electron is

1) h 2) C 3) $1/h$ 4) $1/C$

115. Find the frequency of revolution of the electron in the first stationary orbit of H- atom

1) $6\times10^{14}\,Hz$ 2) $6.6\times10^{10}\,Hz$ 3) $6.6\times10^{-10}\,Hz$ 4) $6.6\times10^{15}\,Hz$

116. If a source of power 14KW produces 10^{20} photons 1 second, the radiation belong to a part of the Spectrum called

1) X-rays 2) ultraviolet rays 3) Microwaves 4) r-rays

117. Energy released as mass of 2amu is converted into energy is

1) $1.5\times10^{-10}\,J$ 2) $3\times10^{-10}\,J$ 3) $1863J$ 4) $931.5MeV$

118. The current gain of a common emitter amplifier is 69. If the emitter current is 7.0 mA, collector current Is

1) 0.69mA 2) 6.9mA 3) 69mA 4) 9.6mA

119. In the boolean algebra, the following one which is not equal to A is

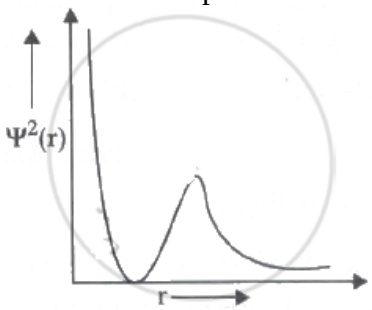
1) A.A 2) $A+A$ 3) $\overline{A}.A$ 4) $\overline{A}+\overline{A}$

120. In an amplitude modulated wave for audio frequency of 500 cycle /second, the appropriate carrier frequency will be

1) 50cycles/second 2) 100cycles/second 3) 500cycles/second 4) 50000cycles/second

CHEMISTRY

121. The graph between variation of probability density $\psi^2(r)$ and distance of the electron from the nucleus, r is shown below. This represents



1)1s-orbital 2)2s-orbital 3)3s-orbital 4)4s-orbital

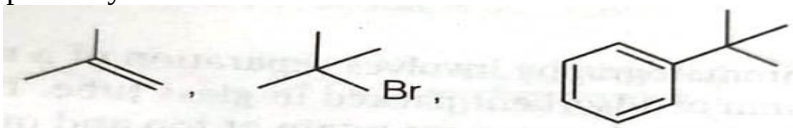
122. For the redox reaction $MnO_4^- + C_2O_4^{2-} + H^+ \rightarrow Mn^{2+} + CO_2 + H_2O$, the correct coefficient of the reactants for the balanced reaction are respectively

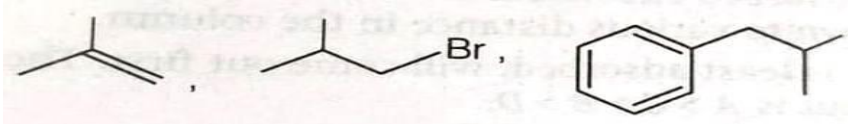
1) 2 , 5 ,16 2) 16, 3 ,12 3) 15,16,12 4) 2,16,5

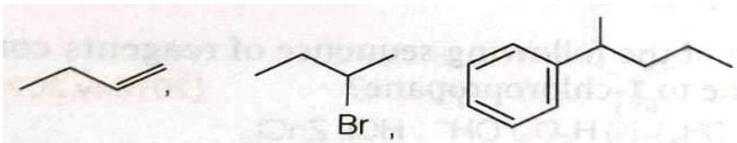
123. If the bond order in c_2 is 'x' then bond order in B_2 and O_2 ,respectively are

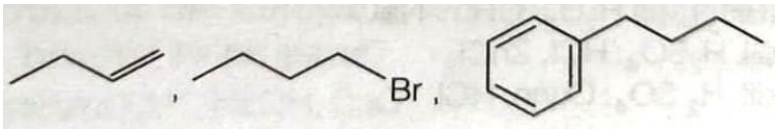
1) $\frac{1}{2}x, 2x$ 2) x, x 3) $\frac{1}{2}x, x$ 4) $x, 2x$

124. An alkene $X(C_4H_6)$ on reaction with HBr gave $Y(C_4H_9Br)$. Reaction of Y with benzene in the presence of anhydrous gave Z which is resistant to oxidation with $KMnO_4KOH$ .What are X,Y,Z respectively?

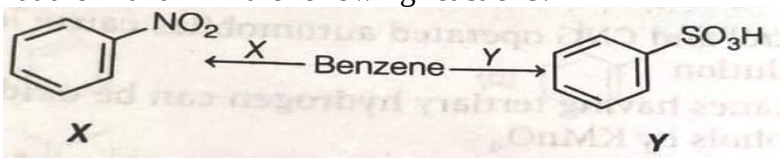
1) 

2) 

3) 

4) 

125. What are X and Y in the following reactions?

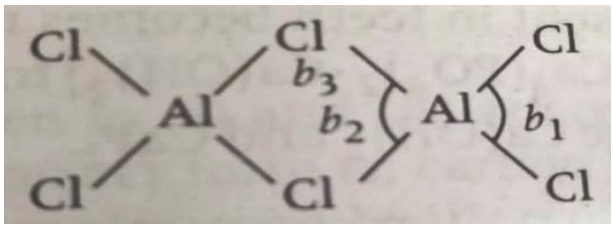


1) $Conc.HNO_3$ $H_2SO_4(SO_3)$

2) $Conc.HNO_3 + Conc.H_2SO_4 / 333\,K$ $H_2SO_4(SO_3)$

3) $NaNO_2 / HCl$ H_2SO_4 4) $Dil.HNO_3$ SO_3

126. The bond angles b_1, b_2 *and* b_3 given structure are respectively(in ^{0})



1) 79,101,118 2) 118,101,79 3)79,118,101 4) 118,79,101

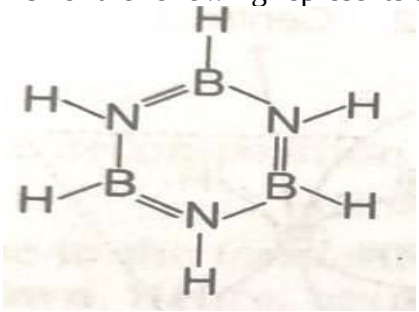
127. Match the following

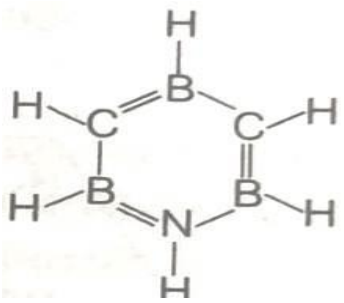
LIST I	LIST II
A Carbon black	I. Electrodes in batteries
B Graphite	II. Extraction of metals
C. Diamond	III. Abrasive
D. Activated charcoal	IV. Filler in automobile tyres
	V. Air conditioning system

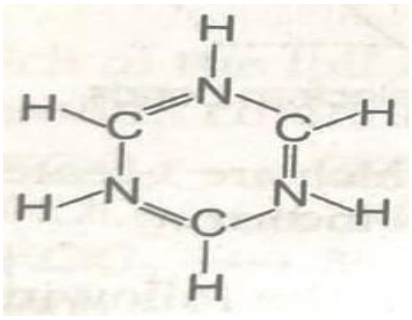
1) $A-IV, B-III, C-II, D-V$ 2) $A-III, B-I, C-II, D-IV$

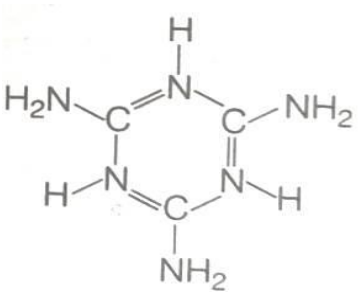
3) $A-V, B-I, C-III, D-II$ 4) $A-IV, B-I, C-III, D-V$

128. Which of the following represents the structure of inorganic benzene?

1) 

2) 

3) 

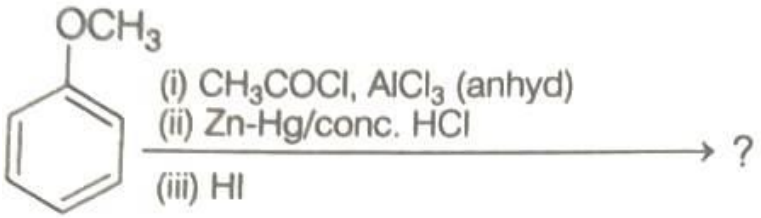
4) 

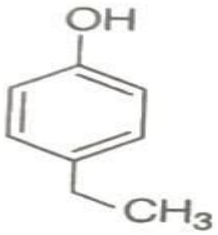
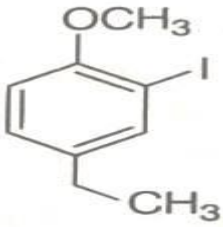
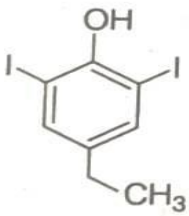
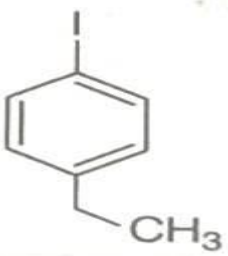
129. $2Cu_2O(s)+Cu_2S(s)\rightarrow 6Cu(s)+SO_2(g)$ the oxidant and reductant respectively in the above reaction are

1)Oxide of Cu_2O and sulphide of Cu_2S 2) Sulphide of Cu_2S and oxide of Cu_2O

3) Cu(l) of Cu_2O, Cu_2S and sulphide of Cu_2S 4)Cu(l) of Cu_2S ,Cu(l) of Cu_2O

130. The Major product of the following reaction sequence is



1)  2)  3)  4) 

131. Which of the following sets of reagents convert toluene to benzaldehyde?

A) $Cl_2\,|\,hv;H_2O,\Delta$ B) $KMnO_4\,|\,OH^-;H^+$ C) $Cl_2\,|\,Fe;H_2O$ D) $CrO_2Cl_2\,|\,CS_2;H_3O^+$

1)B,C,D 2) A,C 3) A,D 4) B,D

132. Under which of the following conditions E value of the cell, for the cell reaction given is maximum ?

$$Zn(s)+Cu^{2+}(aq)\square\quad Cu(s)+Zn^{2+}(aq)\left(\begin{array}{c}\dfrac{2.303rt}{F}\ at\ 298K=0.059V,\\ E^0_{Zn^{2+}/Zn}=-0.76V,E^0_{Cu^{2+}/Cu}=+0.34V\end{array}\right)$$

1) $C_1=0.1M,C_2=0.01M$ 2) $C_1=0.01M,C_2=0.1M$

3) $C_1=0.1M,C_2=0.2M$ 4) $C_1=0.2M,C_2=0.1M$

133. The validity of freundilich isotherm can be verified by plotting

1) $\log\frac{x}{m}$ on y-axis and log p on x-axis 2) $\frac{x}{m}$ on y-axis and log p on x-axis

3) $\log\frac{x}{m}$ on x-axis and log p on y-axis 4) $\frac{x}{m}$ on x-axis and log p on y-axis

134. In f-block elements ------- orbitals are progressively filled by the electrons
1) $3l$ *and* $4l$ 2) $4l$ *and* $5l$ 3) $5l$ *and* $6l$ 4) $6l$ *and* $7l$

135. Match the following based on valence bond theory

	Hybridisation		**Geometry**		**Complex structure**
A	sp^3	**i.**	**Square planar**	**p.**	$[Fe(CN)_6]^{3-}$
B	d^2sp^3	**ii.**	**Tetrahedral**	**q.**	$(ZnCl_4)^{2-}$
C	dsp^2	**iii**	**Octahedral**	**r.**	$[(Ni(NH_3)_4]^{2+}$
				s.	$[Ag(CN)_2]^-$

1) $(A-ii-q),(B-iii-p),(C-i-r)$ 2) $(A-ii-q),(B-iii-r),(C-i-s)$
3) $(A-i-q),(B-iii-p),(C-ii-r)$ 4) $(A-ii-r),(B-iii-s),(C-i-q)$

136. At T(K) the equilibrium constant for the reaction $aA(g)$ $bB(g)$ *is* K_c. If the reaction takes place in the following form $2aA(g)$ $2bB(g)$, its equilibrium constant is K^1_c. The correct relation ship between K_c *and* K^1_c is
1) $K^1_c=(K_c)^2$ 2) $K^1_c=(K_c)^{1/2}$ 3) $K^1_c=(K_c)^{-1}$ 4) $K^1_c=K_c$

137. The crystal structure of an element has fcc lattice. If the edge length of the crystal is $4\overset{0}{A}$. What is the atomic weight of the element. If the density of the crystal is $11.21 g\,cm^3$ ($N_A=6.023\times10^{23}mol^{-1}$)
1)63.5 2) 85.5 3)108.0 4)197.0

138. In water, which of the following gases has the highest Henry's law constant at 293K?
1) N_2 2) O_2 3) He 4) H_2

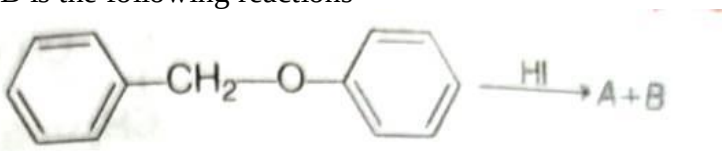
139. For a first order reaction the concentration of reactant was reduced from $0.03molL^{-1}$ *to* $0.02molL^{-1}$ in 25min. What is the rate((*in* $molL^{-1}$)?
1) 6.667×10^{-6} 2) 4×10^{-4} 3) 6.667×10^{-4} 4) 4×10^{-6}

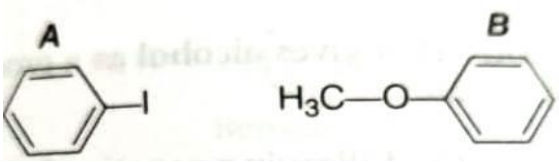
140. Compounds A and B react according to the equation $2A(g)+B(g)\rightarrow 2C(g)+D(g)$. The initial rate of formation was determined at different initial concentrations of A and B. The following results were obtained. The rate law for this reaction may be -------

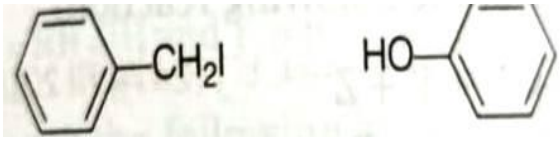
Exp. No	Initial(A)	Initial(B)	Initial rate of formation of C
1	0.1	0.1	6×10^{-3}
2	0.3	0.2	7.2×10^{-2}
3	0.3	0.4	2.88×10^{-1}
4	0.4	0.1	2.4×10^{-2}

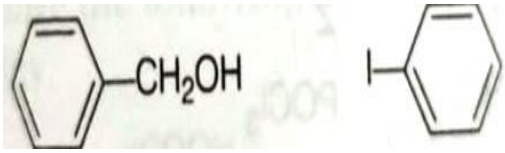
1) $Rate=k[A]^2[B]$ 2) $Rate=k[A]\,[B]^2$ 3) $Rate=k[A]\,[B]$ 4) $Rate=k[A]^2[B]^0$

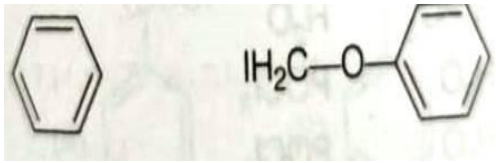
141. Identify A and B is the following reactions



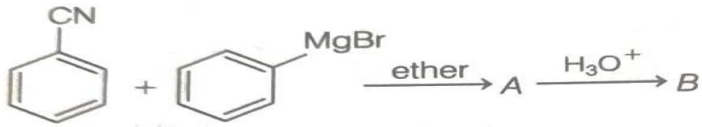
1) 

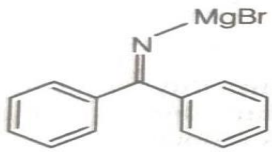
2) 

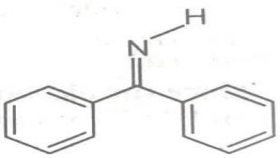
3) 

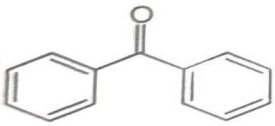
4) 

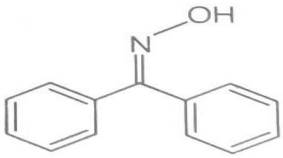
142. Identify B in the given reaction sequence



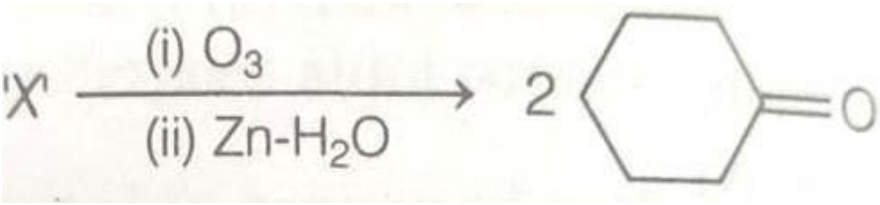
1) 

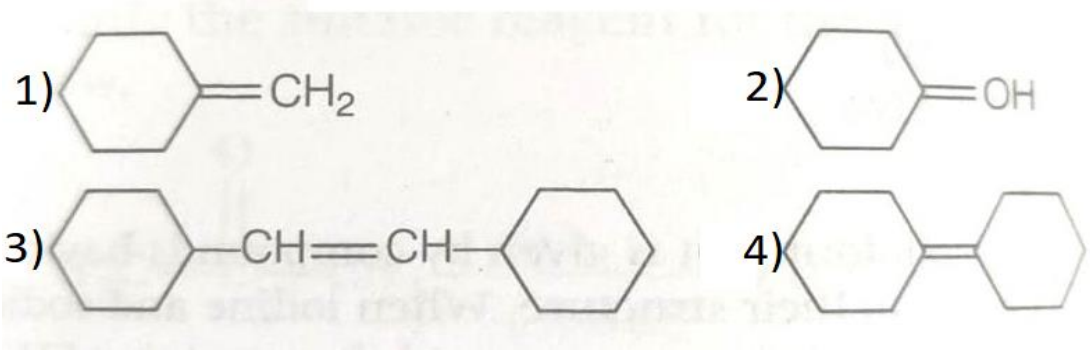
2) 

3) 

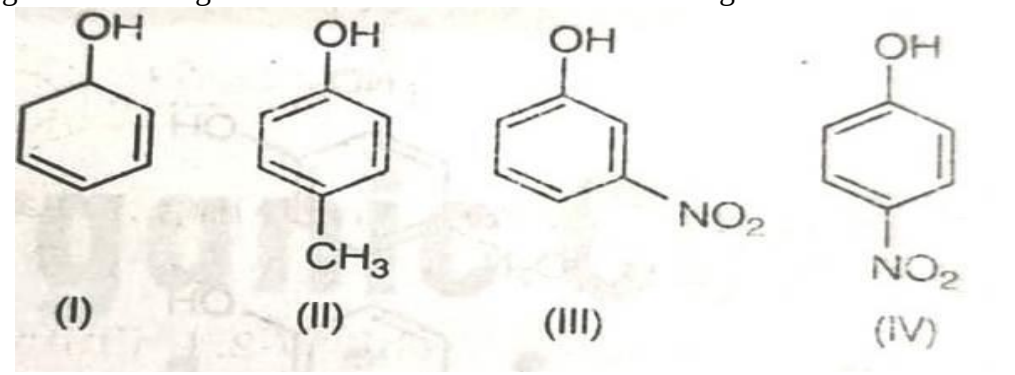
4) 

143. Identify 'X' in the following reaction





144. Arrange the following in the correct order of their acidic strength



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

145. Which of the following polymer is biodegradable?

1)Nylon-6,6 2)Nylon-2-nylon-6 3) Mealamine polymer 4)Nylon-6

146. Which of the following structure of proteins represents its constitution?

1)Secondary structure 2)Quatermary structure 3)Primary structure 4)Tertiary structure

147. Match the following

List-I	List-II
A. Beri-Beri	I. Riboflavin
B. Scurvy	II. Thiamine
C. Cheilosis	III. Pyridoxine
D. Rickets	IV. Ascorbic acid
	V. Vitamin D

The correct answer is

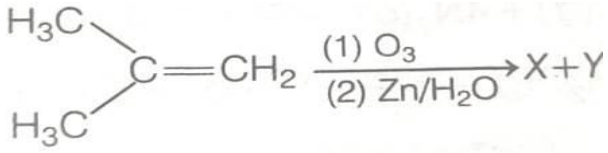
1) $A-III, B-IV, C-III, D-V$ 2) $A-II, B-IV, C-I, D-V$

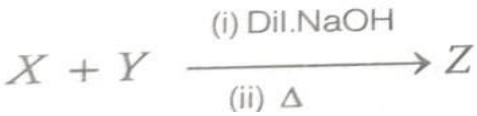
3) $A-III, B-V, C-I, D-II$ 4) $A-III, B-V, C-IV, D-II$

148. The mass % of carbon in $C_{57}H_{110}O_6$ is

1)57.96 2) 62.35 3) 73.45 4) 76.85

149. Consider the reactions





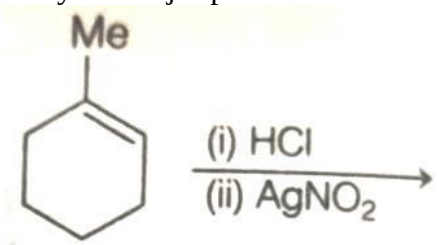
The IUPAC name of Z is

1)But-1-en-3-one 2)4-hydroxybutan-2-one 3)But-3-en-2-one 4)1-hydroxybutan-3-one

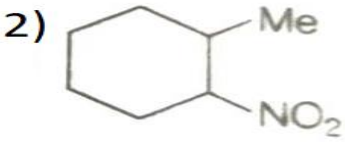
150. In Kolbe's electrolysis of sodium propanoate, products formed at anode and cathode are respectively

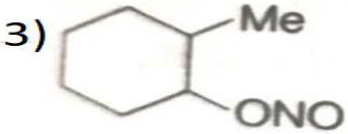
1) C_2H_6, H_2 2) C_3H_8, H_2 3) C_4H_{10}, H_2 4) H_2, C_4H_{10}

151. Identify the major product formed from the following reaction



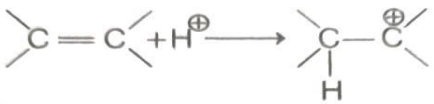
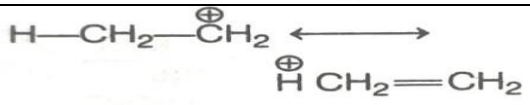
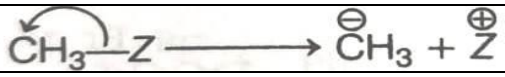
1) 

2) 

3) 

4) 

152. Match the following

	List I		List II
A	Resonance	i.	
B	Inductive effect	ii.	
C	Electromeric effect	iii.	C_6H_6
D	Hyperconjugation	iv.	
		v)	$CH_3-CH_2-CH_2Cl$

The correct answer is

	A	B	C	D
1)	II	I	IV	III
2)	III	V	I	II
3)	I	III	II	IV

153. The spin only magnetic moments of the complexes $[Mn(CN)_6]^{3-}$ and $[Co(C_2O_4)_3]^{3-}$ are respectively
1)2.84 ,0 BM 2) 0,0 BM 3) 0 , 1.2 BM 4) 1, 2 BM

154. The products formed when borax dissolves in water is/are
1) $NaOH, H_3BO_3$ 2) $Na_2[B_4O_5(OH)_4]$ 3) NaH, B_2O_3 4) $B_2H_6, NaOH$

155. Which statement about noble gases is not correct?
1) 'Xe' forms XeF_6 under suitable conditions 2)'Ar' is used in electric bulbs
3)The number of lone pair of electrons present on Xe in XeF_2 is 3
4) 'He' has the highest boiling point among all the noble gases

156. Which one of the following methods is used to prepare carbon monoxide on commercial scale?
1)Dehydration of formic acid with conc. H_2SO_4
2) Direct oxidation of C in limited supply of oxygen
3) Passing steam over hot cake
4) Heating lime stone

157. Match the following

List-I((process)	List_II(catalyst)
A. Ostwald's process	I. No
B. Lead chamber process	II. Fe
C. Deacon's Process	III. Rh
D.Haber's process	IV. $CuCl_2$

1) $A-IV, B-I, C-II, D-III$ 2) $A-II, B-III, C-IV, D-I$
3) $A-III, B-I, C-IV, D-II$ 4) $A-III, B-IV, C-I, D-II$

158. The O-H bond length in H_2O in gas phase is
1) 95.7 pm 2) 90.2 pm 3) 104.5pm 4) 115.5 pm

159. The set of amphoteric oxides among $ZnO, TIO_3, In_2O_3, B_2O_3, PbO, SnO_2$ is
1) ZnO, TIO_3, PbO 2) ZnO, SnO_2, PbO 3) ZnO, In_2O_3, SnO_2 4) ZnO, In_2O_3, PbO

160. $A \rightarrow$ products, is a first order reaction. The time required to decompose A to half its initial amount is 60 minutes. The rate constant of the reaction is
1) 1.05×10^{-2} 2) 1.15×10^{-2} 3) 1.25×10^{-4} 4) 1.92×10^{-4}

KGCET - 2K25

KSRM COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
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FOR ENGINEERING ASPIRANTS

KEY SHEET

MATHS									
01	02	03	04	05	06	07	08	09	10
1	**2**	**3**	**2**	**1**	**2**	**1**	**1**	**1**	**4**
11	12	13	14	15	16	17	18	19	20
4	**2**	**4**	**2**	**2**	**4**	**3**	**2**	**3**	**4**
21	22	23	24	25	26	27	28	29	30
3	**3**	**4**	**1**	**2**	**2**	**1**	**2**	**1**	**3**
31	32	33	34	35	36	37	38	39	40
4	**3**	**2**	**3**	**2**	**2**	**1**	**3**	**3**	**4**
41	**42**	**43**	**44**	**45**	**46**	**47**	**48**	**49**	**50**
2	3	3	1	1	2	1	2	3	2
51	**52**	**53**	**54**	**55**	**56**	**57**	**58**	**59**	**60**
3	1	2	1	3	3	2	1	3	2
61	**62**	**63**	**64**	**65**	**66**	**67**	**68**	**69**	**70**
3	3	2	2	4	3	1	2	3	1
71	**72**	**73**	**74**	**75**	**76**	**77**	**78**	**79**	**80**
4	2	2	1	1	2	2	2	2	3
PHYSICS									
81	**82**	**83.**	**84**	**85**	**86**	**87**	**88**	**89**	**90**
4	**2**	**1**	**4**	**2**	**1**	**3**	**3**	**3**	**3**	**3**
91	**92**	**93**	**94**	**95**	**96**	**97**	**98**	**99**	**100**
4	**3**	**4**	**4**	**4**	**4**	**4**	**2**	**1**	**2**
101	**102**	**103**	**104**	**105**	**106**	**107**	**108**	**109**	**110**
2	**3**	**4**	**2**	**4**	**1**	**4**	**3**	**4**	**1**
111	**112**	**113**	**114**	**115**	**116**	**117**	**118**	**119**	**120**
3	**3**	**3**	**2**	**4**	**1**	**2**	**2**	**3**	**4**
CHEMISTRY									
121	122	123	124	125	126	127	128	129	130
2	**1**	**3**	**1**	**2**	**4**	**4**	**1**	**3**	**1**
131	132	133	134	135	136	137	138	139	140

4	**1**	**1**	**2**	**1**	**1**	**3**	**3**	**1**	**2**
141	**142**	**143**	**144**	**145**	**146**	**147**	**148**	**149**	**150**
2	**3**	**4**	**2**	**2**	**33**	**2**	**4**	**3**	**3**
151	**152**	**153**	**154**	**155**	**156**	**157**	**158**	**159**	**160**
1	**2**	**2**	**1**	**4**	**3**	**3**	**1**	**2**	**4**

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SET-2

MATHEMATICS

1. If $f:R\to R$ satisfies $f(x+y)=f(x)+f(y)\forall x,y\in R$ and $f(1)=7$ then $\sum_{r=1}^{n} f(r)$ is

1) $\frac{7(n+1)}{2}$ 2) $\frac{7n(n+1)}{2}$ 3) $\frac{7n}{2}$ 4) $7n(n+1)$

2. Let $f(x)=2^{10}.x+1$ and $g(x)=3^{10}.x-1$ if $(fog)(x)=x$ then x is equal to

1) $\frac{3^{10}-1}{3^{10}-2^{-10}}$ 2) $\frac{2^{10}-1}{2^{10}-3^{-10}}$ 3) $\frac{1-3^{-10}}{2^{10}-3^{-10}}$ 4) $\frac{1-2^{-10}}{3^{10}-2^{-10}}$

3. If $f(x)=4^x-2^{x+1}+5$ then the range of f is

1) $[4,\infty)$ 2) $(4,\infty)$ 3) $(5,\infty)$ 4) R

4. If $A=\begin{bmatrix}-2 & 1\\ 3 & 4\end{bmatrix}$ and $A=P+Q$, where P is symmentric matrix and Q is skew symmentric matrix, then Q is

1) $\begin{bmatrix}0 & -2\\ 2 & 0\end{bmatrix}$ 2) $\begin{bmatrix}0 & 2\\ -2 & 0\end{bmatrix}$ 3) $\begin{bmatrix}0 & -1\\ 1 & 0\end{bmatrix}$ 4) $\begin{bmatrix}0 & 1\\ -1 & 0\end{bmatrix}$

5. If a,b,c are nonzero complex number satisfying $a^2+b^2+c^2=0$ and $\begin{vmatrix}b^2+c^2 & ab & ac\\ ab & c^2+a^2 & bc\\ ac & bc & a^2+b^2\end{vmatrix}=K.a^2b^2c^2$, then K is equal to

1) 1 2) 2 3) 3 4) 4

6. If a,b,c are nonzero real numbers and if the system of equation $(a-1)x=y+z,(b-1)y=z+x,(c-1)z=x+y$ has a nontrivial solution, then $ab+bc+ca$ equal

1) $a+b+c$ 2) abc 3) 1 4) -1

7. $\frac{(1+i)^{2016}}{(1-i)^{2014}}=$

1) $-2i$ 2) $2i$ 3) 2 4) -2

8. If z is a complex number such that $|z+4|\geq 3$, then the smallest value of $|z+3|$ is

1) 3 2) 1 3) 2 4) 0

9. If $1,\omega,\omega^2$ are the cube roots of unity, then $\frac{1}{1+2\omega}+\frac{1}{2+\omega}-\frac{1}{1+\omega}=$

1) 1 2) ω 3) ω^2 4) 0

10. If $x_n=\cos\left(\frac{\pi}{2^n}\right)+i\sin\left(\frac{\pi}{2^n}\right)$ then $x_1.x_2.x_3.....\infty=$

1) 1 2) 2 3) -1 4) -2

11. If α and β are roots of the equation $x^2+px+\frac{3P}{4}=0$ such that $|\alpha-\beta|=\sqrt{10}$ then P belongs to the set

1) $\{-2,5\}$ 2) $\{2,-5\}$ 3) $\{-3,2\}$ 4) $\{3,-5\}$

12. If $ax^2+bx+c=0$ and $bx^2+cx+a=0$ have a common root and $abc\neq 0$ then $\frac{a^3+b^3+c^3}{abc}=$

1) 1 2) 2 3) 3 4) 4

13. If the roots of the equation $x^3+3px^2+3qx-8=0$ are in geometric progression, then $\frac{q^3}{p^3}=$

1) 1 2) -2 3) 4 4) -8

14. If $f(x)=2x^4-13x^2+ax+b$ is divisible by x^2-3x+2 then $(a,b)=$

1) $(2,9)$ 2) $(9,2)$ 3) $(-9,-2)$ 4) $(6,4)$

15. If ${}^nC_4$, ${}^nC_5$ and ${}^nC_6$ are in arthematic progression then n can be.

1) 9 2) 12 3) 11 4) 14

16. A village has 10 players. A team of 6 players is to be formed. 5 members are chosen first out of these 10 players and then captain is chosen from the remaining players. Then the total number of ways choosing such team is

1) 1260 2) 210 3) $10c_6.5!$ 4) $10c_6.6$

17. The total number of irrational terms in the binomial expansions of $\left(7^{\frac{1}{5}}-3^{\frac{1}{10}}\right)^{60}$ is

1) 48 2) 55 3) 49 4) 54

18. The coefficient of x^4 in the expansion of $\left(1-x+x^2-x^3\right)^4$ is

1) 31 2) 30 3) 25 4) -14

19. If $\frac{x^2+5x+7}{(x-3)^2}=\frac{A}{x-3}+\frac{B}{(x-3)^2}+\frac{C}{(x-3)^3}$ then the equation of the line having slope A and passing through the point (B,C) is

1) $x+y-20=0$ 2) $x-y+20=0$ 3) $x+y+20=0$ 4) $x-y-20=0$

20. Let $f_k(x)=\frac{1}{K}\left(\sin^k x+\cos^k x\right)$ where $x\in R$ and $K\geq 1$. Then $f_4(x)-f_6(x)$ equals.

1) $\frac{1}{3}$ 2) $\frac{1}{4}$ 3) $\frac{1}{6}$ 4) $\frac{1}{12}$

21. $\cot\theta-\tan\theta-2\tan\theta-4\tan 4\theta=$

1) $4\cot 8\theta-\tan 6\theta$ 2) $\cot 8\theta+\tan 3\theta$ 3) $\cot 8\theta+\tan 6\theta$ 4) $8\cot 8\theta$

22. If $f(x)=\sin^2\left(\frac{\pi}{8}+\frac{x}{2}\right)-\sin^2\left(\frac{\pi}{8}-\frac{x}{2}\right)$ then the period of f is

1) 2π 2) $\frac{\pi}{2}$ 3) $\frac{\pi}{3}$ 4) π

23. If the general solution of $\sin x+3.\sin 3x+\sin 5x=0$ is $x=y$ then the set of all values of $\cos y$ is

1) $\left\{-1,\frac{-\sqrt{3}}{2},\frac{\sqrt{3}}{2},1\right\}$ 2) $\left\{\frac{-\sqrt{3}}{2},0,1,\frac{\sqrt{3}}{2}\right\}$ 3) $\left\{-1,-\frac{1}{2},\frac{1}{2},1\right\}$ 4) $\left\{-1,\frac{1}{2},1\right\}$

24. A value of 'x' for which $\sin\left(\cot^{-1}(1+x)\right)=\cos\left(\tan^{-1}x\right)$, is

1) $-\frac{1}{2}$ 2) $\frac{1}{2}$ 3) 1 4) 0

25. If $\cosh^{-1}x=2.\log_e\left(\sqrt{2}+1\right)$, then $x=$

1) 1 2) 2 3) 3 4) 4

26. In ΔABC if $\frac{2.\cos A}{a}+\frac{\cos B}{b}+\frac{2\cos C}{c}=\frac{a}{bc}+\frac{b}{ca}$. Then $\angle A=$

1) 30^0 2) 45^0 3) 60^0 4) 90^0

27. In ΔABC if $r_1=2r_2=3r_3$ then $a:b:c$

1) 3 : 4 : 5 2) 5 : 3: 4 3) 5 : 4 : 3 4) 3 : 5 : 4

28. In ΔABC, $r.r_1 =$

1) $s(s-a)$ 2) $(s-b)(s-c)$ 3) $(s-a)(s-b)$ 4) $(s-c)(s-a)$

29. ABCDEF is a regular hexagon whose centre is O. Then. $\overline{AB}+\overline{AC}+\overline{AD}+\overline{AE}+\overline{AF}$ is

1) $2\overline{AO}$ 2) $3\overline{AO}$ 3) $5\overline{AO}$ 4) $6\overline{AO}$

30. If the vector $\bar{a}=2\bar{i}+3\bar{j}+6\bar{k}$ and $\bar{b}$ are collinear and $|\bar{b}|=21$, then $\bar{b}=$

1) $\pm\left(2\bar{i}+3\bar{j}+6\bar{k}\right)$ 2) $\pm3\left(2\bar{i}+3\bar{j}+6\bar{k}\right)$ 3) $\bar{i}+\bar{j}+\bar{k}$ 4) $\pm2\left(2\bar{i}+3\bar{j}+6\bar{k}\right)$

31. If $\bar{a},\bar{b},\bar{c}$ are vectors such that $\bar{a}+\bar{b}+\bar{c}=0, |\bar{a}|=1, |\bar{b}|=2, |\bar{c}|=3$ then $\bar{a}.\bar{b}+\bar{b}.\bar{c}+\bar{c}.\bar{a}=$

1) -7 2) 0 3) 7 4) 1

32. If $\bar{a}=2\bar{i}+3\bar{j}-5\bar{k}$, $\bar{b}=m\bar{i}+n\bar{j}+12\bar{k}$ and $\bar{a}\times\bar{b}=0$, then $(m,n)=$

1) $\left(\frac{-24}{5},\frac{-36}{5}\right)$ 2) $\left(\frac{-24}{5},\frac{36}{5}\right)$ 3) $\left(\frac{24}{5},\frac{-36}{5}\right)$ 4) $\left(\frac{24}{5},\frac{36}{5}\right)$

33. the minimum volume of the parallelopiped formed by the vectors $\bar{i}+a\bar{j}+\bar{k},\bar{j}+a\bar{k}$ and $a\bar{i}+\bar{k}$ is

1) $\frac{1}{3\sqrt{3}}$ 2) $\frac{1}{\sqrt{3}}$ 3) $\frac{3\sqrt{3}-2}{3\sqrt{3}}$ 4) $\frac{3\sqrt{3}+2}{3\sqrt{3}}$

34. If the variance of 1, 2, 3, …….10 is $\frac{99}{12}$ then the standard deviation of 3, 6, 9, 12…….30 is.

1) $\frac{297}{4}$ 2) $\frac{3}{2}\sqrt{33}$ 3) $\frac{3}{2}\sqrt{99}$ 4) $\frac{3\sqrt{3}}{2}$

35. If the average of the first n number in the sequence 148, 146, 144, …….. is 125, then $n=$

1) 24 2) 30 3) 36 4) 18

36. A coin is tossed 3 times. The probability of getting head and tail alternately.

1) $\frac{1}{6}$ 2) $\frac{1}{8}$ 3) $\frac{1}{4}$ 4) $\frac{1}{3}$

37. Four person can hit a target correctly with probabilities is $\frac{1}{2},\frac{1}{3},\frac{1}{4}$ and $\frac{1}{8}$ respectively. If all hit at the target independently, then the probability that the target would be hit is

1) $\frac{25}{32}$ 2) $\frac{25}{192}$ 3) $\frac{1}{10}$ 4) $\frac{1}{11}$

38. A and B are two events such that $P(A)=0.58\,P(B)=0.32$ and $P(A\cap B)=0.28$. Then the probability that neither A nor B occurs. is

1) 0.9 2) 0.38 3) 0.62 4) 0.72

39. If the probability function of a random variable X is given by $P(X=K)=\frac{3^{ck}}{K!}$ for $K=1,2,3,.....$(Where c is a constant), then $c=$

1) $\frac{1}{2}\log_3\left(\log_e^2\right)$ 2) $\frac{1}{2}\log_2\left(\log_e^3\right)$ 3) $\log_3\left(\log_e^2\right)$ 4) $\frac{1}{2}\log_2\left(\log_e^3\right)$

40. If X is a Poisson variate and $P(X=1)=2P(X=2)$ then $P(X=3)=$

1) $\frac{e^{-1}}{6}$ 2) $\frac{e^{-2}}{2}$ 3) $\frac{e^{-1}}{2}$ 4) $\frac{e^{-1}}{3}$

MATHEMATICS-B

41. The locus of a point which is collinear with the points $(3,4)$ and $(-4,3)$ is

1) $2x+3y-12=0$ 2) $2x+3y+12=0$ 3) $2x+3y-20=0$ 4) $x-7y+25=0$

42. The origin is shifted to $(1,2)$. The equation $y^2-8x-4y+12=0$ changes to $y^2=4ax$ then $a=$

1) 1 2) 2 3) -2 4) -1

43. A line L cuts the sides AB, BC of ΔABC in the ratio 2:5, 7: 4 respectively, then the line L cuts CA In the ratio

1) 7 : 10 2) 7 : -10 3) 10 : 7 4) 10 : -7

44. If α, β are the angles made by the normal is drawn from the origin to the lines $x+y+\sqrt{2}=0$ and $x-\sqrt{3}y-2=0$ with the positive direction of the x-axis respectively measured in anticlockwise direction, then $\alpha+\beta=$

1) $-\frac{13\pi}{12}$ 2) $\frac{29\pi}{12}$ 3) $-\frac{11\pi}{12}$ 4) $\frac{35\pi}{12}$

45. If the angle between the lines represented by $2x^2+5xy+3y^2+6x+7y+4=0$ is $\tan^{-1}(m)$ and $a^2+b^2-ab-a-b+1\le 0$ then $2a+3b=$

1) $\frac{1}{m}$ 2) m 3) $-m$ 4) m^2

46. The equation of the pair of straight lines through the point $(1,1)$ and perpendicular to the pair of straight lines $3x^2-8xy+5y^2=0$ is

1) $5x^2+8xy+3y^2-14x-18y+16=0$ 2) $5x^2+8xy+3y^2-18x-14y+16=0$
3) $5x^2-8xy+3y^2-18x-14y+32=0$ 4) $5x^2-8xy+3y^2-14x-18y+32=0$

47. The harmonic conjugate of $(2,3,4)$ w.r.t the points $(3,-2,2)(6,-17,-4)$ is

1) $\left(\frac{1}{2},\frac{1}{3},\frac{1}{4}\right)$ 2) $\left(\frac{18}{5},-5,\frac{4}{5}\right)$ 3) $\left(-\frac{18}{5},\frac{5}{4},\frac{4}{5}\right)$ 4) $\left(\frac{18}{5},-5,-\frac{4}{5}\right)$

48. If a line makes angles $\alpha,\beta,\gamma,\delta$ with the four diagonals of a cube, then the value of $\sin^2\alpha+\sin^2\beta+\sin^2\gamma+\sin^2\delta=$

1) $\frac{4}{3}$ 2) $\frac{8}{3}$ 3) $\frac{7}{3}$ 4) $\frac{5}{3}$

49. The volume of the tetrahedron included between the planes $3x+4y-5z-60=0$ and the coordinate planes is

1) 60 2) 600 3) 720 4) None

50. If $\underset{x\to\infty}{Lt}\left(\frac{x+h}{x-h}\right)^x=4$ then $h=$

1) $\log_e 2$ 2) $\log_{10} 2$ 3) $\log_2 e$ 4) $\log_2 10$

51. If $[x]$ denotes the greater integer function then $\underset{x\to 0}{Lt}\frac{\sin[\cos x]}{1+[\cos x]}=$

1) 0 2) 1 3) -1 4) does not exist

52. If $f(x)=\frac{7|x|+5x}{7|x|-5x}$, $x\neq 0, f(0)=6$ at $x=0$ then

1) continuous 2) discontinuous 3) not determined 4) none

53. If $y=\log_{10}x+\log_e x+\log_{10}10$ then $\left(\frac{dy}{dx}\right)_{x=10}=$

1) $\frac{1}{10}\log_7^{(10e)}$ 2) $\frac{1}{10}\log_{10}^{(10e)}$ 3) $\frac{1}{10}\log_{12}^{(11e)}$ 4) $-\frac{1}{10}\log_9^{(10e)}$

54. If $\sqrt{1-x^6}+\sqrt{1-y^6}=a(x^3-y^3)$ and $\frac{dy}{dx}=f(x,y)\sqrt{\frac{1-y^6}{1-x^6}}$ then $f(x,y)=$

1) $\frac{y}{x}$ 2) $\frac{x}{y}$ 3) $\frac{y^2}{x^2}$ 4) $\frac{x^2}{y^2}$

55. Let f and g be two differentiable functions satisfying $g(3)=7$, $g(3)=21$ and $g=f^{-1}$ $f'(21)=$

1) $\frac{1}{3}$ 2) $\frac{1}{21}$ 3) 147 4) $\frac{1}{7}$

56. the relation between pressure P and volume V is given by $PV^{\frac{1}{4}} = \text{constant}$. If the percentage decrease in volume is $\frac{1}{2}$, then the percentage increases in pressure is

1) $-\frac{1}{8}$ 2) $\frac{1}{16}$ 3) $\frac{1}{8}$ 4) $\frac{1}{2}$

57. the angle between the curves $y = e^{-x}$ and $y = e^{x}$ is

1) $\frac{\pi}{6}$ 2) $\frac{\pi}{4}$ 3) $\frac{\pi}{3}$ 4) $\frac{\pi}{2}$

58. A particle moves on a line by $S = at^2 + bt + c$. If the displacement after 1sec is 16cm, the velocity after 2sec in 24cm/sec and the acceleration is 8cm/sec^2 then (a, b, c)=

1) (4,8,4) 2) (4,4,8) 3) (8,4,4) 4) (8,8,4)

59. If l, m, n are the direction cosines of a ray thus the maximum value of lmn is

1) $\frac{1}{8}$ 2) $\frac{1}{2\sqrt{2}}$ 3) 1 4) $\frac{1}{3\sqrt{3}}$

60. Equation of the circle concentric with $x^2 + y^2 - 8x - 16y + 4 = 0$ and touches y-axis is

1) $x^2 + y^2 - 8x - 16y + 16 = 0$ 2) $x^2 + y^2 - 8x - 16y + 32 = 0$

3) $x^2 + y^2 - 8x - 16y + 64 = 0$ 4) $2x^2 + 2y^2 = 5$

61. If $(6, 8)(k, 2)$ are inverse points w.r.t the circle $x^2 + y^2 = 25$ then $2k =$

1) 1 2) 3 3) 5 4) 7

62. If $4l^2 - 5m^2 + 6l + 1 = 0$ and the line $lx + my + 1 = 0$ touches a fixed circle then the radius and centre of a circle

1) $\sqrt{5}, (3,0)$ 2) $\sqrt{5}, (-3,0)$ 3) $\sqrt{3}, (0,3)$ 4) $\sqrt{3}, (0,-3)$

63. Given $A = (0,6), B = (4,0), C = (-3,0), D = (0,-2)$ are concyclic points. The orthocenter of ΔABC is

1) $(2,0)$ 2) $(0,-2)$ 3) $(0,2)$ 4) $(2,2)$

64. For all real values of k, the polar of the point $(2k, k-4)$ w.r.t $x^2 + y^2 - 4x - 6y + 1 = 0$ passes through the point

1) $(1, 1)$ 2) $(1, -1)$ 3) $(-3, 1)$ 4) $(3, 1)$

65. If the line $x - y + k = 0$ is a normal to $y^2 = 4ax$ then the value of k is

1) 4a 2) -a 3) -5a 4) -3a

66. An equilateral triangle is inscribed in the parabola $y^2 = 4ax$ with one vertex as origin. Then length of each side is

1) $8\sqrt{3}a$ 2) $6\sqrt{3}a$ 3) $4\sqrt{3}a$ 4) $2\sqrt{3}a$

67. If the two normal to $y^2 = 8x$ at $(2,4)$ and $at(18, 12)$ intersect at $P(x_1, y_1)$ then the foot of the third normal is

1) (32, 16) 2) (32, -16) 3) (-16, 32) 4) (2, 4)

68. The latus rectum subtends a right angle at the centre of the ellipse then its eccentricity is

1) $2\sin 18^0$ 2) $2\cos 18^0$ 3) $2\sin 54^0$ 4) $2\cos 54^0$

69. The foci of the ellipse $\frac{x^2}{16} + \frac{y^2}{b^2} = 1$ and the hyperbola $\frac{x^2}{144} - \frac{y^2}{81} = \frac{1}{25}$ coincide. Then the value of b^2 is

1) 5 2) 7 3) 9 4) 1

70. $\int \frac{x + \sin x}{1 + \cos x} dx$

1) $x\tan\frac{x}{2} + c$ 2) $x\cot\frac{x}{2} + c$ 3) $x\sin\frac{x}{2} + c$ 4) $x\cos\frac{x}{2} + c$

71. If $\int \frac{1}{x^2 - 13x + 42} dx = \log\left|\frac{x-a}{x-b}\right| + c$ then $a + b =$

1) 13 2) 1 3) -13 4) -1

72. The displacement function s(t) of a particle moving with velocity $v(t)=u+at$ along a straight line assuming that s(O) = 0 is

1) $ut+\frac{1}{2}at^2$ 2) $ut+\frac{1}{2}at^2+c$ 3) Constant 4) $ut-\frac{1}{2}at^2$

73. $\int\frac{\cos^3 x+\cos^5 x}{\sin^2 x+\sin^4 x}dx=A\sin x+B\cos\sec x+C\tan^{-1}(\sin x)+k$ then $A+B-C$

1) -7 2) 5 3) 7 4) 9

74. $\int e^{-x}\tan^{-1}(e^x)dx=f(x)-\frac{1}{2}\log(1+e^{2x})+c\Rightarrow f(x)$

1) $e^x-e^{-x}\tan^{-1}(e^x)$ 2) $x^2+e^{-x}\tan^{-1}(e^x)$ 3) $-e^{-x}\tan^{-1}(e^x)$ 4) $x-e^{-x}\tan^{-1}(e^x)$

75. $\int_0^{\frac{\pi}{2}}\frac{200\sin x+100\cos x}{\sin x+\cos x}dx$

1) 50π 2) 25π 3) 75π 4) 150π

76. By the definition of the definite integral, the value of

$$\underset{n\to\infty}{Lt}\left[\frac{1}{\sqrt{n^2-1}}+\frac{1}{\sqrt{n^2-2^2}}+.....+\frac{1}{\sqrt{n^2-(n-1)^2}}\right]$$

1) π 2) $\frac{\pi}{2}$ 3) $\frac{\pi}{4}$ 4) $\frac{\pi}{6}$

77. The area of the region bounded by the curves $y=9x^2$ and $y=5x^2+4$ is

1) 64 2) $\frac{64}{3}$ 3) $\frac{32}{3}$ 4) $\frac{16}{3}$

78. The differential equation of the family of curves $r^2=a^2\cos 2\theta$, where a is arbitrary constant

1) $\frac{dr}{d\theta}=r\tan 2\theta$ 2) $\frac{dr}{d\theta}=r\cot 2\theta$ 3) $\frac{dr}{d\theta}\cos 2\theta+r\sin 2\theta=0$ 4) $\frac{dr}{d\theta}=0$

79. The solution of $x\sqrt{1+y^2}dx+y\sqrt{1+x^2}dy=0$

1) $\sinh^{-1}x+\sinh^{-1}y=c$ 2) $\sqrt{1+x^2}+\sqrt{1+y^2}=c$

3) $(1+x^2)(1+y^2)=c$ 4) $\sqrt{\frac{1+x^2}{1+y^2}}=c$

80. The solution of $\frac{dy}{dx}+y\tan x=\cos^2 x$

1) $y\sec^2 x=c+\sin x$ 2) $y=\sec x=c+\cos x$

3) $y\sec^2 x=c+\cos x$ 4) $y\sec x=c+\sin x$

PHYSICS

81. N divisions on the main scale of a vernier calipers coincide with (N+1) division of the vernier scale. If each division of main scale is a units, then the least count of the calipers is

1) $\frac{a}{N}$ 2) a 3) $\frac{a}{N+1}$ 4) $\frac{Na}{N+1}$

82. The component of vector $P=3\hat{i}+4\hat{j}$ a log the direction $\left(\hat{i}+2\hat{j}\right)$ is

1) $\frac{8}{\sqrt{5}}$ 2) $\frac{11}{\sqrt{5}}$ 3) $\frac{11}{2}$ 4) $\sqrt{10}$

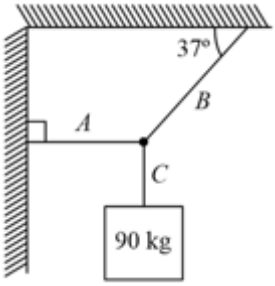
83. The velocity of particle is given by $v=2t^2-8t+15ms^{-1}$. Find its instantaneous acceleration at t=5s

1) $18ms^{-2}$ 2) $20ms^{-2}$ 3) $5ms^{-2}$ 4) $12ms^{-2}$

84. A projectile is launched from the ground such that it hits a target on the ground which is 90m away. The minimum velocity of projectile to hit the target is (acceleration due to gravity $=10ms^{-2}$)

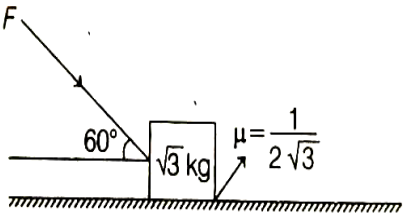
1) $10ms^{-1}$ 2) $16ms^{-1}$ 3) $60ms^{-1}$ 4) $30ms^{-1}$

85. A block of mass 90kg is suspended by three strings A,B and C as shown in figure. Tensions in the strings A,B and C respectively are ($g = 10ms^{-2}, \sin 37^{0} = 0.6, \cos 37^{0} = 0.8$)



1)400N,500N and 300N 2)500N,300N and 900N
3) 300N,600N and 900N 4)1200N,1500N and 900N

86. The maximum value of the applied force F such that the block as shown in the arrangement does not move is(acceleration due to gravity , $g = 10ms^{-2}$)



1) 20 N 2) 15 N 3) 25 N 4) 10 N

87. When the mass and speed of the body are doubled, the kinetic energy of the body
1)becomes double 2) becomes four times 3) becomes eight times 4) remains unchanged

88. A bullet of mass m and velocity v when fired at a sand bag of mass M, suspended by a string gets embedded into the bag. The loss of kinetic energy in this process is

1) $\frac{mv^2}{2}$ 2) $\frac{mv^2}{2(M+m)}$ 3) $\frac{Mv^2}{2}$ 4) $\frac{mMv^2}{2(M+m)}$

89. The moment of inertia of a thin rod of mass M and length L about an axis passing through a point at a distance $\frac{L}{4}$ from its centre and perpendicular to its length is

1) $\frac{ML^3}{48}$ 2) $\frac{ML^2}{48}$ 3) $\frac{ML^2}{12}$ 4) $\frac{7ML^2}{48}$

90. A solid cylinder of radius R is at rest at a height h on an inclined plane. If it rolls down then its velocity on reaching the ground is

1) $\sqrt{\frac{5gh}{3}}$ 2) $\sqrt{\frac{2h}{3g}}$ 3) $\sqrt{\frac{2gh}{3}}$ 4) $\sqrt{\frac{4gh}{3}}$

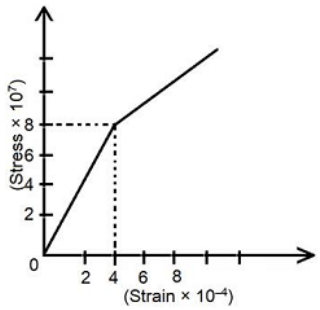
91. A simple harmonic oscillation is represented by $x = A\cos\left(wt + \frac{\pi}{4}\right)$. Its speed is maximum when t equals

1) $\frac{\pi}{2\omega}$ 2) $\frac{\pi}{4\omega}$ 3) $\frac{\pi}{\omega}$ 4) $\frac{2\pi}{\omega}$

92. An object is thrown directly away from the surface of the earth with an initial speed v. The object reaches up to a height of $\frac{4}{5}R_E$ from earth's surface, where R_E is radius of the earth. If the escape velocity of the object is v_E then the value of $\frac{v}{v_E}$ is

1) 4/3 2) 3/4 3) 2/3 4) 4/5

93. Find the young's modulus of the wire whose stress-strain curve is as shown in the following figure



1) $8\times10^{11}\,Nm^{-2}$ 2) $24\times10^{11}\,Nm^{-2}$ 3) $10\times10^{11}\,Nm^{-2}$ 4) $2\times10^{11}\,Nm^{-2}$

94. Statement (A): When the temperature increase the viscosity of gases increases and the viscosity of liquids decreases
Statement (B) : Water does not wet an oily glass because cohesive force of oil is less than that of water
Statement (C): A liquid will wet a surface of a solid. If the angle of contact is greater than 90^0
1) A, B, and C are false 2) A, and B false C is true
3) B, and C false A is true 4) A, and C false B is true

95. The lower end of a capillary tube is dipped into water and it is observed that the water in capillary tube raise by 7.5 cm. Find the radius of the capillary tube used, if surface tension of water is $7.5\times10^{-2}\,Nm^{-1}$. Angle of contact between water and glass is 0^0 and acceleration due to gravity is $10ms^{-2}$
1)0.2 cm 2) 0.1 cm 3)0.4mm 4) 0.2mmTwo blocks of ice

96. when pressed together join to form one block because
1) of heat produced during pressing
2)of cold produced during pressing
3) melting point of ice decreases with increase of pressure
4) melting point of ice increases with increase of pressure

97. Steam at 100^0C is passed into 1 Kg of water contained in a calorimeter at 9^0C till the temperature of water and calorimeter is increased to 90^0C. The mass of the steam condensed is nearly
1)81g 2) 162g 3) 243g 4) 486 g

98. A monoatomic gas $\left(\gamma=\frac{5}{3}\right)$ at a pressure of 4 atm is compressed adiabatically so that its temperature pressure of the gas in its final state is
1) $2^{\frac{5}{3}}atm$ 2) $2^{\frac{10}{3}}atm$ 3) $2^{\frac{5}{2}}atm$ 4) $2^{\frac{9}{2}}atm$

99. A carnot engine whose heat sink is at 27^0C has an efficiency of 40% By how much should its source temperature be changed, so as to increase its efficiency to 60%?
1) 250K 2) 100K 3) 500K 4) 350 K

100. For a molecule of an ideal gas, the number density is $2\sqrt{2}\times10^{8}cm^{-3}$ and the mean free path is $\frac{10^{-2}}{\pi}$ cm. The diameter of the gas molecule is
1) $5\times10^{-4}cm$ 2) $0.5\times10^{-4}cm$ 3) $2.5\times10^{-4}cm$ 4) $4\times10^{-4}cm$

101. A string of length 1m and mass 490 g is put under a tension of 25 N, a wave of frequency 120 Hz is sent along it. The speed of this wave is
1) $7.14ms^{-1}$ 2) $0.71ms^{-1}$ 3) $0.51ms^{-1}$ 4) $51.0ms^{-1}$

102. Assertion (A): The focal length of lens does not change when red light is replaced by blue light.
Reason (R): The focal length of lens does non depend on colour of light used
1) both are true and R is a correct explanation for A
2) both are true and R is a correct explanation for A
3) A is true, R is false
4) both are false

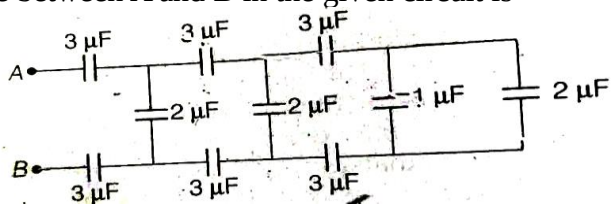
103. In a compound microscope, the focal lengths of two lenses are 1.5cm and 6.25 cm. An object is placed at 2cm from the objective and the final image is formed at 25 cm from the eye lens. The distance between the two lenses is -------(in cm)
1)6 2) 7.75 3) 9.25 4) 11

104. Young's double slit experiment is conducted with monochromatic light of wavelength 5000 $\overset{0}{A}$,with slit separation of 3 mm and observer at 20 cm away from the slits. If a 1 mm transparent plate is placed Infront of one of the slits, the fringes shift by 6mm. The refractive index of the transparent plate is
1) 1.08 2) 1.09 3) 1.1 4) 1.2

105. Two charges $+80\mu C \; and \; +20\mu C$ are separated by a distance in air . An unknown third charge q is placed at the centre of the line joining the two charges. If the charges are in equilibrium then q
1) $-20\mu C$ 2) $+20\mu C$ 3) $-10\mu C$ 4) $-4\mu C$

106. When a charge of 20C is taken from one point to another separated by a distance of 0.2m,work of 2 J is required to be done. What is the potential difference between the two points ?
1) $2\times10^{-2}V$ 2) $4\times10^{-4}V$ 3) 8 V 4) 0.1 V

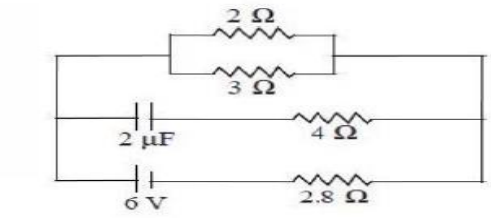
107. The equivalent capacitance between A and B in the given circuit is



1) $3\mu F$ 2) $1\mu F$ 3) $2\mu F$ 4) $1.5\mu F$

108. A cell can supply currents of 1 A and 0.5 A via resistance of $2.5\Omega \; and \; 10\Omega$ respectively. The internal resistance of the cell is
1) 2Ω 2) 3Ω 3) 4Ω 4) 5Ω

109. In the given circuit, the current through 2Ω resistor is



1) 9 A 2) 0.9 A 3) $\frac{1}{9}A$ 4) $\frac{1}{0.9}A$

110. A galvanometer has a coil of resistance 100Ω showing a full scale deflection at 50 μA . The resistance that should be added to use if as an ammeter of range 10mA is
1) 5Ω 2) $5\times10^{-2}\,\Omega$ 3) 0.5Ω 4) 1Ω

111. At a certain place, the horizontal component of earth's magnetic field is $1/\sqrt{3}$ times the vertical component. The angle of dip at that place is
1) 30^0 2) 45^0 3) 60^0 4) 90^0

112. A coil having 500 square loops each of side 10cm is placed normal to a magnetic flux which increases at a rate of $1Ts^{-1}$. The induced emf is
1)0.1 V 2) 0.5 V 3) 1 V 4) 5 V

113. In an L-C-R circuit, the capacitance is changed from C to 4C. For the same resonant frequency, the inductance should be changed from L to
1) 2L 2) $L/2$ 3) $L/4$ 4) $4L$

114. Suppose that the electric field of an electromagnetic wave in vacuum is
$E=(3.1NC^{-1})\cos\left[\left(1.8radm^{-1}\right)y+\left(5.4\times10^{8}radsec^{-1}\right)t\right]\hat{i}$.
What is the wavelength λ ?
1) 3.49m 2) 3.50m 3) 3.40 m 4) 3.45m

115. If ultra violet radiation of 6.2eV falls of an aluminium surface, then kinetic energy of the fastest emitted electron is
1) $32\times10^{-19}\,J$ 2) $32\times10^{-21}\,J$ 3) $7\times10^{-25}\,J$ 4) $9\times10^{-31}\,J$

116. Ionization potential of hydrogen atom is 13.6 eV. When hydrogen atoms in ground state are excited by a supply of 12.1 eV, then the number of spectral lines emitted by hydrogen atoms according to Bohr's theory is

1) 2 2) 3 3) 1 4) 4

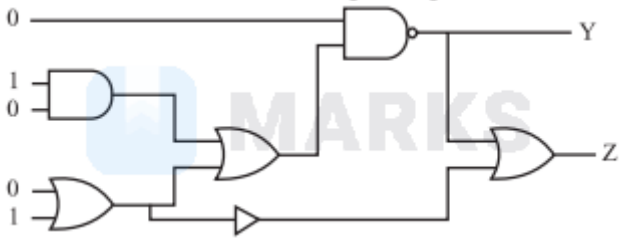
117. A radio active element of mass 1 kg after N years is left with only 125 g. If the half life of the element is 12.5y, then the value of N is

1) 37.5 years 2) 25.0 years 3) 50.0 years 4) 75.0 years

118. Assuming that the junction diode is ideal, the current in the arrangement shown in the circuit diagram

1) 2mA 2) 20mA 3) 30mA 4) 10mA

119. The values of Y and Z in the given logic circuit are



1) $Y=1, Z=1$ 2) $Y=0, Z=1$ 3) $Y=0, Z=0$ 4) $Y=1, Z=0$

120. A TV transmitter has a range of 50km. The height of the TV transmitter is

1)195.3 m 2) 186.5 m 3) 206 m 4) 175 m

CHEMISTRY

121. The energy associated with Bohr's orbit in the hydrogen atom is given by the expression $E_n = \frac{13.6}{n^2}$.

The energy in eV associated with the orbit having a radius $9r_1$ is

1)-13.6 2) -6.8 3) -1.51 4) -1.36

122. When a certain metal was irradiated with light of frequency $4.0\times10^{16}s^{-1}$,the photo electrons emitted had four times the kinetic energy as the kinetic energy of photo electrons emitted when the same metal was irradiated with light of frequency $2.0\times10^{6}s^{-1}$. The threshold frequency of the metal in s^{-1} is

1) 2×10^{16} 2) 4×10^{16} 3) 2.5×10^{16} 4) 1.33×10^{16}

123. Identify X and Y in the following reactions $X \xrightarrow{H_2/Ni} CH_3CH_2NH_2 \xrightarrow{Br_2,NaOH} Y$

1) $X = CH_3CH_2CH_2CN$ $Y = CH_3CH_2CONH_2$

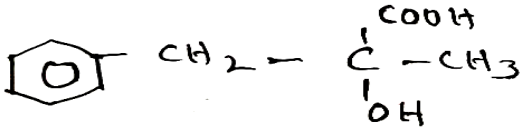
2) $X = CH_3CH_2CN$ $Y = CH_3CH_2CH_2CONH_2$

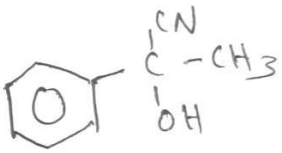
3) $X = CH_3CH_2CH_2NC$ $Y = CH_3CH_2CONHCH_3$

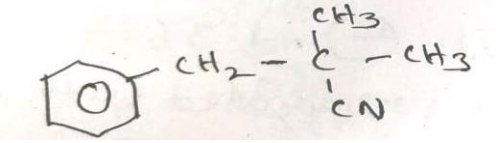
4) $X = CH_3CH_2CN$ $Y = CH_3CH_2CONH_2$

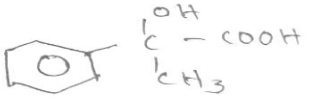
124. In the following reaction sequence, the product D is

$CH_3COOH \xrightarrow{SOCl_2} A \xrightarrow[AlCl_3]{C_6H_6} B \xrightarrow{HCN} C \xrightarrow{H_2O} D$

1) 

2) 

3) 

4) 

125. If general formula of oxime and semi carbazone is $\frac{CH_3}{CH_3}\!\!\diagdown C = N - Z$ what is 'Z' in oxine (A) and semicarbazone(B) ?

1) $A = NHCONH_2$ $B = OH$ 2) $A = OH$ $B = NH_2$

3) $A = OH$ $B = NHCONH_2$ 4) $A = NH_2$ $B = OH$

126. The product of the following reaction is $C_6H_5CHO + CH_3CHO \xrightarrow[\Delta]{dil\ NaOH} X$

1) $X = C_6H_5 - CH = CHCH_2CHO$

2) $X = C_6H_5 - CH - CH_2 - CH_2 - CHO$ (OH)

3) $X = C_6H_5 - CH = C - CHO$ (CH_3)

4) $X = C_6H_5 - CH - CH - CHO$ (OH, CH_3)

127. The major product obtained in the following reaction is

$$C_2H_5ONa + CH_3 - \underset{\displaystyle CH_3}{\overset{\displaystyle CH_3}{\overset{|}{C}}} - Cl \rightarrow X$$

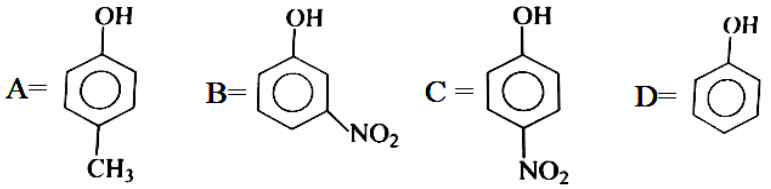
1) $X = CH_3 - \underset{\displaystyle CH_3}{\overset{\displaystyle CH_3}{\overset{|}{C}}} - O - C_2H_5$

2) $X = CH_2 = \underset{\displaystyle CH_3}{\overset{}{\overset{|}{C}}} - CH_3$

3) $X = CH_3 = CH - O - C_2H_5$ (CH_3)

4) $X = CH_3 - \underset{\displaystyle CH_3}{\overset{\displaystyle CH_3}{\overset{|}{C}}} - CH_2CHO$

128. Arrange the following in increasing order of acid character



1) $A < B < C < D$ 2) $A < D < B < C$ 3) $D < C < B < A$ 4) $B < C < D < A$

129. Which one of the following statements are correct?

a) The c-cl bond in chlorobenzene is shorter than in chloromethane

b) It is difficult to replace chloride from chlorobenzene than from benzyls chloride

c) The c-cl bond in chlorobenzene has some double bond character.

d) Chlorobenzene on chlorination gives m-di chlorobenzene

1) A, B, C 2) A, D only 3)B, C, D 4)C, D ONLY

130. Which of the following is not analgesic?

1) Ofloxacin 2) Paracetamol 3)Morphine 4) Codeine

131. Which of the following statements about DNA is not correct ?

1) It has a double helix structure.

2) Adenine form hydrogen bonds with thymine and cytosine form hydrogen bond with Guanine

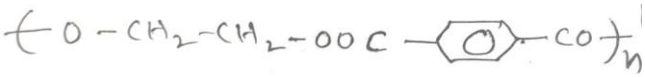
3) The two stand in a DNA molecule are not complementary to each other.

4) It contain the pentose sugar , 2-deoxyribose.

132. Match the following

List I	List II
A) $(NH + CH_2)_6 - NH - CO + CH_2) - CO)_n$	I. Ethylene glycol and terephthalic acid
B) $(CO - (CH_2)_5 - NH)_n$	II. Phenol and formaldehyde

C) $(CF_2-CF_2)_n$ III. Caprolactam

D)  IV)Hexamethylene diamine and adipic acid

V)Tetra fluoro ethene

1) $A-IV, B-III, C-V, D-I$ 2) $A-III, B-II, C-IV, D-I$

3) $A-IV, B-III, C-II, D-I$ 4) $A-II, B-IV, C-III, D-V$

133. Disproportionation products od one mole of MnO_4^{-2} in aqueous acidic medium are

1)1/3 mole of MnO_4 ,2/3 mole of MnO_2 2)2/3 mole of MnO_4^- ,1/3 mole of MnO_2

2))1/3 mole of Mn_2O_7 ,1/3 mole of MnO_2 4)2/3 mole of Mn_2O_7 ,1/3 mole of MnO_2

134. Which one of the following coordination complexes exhibits the lowest value of magnetic moment [in B.M] ?

1) $\left[Cr(CN)_6\right]^{-3}$ 2) $\left[Mn(CN)_6\right]^{-3}$ 3) $\left[Fe(CN)_6\right]^{-3}$ 4) $\left[Co(CN)_6\right]^{-3}$

135. Which one of the following statements regarding helium is not correct?

1. It is used to fill gas balloons instead of hydrogen because it is Lighter and not Inflammable.
2. It is used in gas cooled nuclear reactors.
3. It is used to produce and sustain powerful super conducting magnets.
4. It is not used as a cryogenic agent.

136. Which one of the following reactions does not occur

1) $Cl_2 + 2Br^- \rightarrow Br_2 + 2Cl^-$ 2) $ClF_3 + H_2O \rightarrow HCl + HOF + F_2$

3) cold&dial $2NaOH + Cl_2 \rightarrow NaCl + NaOCl + H_2O$ 4) $Na_2SO_3 + 2HCl \rightarrow 2NaCl + SO_2 + H_2O$

137. Assertion(A):p4010 cannot be used to remove moisture from ammonia gas
Reason(R): p4010 reacts with …….. gas the correct answer is.

1. Both (A) and (R) are correct and ® is the correct explanation of (A).
2. Both (A) and ® are correct and (R) is not the correct explanation of (A).
3. (A) is correct but (R) is not correct.
4. (A) is not correct but (R) is not correct.

138. Which one of the following statements is not correct?

1. Van Arkel method is used for refining of zirconium.
2. Mond process is used for refining of Nickel.
3. Zone refining is based on the principal that the impurities are more soluble in the melt Than in the solid state of the metal.
4. High melting metals are refined by liquation.

139. Which of the following statements is not correct.

1. Both physical and chemical adsorptions are exothermic.
2. Physical adsorption takes place with decreases of free energy. Whereas chemical Adsorption occurs with increases of free energy.
3. Physical adsorption requires low activation energy but chemical adsorption requires High activation energy.
4. The magnitude of chemical adsorption increases and that of physical adsorption Decreases with rise in temperature.

140. The reaction $X \rightarrow$ products is a first order reaction in 40 minutes. The concentration Of x changes from 1.0m t 0.025m. What is the Intial rate of reaction when [X] =0.1M?(log4=0.60)

1) $1.73\times10^{-3} Mol\ L^{-1} \min^{-1}$ 2) $3.47\times10^{-4} Mol\ L^{-1} \min^{-1}$

3) $1.73\times10^{-4} Mol\ L^{-1} \min^{-1}$ 4) $3.45\times10^{-3} Mol\ L^{-1} \min^{-1}$

141. The end of the following cell $Mg / Mg^{+2}(0.01M\ //\ Sn^{+2}(0.1M) / Sn$ at 298 K in 'V' is

1) 2.17 2) 2.23 3) 2.51 4) 2.45

142. 100 ml. of 1.5% (W/V) of work is found to have and osmotic pressure of 6.0 atm and 100ml of 3.42%(W/V) solution of can sugar is found to have an osomatic pressure 2.4 atm. If the two solutions are mixed the osomatic pressure of the resulting solution in atm is

1) 8.4 2) 16.8 3) 4.2 4) 2.1

143. 1.2ml of acetic acid having density 1.06 gcm^{-2} is dissolved in 1 ltr of water. The depression in freezing point observed for the concentration of acid was $0.041^0 c$ .The van't hoff factor of the acid is

1)0.41 2) 1.04 3) 0.96 4) 1.54

144. Which one of the following statements is not correct?

1) Schottky defect in ionic solids doesnot change the density of the crystal

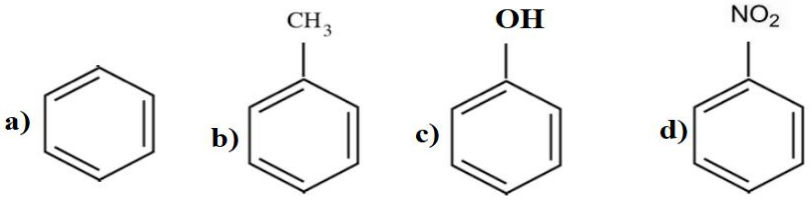
2) Packing efficiency is the percentage of total space filled by the particles

3) In body centered cubic unit cell, the relationship between atomic radius R and the edge length is

$$r = \frac{\sqrt{3}}{4}a$$

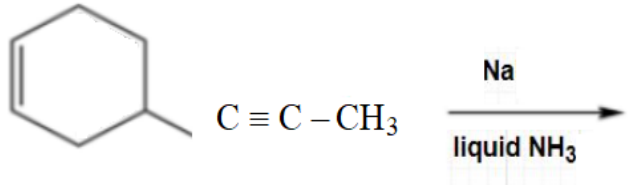
4)photovoltaic cell is used for conversion of light energy into electrical energy

145. The correct order of reactions of the following compounds towards electrophilic substitution reactions is



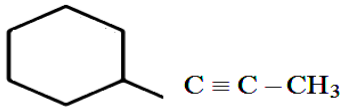
1) $a > b > c > d$ 2) $d > c > b > a$ 3) $c > b > a > d$ 4) $b > c > a > d$

146.

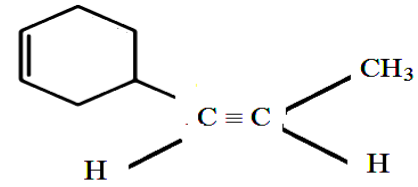


The product formed in the above reaction is

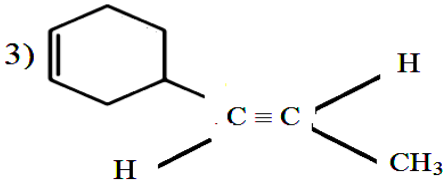
1)



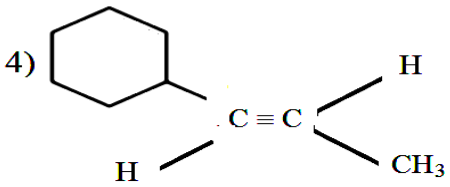
2)



3)



4)



147. The stability order of the following resonance structures is

I) $CH_2 = CH - \overset{\overset{:O:}{\|}}{C} - H$ II) $\overset{\oplus}{C}H_2 - CH - \overset{\overset{:\ddot{O}}{|}}{C} - H$ III) $:\overset{\ominus}{C}H_2 - CH - \overset{\overset{:\overset{\oplus}{O}:}{|}}{C} - H$

1) $III < II < I$ 2) $II > I > III$ 3) $II < I < III$ 4) $II > III > I$

148. which one of the following statement is not correct?

1. NO_2 is a Lung irritant.
2. The municipal sewage has BOD value of 100-4000 PPM.
3. Main source of co is automobile exhaust fumes.
4. COD is the measure of bacteria in water.

149. Consider the following statements.

I. In diamond each carbon atom is sp3 hybridized.

II. Graphite has planer hexagonal layers of carbon atoms.

III. Silicones being surrounded by non polar alkyls groups are water repelling in nature.

IV. The order of catenation in group 14 Elements is Si >C > GE > Pb.

1. I, II, III 2. II, III, IV 3. I, II, IV 4. I, III ,IV.

150. In the following reactions $B_2H_6 + NH_3(excess) \xrightarrow{\Delta} X + H_2, NaH + BF_3 \xrightarrow{450K} Y + NaF$

$B_2H_6 + H_2O \longrightarrow Z + H_2$ X,Y, and Z are respectively

1) $B_2H_6, LiBH_2, H_3BO_3$ 2) $B_3N_3H_6, B_2H_6, H_3BO_3$ 3) $(BN)_n, LiBH_4, +HBO_2$ 4) B_2H_6, B_2H_6, HBO_2

151. Compound 'A' is prepared by the electrolysis of aqueous solution of 'B' using caster-Kellner anode A and B respectively are

1)NAOH, NaCl 2) NaCl , NaOH 3) $NaHCO_3, NaOH$ 4) Na_2CO_3, NH_3

152. Identify the correct statements from the following

I) B_2H_6 is an electron deficient hydride II) NH_3 is an electron rich hydride

III) NaH is a covalent hydride IV) $YbH2.5$ is an interstitial hydride

153. A buffer solution is prepared by mixing 10ml of 0.1m acetate and then distributed to 100ml. with distributed water. The Ph of the buffer solution is [PKA of acetic acid is 4.76]

1) 4.84 2) 5.21 3)4.34 4) 4.76

154. Observe the following equations

$NH_3 + Ag^+ \square \ [Ag(NH_3)]^+, K_1 = 1.6\times10^3$

$[Ag(NH_3)]^+ + NH_3 \square \ [Ag(NH_3)_2]^+ K_2 = 6.8\times10^3$

The equilibrium constant for the following reaction $Ag^+ + 2NH_3 \square \ [Ag(NH_3)_2]^+$ is

1) 6.008×10^3 2) 1.008×10^7 3) 1.088×10^6 4) 1.028×10^3

155. At 300k the equilibrium constant for a reaction is 10. The standard free energy change (in $KJ\ Mol^{-1}$) for the reaction is .

1) -57.4 2) -115.2 3) +57.4 4) -5.74.

156. On reduction with hydrogen, 3.6g of an oxide of metal (M) left 3.2g of the metal. If the atomic weight of the metal is 64, the formula of the oxide is

1) M_2O_3 2) M_2O 3) MO 4) MO_2

157. The ratio between RMS velocities H2 at 50k and O_2 at 800k is.

1) 4:1 2) 2:1 3) 1:1 4) 1:4

158. Arrange the following species in the increasing order of lone pair of electrons

1) CO 2) NO_2^- 3) NF_3 4) CO_3^{-2}

159. The changes in bond length with respect to N-N and O-O when N2 becomes ……. And ……..becomes …are respectively.

1) Increasing, Decreases 2) Decreases, Increases.

3) Increases, Increases 4) Decreases, Decreases

160. Which of the following statements are correct for classification of elements?

I. The properties of elements are periodic functions of their atomic numbers.

II. Non metallic elements are less in number than the metallic elements.

III. The first Ionization energies of elements along a period do not vary in a regular manner.

IV. The ground state electronic configuration of pd […….

1) I, II, III, IV 2) I, II, III only 3) II, III, IV only 4) I, II, IV only

KEY

MATHEMATICS

1	2	3	4	5	6	7	8	9	10
2	4	1	3	4	2	1	3	4	3
11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
1	3	4	2	4	1	4	1	2	4
21	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
4	1	3	1	3	4	3	2	4	2
31	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**
1	1	3	2	1	3	1	2	3	1
41	**42**	**43**	**44**	**45**	**46**	**47**	**48**	**49**	**50**
4	2	4	4	1	2	2	2	2	1
51	**52**	**53**	**54**	**55**	**56**	**57**	**58**	**59**	**60**
1	2	2	4	4	3	4	1	4	3
61	**62**	**63**	**64**	**65**	**66**	**67**	**68**	**69**	**70**
2	1	3	4	4	1	2	1	2	1
71	**72**	**73**	**74**	**75**	**76**	**77**	**78**	**79**	**80**
1	1	2	4	3	2	4	3	2	4

PHYSICS									
81	**82**	**83.**	**84**	**85**	**86**	**87**	**88**	**89**	**90**
3	**2**	**4**	**4**	**4**	**1**	**3**	**4**	**4**	**2**
91	**92**	**93**	**94**	**95**	**96**	**97**	**98**	**99**	**100**
2	**3**	**4**	**3**	**4**	**1**	**2**	**4**	**1**	**1**
101	**102**	**103**	**104**	**105**	**106**	**107**	**108**	**109**	**110**
1	**4**	**4**	**2**	**4**	**4**	**2**	**4**	**2**	**3**
111	**112**	**113**	**114**	**115**	**116**	**117**	**118**	**119**	**120**
3	**4**	**3**	**1**	**1**	**2**	**1**	**2**	**1**	**1**
CHEMISTRY									
121	122	123	124	125	126	127	128	129	130
3	**4**	**2**	**4**	**3**	**3**	**2**	**2**	**1**	**1**
131	132	133	134	135	136	137	138	139	140
3	**1**	**2**	**4**	**4**	**2**	**1**	**4**	**2**	**4**
141	**142**	**143**	**144**	**145**	**146**	**147**	**148**	**149**	**150**
2	**3**	**2**	**1**	**3**	**3**	**1**	**4**	**1**	**2**
151	**152**	**153**	**154**	**155**	**156**	**157**	**158**	**159**	**160**
1	**3**	**4**	**2**	**4**	**2**	**3**	**4**	**1**	**2**

KGCET - 2K25
KSRM COLLEGE OF ENGINEERING (AUTONOMOUS), KADAPA
KLM COLLEGE OF ENGINEERING FOR WOMEN, KADAPA
FOR ENGINEERING ASPIRANTS

SET-3

MATHS

1. If $A=\begin{bmatrix}0 & 1\\ 1 & 0\end{bmatrix}$ then $A^5=$

   1) I 2) O 3) A 4) A^2

2. If x,y,z not all zeros and the equations $x+y+z=0$, $(1+a)x+(2+a)y-8z=0$, $x-(1+a)y+(2+a)z=0$ have non-trivial solution then a =

   1) $2+\sqrt{15}$ 2) $3\pm\sqrt{15}$ 3) $\sqrt{15}$ 4) $-5\pm2\sqrt{2}$

3. Range of $\sqrt{9-x^2}$ is

   1) $[0,3]$ 2) $[-3,3]$ 3) $[-3,0]$ 4) R

4. If $f:R^+\to R$ such that $f(x)=\log_5 x$ then $f^{-1}(x)=$

   1) $\log_x 10$ 2) 5^x 3) 3^{-x} 4) $3^{1/x}$

5. If $\overline{AB}=(3,-2,2)$, $\overline{BC}=(-1,0,-2)$ are the adjacent sides of a parallelogram, then the obtuse angle between its diagonals is

   1) $\frac{\pi}{4}$ 2) $\frac{2\pi}{3}$ 3) $\frac{\pi}{3}$ 4) $\frac{3\pi}{4}$

6. The locus of the point equidistant from two given points a and b is given by

   1) $\left[\left(\bar{r}-\frac{\bar{a}+\bar{b}}{2}\right).(\bar{a}+\bar{b})\right].(\bar{a}-\bar{b})=0$ 2) $\left[\left(\bar{r}-\frac{\bar{a}+\bar{b}}{2}\right).(\bar{a}+\bar{b})\right].(\bar{a}+\bar{b})=0$

   3) $\left[\left(\bar{r}-\frac{\bar{a}+\bar{b}}{2}\right).(\bar{a}-\bar{b})\right].(\bar{a}+\bar{b})=0$ 4) $\left[\left(\bar{r}-\frac{\bar{a}+\bar{b}}{2}\right).(\bar{a}-\bar{b})\right].(\bar{a}-\bar{b})=0$

7. If $A=\begin{bmatrix}\alpha^2 & 5\\ 5 & -\alpha\end{bmatrix}$ and $\det(A^{10})=1024$ then $\alpha=$

   1) -2 2) -3 3) -1 4) 0

8. In a ΔABC, $2ac\sin\frac{A-B+C}{2}=$

   1) $a^2+b^2-c^2$ 2) $c^2+a^2-b^2$ 3) $b^2-c^2-a^2$ 4) $c^2-a^2-b^2$

9. $8\sin^2 x+3\cos^2 x=5\Rightarrow\cot x=$

   1) $\pm\frac{1}{\sqrt{2}}$ 2) $\pm\frac{1}{\sqrt{3}}$ 3) $\pm\sqrt{\frac{3}{2}}$ 4) $\pm\sqrt{\frac{2}{3}}$

10. $\cos35^0+\cos85^0+\cos155^0=$

    1) -1 2) 0 3) 1 4) 2

11. The vector $\bar{b}$ which is collinear with the vector $\bar{a}=(2,1,-1)$ and satisfies the relation $\bar{a}.\bar{b}=3$ is____

    1) $\left(1,\frac{1}{2},\frac{-1}{2}\right)$ 2) $\left(\frac{2}{3},\frac{1}{3},\frac{-1}{3}\right)$ 3) $\left(\frac{1}{2},\frac{1}{4},\frac{-1}{4}\right)$ 4) $(1,1,0)$

12. Angle between the planes $x-y+z=3$, $x+y+z=4$ is

    1) $\cos^{-1}\frac{1}{3}$ 2) $\cos^{-1}\frac{4}{41}$ 3) $\sin^{-1}\frac{4}{27}$ 4) $\sin^{-1}\frac{4}{41}$

13. If $|\bar{a}|=1, |\bar{b}|=2, (\bar{a},\bar{b})=\frac{2\pi}{3}$ then $\left\{(\bar{a}+3\bar{b})\times(3\bar{a}-\bar{b})\right\}^2 =$

1) 425 2) 375 3) 325 4) 300

14. Let $\bar{a}=\bar{i}+\bar{j}$, $\bar{b}=2\bar{i}-\bar{k}$. Then the point of intersection of the lines $\bar{r}\times\bar{a}=\bar{b}\times\bar{a}$ and $\bar{r}\times\bar{a}=\bar{a}\times\bar{b}$ is

1) $3\bar{i}+\bar{j}-\bar{k}$ 2) $3\bar{i}-\bar{j}-\bar{k}$ 3) $3\bar{i}-3\bar{j}-\bar{k}$ 4) $3\bar{i}+3\bar{j}+\bar{k}$

15. If $\bar{a}=2\bar{i}+\bar{j}+3\bar{k}$, $\bar{b}=3\bar{i}+2\bar{j}+\bar{k}$, $\bar{c}=\bar{i}-\bar{j}-4\bar{k}$, $\bar{d}=\bar{i}+2\bar{j}-\bar{k}$ then $(\bar{a}\times\bar{b})\times(\bar{c}\times\bar{d})=$

1) $24(\bar{i}+\bar{j}-2\bar{k})$ 2) $24(\bar{i}-\bar{j}-\bar{k})$ 3) $12(2\bar{i}+\bar{j}-3\bar{k})$ 4) $12(\bar{i}-\bar{j}+3\bar{k})$

16. If $\alpha\bar{a}+\beta\bar{b}+\gamma\bar{c}=\bar{0}$ then $(\bar{a}\times\bar{b})\times\left\{(\bar{b}\times\bar{c})\times(\bar{c}\times\bar{a})\right\}=$

1) $\bar{0}$ 2) A vector perpendicular to the plane of $\bar{a},\bar{b},\bar{c}$

3) A scalar quantity 3) $2\left[\bar{a}\ \bar{b}\ \bar{c}\right]$

17. If any triangle ABC, $r^2\cot\frac{A}{2}\cot\frac{B}{2}\cot\frac{C}{2}=$

1) 2Δ 2) Δ 3) Δ^2 4) 5Δ

18. the minimum and maximum value of $\sin^2(60^0-x)+\sin^2(60^0+x)$ are

1) $-\frac{1}{2},\frac{1}{2}$ 2) $\frac{1}{2},1$ 3) $\frac{1}{2},\frac{3}{2}$ 4) $\frac{3}{2},2$

19. $\cot\theta=\dfrac{2\tan 7\frac{1}{2}^0}{1-\tan^2 7\frac{1}{2}^0}$, then $\sin 3\theta=$

1) $\frac{-1}{\sqrt{2}}$ 2) $\frac{\sqrt{3}}{2}$ 3) $\frac{1}{\sqrt{2}}$ 4) $\frac{1}{2}\sqrt{2-\sqrt{2}}$

20. If $\log_e(\sqrt{5}+2)=\sinh^{-1}(k)$ then $k=$

1) 1 2) 5 3) 3 4) 2

21. If the distance from P to the points $(5,-4),(7,6)$ are in the ratio 2 : 3, then the locus of P is

1) $5x^2+5y^2-12x-86y+17=0$ 2) $5x^2+5y^2-34x+120y+29=0$

3) $5x^2+5y^2-5x+y+14=0$ 4) $3x^2+3y^2-20x+38y+87=0$

22. A square formed by the lines $x=0, y=0, x=1, y=1$ then equation of its diagonals will be

1) $y=x,\ x+y=1$ 2) $y=x,\ x+y=2$ 3) $2y=x,\ x+y=\frac{1}{2}$ 4) $y=2x,\ x+y=\frac{1}{4}$

23. The equation of the plane passing through a point with position vector $\hat{i}+2\hat{j}+3\hat{k}$ and parallel to the plane $\vec{r}.(3\hat{i}+4\hat{j}+5\hat{k})=0$ is

1) $3x+4y-5z+26=0$ 2) $3x+4y+5z-26=0$

3) $3x-4y+5z-26=0$ 4) $3x+4y-5z-26=0$

24. The d.c's of the normal to the plane $2x-y+2z+5=0$ are

1) $(3,-2,6)$ 2) $\left(\frac{2}{7},\frac{3}{7},\frac{-6}{7}\right)$ 3) $\left(\frac{3}{7},\frac{-2}{7},\frac{6}{7}\right)$ 4) $\left(\frac{2}{3},\frac{-1}{3},\frac{2}{3}\right)$

25. $\lim\limits_{x\to 0} x^3\cos\frac{2}{x}=$

1) 0 2) 1 3) ∞ 4) does not exist

26. If the function $f(x)=\dfrac{e^{x^2}-\cos x}{x^2}$ for $x\neq 0$ is continuous at $x=0$ then $f(0)=$

1) $\frac{1}{2}$ 2) $\frac{3}{2}$ 3) 2 4) $\frac{1}{3}$

27. $f(x)=\dfrac{p+q^{\frac{1}{x}}}{r+s^{\frac{1}{x}}}, s>1, q>1, r\neq 0,\ f(0)=1$ is left continuous at $x=0$ then

1) $p=0$ 2) $p=r$ 3) $p=q$ 4) $p\neq q$

28. If $f(x)=\begin{cases}1 & x<0\\ x^2 & x\geq 0\end{cases}$ then at $x=0$

1) f' is differentiable 2) f is continuous

3) f is differentiable 4) f is not continuous

29. The number of distinct term in $\left(x^3+\dfrac{1}{x^3}+1\right)^{200}$ is

1) 201 2) 400 3) 401 4) 500

30. If $y=(\log x)^x$ then $\dfrac{dy}{dx}=$

1) $(\log x)^x\left[\log(\log x)+\dfrac{1}{\log x}\right]$ 2) $(\log x)^x\left[\log(\log x)-\dfrac{1}{\log x}\right]$

3) $-(\log x)^x\left[\log(\log x)+\dfrac{1}{\log x}\right]$ 4) $-(\log x)^x\left[\log(\log x)-\dfrac{1}{\log x}\right]$

31. Given two points $Q(3,4), R(1,2)$. What is the point $P(x,y)$ on the line $2x-y-1=0$ for which $PQ+PR=QR$ holds

1) $(2,3)$ 2) $(-3,-7)$ 3) $(-2,-5)$ 4) $(4,7)$

32. Pressure P and Volume V of a gas are connected by the relation $PV^{\frac{1}{4}}=C$ (constant). The percentage increase in p corresponding to a diminition of $\dfrac{1}{2}\%$ in the volume is

1) $\dfrac{1}{2}$ 2) $\dfrac{1}{4}$ 3) $\dfrac{1}{8}$ 4) $\dfrac{1}{16}$

33. The point on the curve $x^2+y^2-2x-3=0$ at which the tangent is parallel to x-axis is

1) $(1,0),(-1,-4)$ 2) $(0,-1),(-2,3)$ 3) $(2,13),(-2,-3)$ 4) $(1,2),(1,-2)$

34. The curves $xy=4;\ x^2-y^2=15$

1) touch each other 2) cut each other orthogonally

3) intersect at an angle $\dfrac{\pi}{3}$ 4) intersect at an angle $\dfrac{\pi}{4}$

35. If k is the diameter of a circle and A is the area of a sector of the circle whose vertical angle is θ then $\dfrac{dA}{dt}=$

1) $\dfrac{k^2}{8}\left(\dfrac{d\theta}{dt}\right)$ 2) $\left(\dfrac{k^2}{4}\right)\left(\dfrac{d\theta}{dt}\right)$ 3) $\left(\dfrac{k^2}{4}\right)\left(\dfrac{d\theta}{dt}\right)$ 4) $k\left(\dfrac{d\theta}{dt}\right)$

36. A point is moving along $y^3=27x$. The interval in which the abscissa changes at slower rate than ordinate is

1) $(-2,2)$ 2) $(-\infty,\infty)$ 3) $(-1,1)$ 4) $(-\infty,-3)\cup(3,\infty)$

37. Rolle's theorem cannot be applicable for

1) $f(x)=\sqrt{4-x^2}$ in $[-2,2]$ 2) $f(x)=[x]$ in $[-1,1]$

3) $f(x)=x^2+3x-4$ in $[-4,1]$ 4) $f(x)=\cos 2x$ in $[0,\pi]$

38. A point on the curve $f(x)=\sqrt{x^2-4}$ defined in $[2,4]$, where the tangent is parallel to the chord joining two points on the curves is

1) $(\sqrt{2},\sqrt{6})$ 2) $(\sqrt{6},\sqrt{3})$ 3) $(2,6)$ 4) $(6,2)$

39. The function $f(x)=\sin^2 x\cos^3 x$ attains a maximum when $x=$

1) $\tan^{-1}\frac{2}{3}$ 2) $\tan^{-1}\sqrt{\frac{2}{3}}$ 3) $\tan^{-1}\frac{3}{2}$ 4) $\tan^{-1}\sqrt{\frac{3}{2}}$

40. If the transformed equation of a curve is $9X^2+16Y^2=144$ when the axes are rotated through an angle of 45^0 then the original equation of a curve is

1) $25x^2+14xy+25y^2=288$ 2) $25x^2+14xy-25y^2=288$

3) $25x^2-14xy+25y^2=288$ 4) $25x^2-14xy-25y^2=288$

41. If the roots of the quadratic equation $x^2-4x-\log_3 a=0$ are real, then the least value of a is

1) 81 2) $\frac{1}{81}$ 3) $\frac{1}{64}$ 4) 9

42. Number of solutions of the equation $|x|^2-3|x|+2=0$ is ……

1) 4 2) 2 3) 0 4) 1

43. the points in the $\left\{z\in C: Arg\left(\frac{z-2}{z-6i}\right)=\frac{\pi}{2}\right\}$ lie on the curve which is a (where C denotes the set of all complex numbers)

1) Circle 2) Pair of straight line 3) Parabola 4) Hyperbola

44. $4+5\left(-\frac{1}{2}+\frac{i\sqrt{3}}{2}\right)^{334}+3\left(-\frac{1}{2}+\frac{i\sqrt{3}}{2}\right)^{365}=$

1) $1-i\sqrt{3}$ 2) $-1+i\sqrt{3}$ 3) $i\sqrt{3}$ 4) $-i\sqrt{3}$

45. The biquadratic equation, two of whose roots are $1+i, 1-\sqrt{2}$ is

1) $x^4-4x^3+5x^2-2x-2=0$ 2) $x^4-4x^3-5x^2+2x+2=0$

3) $x^4+4x^3-5x^2+2x-2=0$ 4) $x^4+4x^3+5x^2-2x+2=0$

46. If $f(x)=0$ is a R.E. of first type and odd degree then a factor of $f(x)$ is

1) $x-2$ 2) $x-1$ 3) x 4) $x+1$

47. In the expansion of $\left(\sqrt{a}+\frac{1}{\sqrt{3a}}\right)^n$ if the ratio of the binomial coefficient of the 4th term to the binomial coefficient of the 3rd term is $\frac{10}{3}$, the 5th term is

1) $55a$ 2) $45a^2$ 3) $50a^2$ 4) $55a^2$

48. The sum of the series $1+\frac{k}{3}+\frac{k(k+1)}{3.6}+\frac{k(k+1)(k+2)}{3.6.9}+\ldots$ is

1) $\left(\frac{2}{3}\right)^4$ 2) $\left(\frac{3}{2}\right)^k$ 3) $\frac{2}{3}$ 4) $\frac{3}{2}$

49. If $\sum_{k=1}^{m}(k^2+1)k!=1999(2000!)$, then m is

1) 1999 2) 2000 3) 2001 4) 2002

50. The sum of the value of the digits at the ten's place of all the numbers formed with the help of 3, 4, 5, 6 taken all at a time is

1) 1080 2) 4320 3) 360 4) 180

51. If m parallel lines in a plane are intersected by n parallel lines then number of parallelograms formed is

1) $\frac{m!n!}{(2!)^2}$ 2) $\frac{m!n!}{(m-2)!(n-2)!}$

3) $\frac{m!n!}{(2!)^2(m-2)!(n-2)!}$ 4) $\frac{(m+n)!}{(m+n2)!2!}$

52. The number of odd proper positive divisors of $3^a 6^b 21^c$ is $(a,b,c,\in N)$

1) $(a+1)(b+1)(c+1)-2$ 2) $(a+b+c+1)(c+1)-1$

3) $(a+1)(b+1)(c+1)-1$ 4) $(a+1)(b+1)(c-1)$

53. $\dfrac{2x^3+1}{(x-1)(x+1)(x+2)} =$

1) $2+\dfrac{1}{2(x-1)}+\dfrac{1}{2(x+1)}-\dfrac{5}{x+2}$ 2) $2-\dfrac{1}{2(x-1)}-\dfrac{1}{2(x+1)}-\dfrac{5}{x+2}$

3) $2+\dfrac{1}{2(x-1)}-\dfrac{1}{2(x+1)}-\dfrac{5}{x+2}$ 4) $\dfrac{1}{2(x-1)}+\dfrac{1}{2(x+1)}-\dfrac{5}{x+2}$

54. Which of the following is not a measure of dispersion?

1) Variance 2)Mean deviation 3) Mode 4) Standard Deviation

55. If $x_1, x_2, ..., x_n$ are n observations such that $\sum_{i=1}^{n} x_i^2 = 400$ and $\sum_{i=1}^{n} x_i = 80$ then the least value of n is

1) 12 2) 15 3) 16 4) 18

56. Two numbers are selected at random from 1, 2, 3, …. 100 without replacement. The probability that the minimum of the two numbers is less than 70 is

1) $\dfrac{30_{C_2}}{100_{C_2}}$ 2) $1-\dfrac{30_{C_2}}{100_{C_2}}$ 3) $\dfrac{31_{C_2}}{100_{C_2}}$ 4) $1-\dfrac{31_{C_2}}{100_{C_2}}$

57. Two events A and B have the probabilities 0.25 and 0.5 respectively. The probability that both A and B occur simultaneously is 0.14. the probability that neither A nor B occurs is

1) 0.39 2) 0.29 3) 0.19 4) 0.5

58. The value of C for which $P(X=k)=CK^2$ can serve the probability function of a random variable X that takes values $0,1,2,3,4$ is

1) $\dfrac{1}{30}$ 2) $\dfrac{1}{10}$ 3) $\dfrac{1}{3}$ 4) $\dfrac{1}{15}$

59. The probability of a man hitting the target is $\dfrac{1}{4}$. If the fires 7 times the probability of his hitting the target aleast once is

1) $\left(\dfrac{3}{4}\right)^7$ 2) $1-\left(\dfrac{3}{4}\right)^7$ 3) $\left(\dfrac{1}{4}\right)^7$ 4) $1-\left(\dfrac{1}{4}\right)^7$

60. If X is a poisson variate with parameter $\dfrac{3}{2}$, find $P(X \geq 2)$

1) $\dfrac{5}{2}e^{\frac{-3}{2}}$ 2) $1-\dfrac{5}{2}e^{\frac{-3}{2}}$ 3) $1-e^{\frac{-3}{2}}$ 4) $e^{\frac{-3}{2}}$

61. If the two circles $x^2+y^2+2gx+c=0$ and $x^2+y^2-2fy-c=0$ have equal radius then locus of (g, f) is

1) $x^2+y^2=c^2$ 2) $x^2-y^2=2c$ 3) $x-y^2=c^2$ 4) $x^2+y^2=2c^2$

62. $y=Ae^x+Be^{-2x}$ satisfies which of the differential equation is

1) $\dfrac{d^2y}{dx^2}+\dfrac{dy}{dx}-2y=0$ 2) $\dfrac{d^2y}{dx^2}-\dfrac{2dy}{dx}+y=0$ 3) $\dfrac{d^2y}{dx^2}-\dfrac{2dy}{dx}-y=0$ 4) $\dfrac{dy^2}{dx^2}-\dfrac{dy}{dx}+2y=0$

63. The slope of the radical axis of the circles $(x+2)^2+(y+3)^2=25$ and $(x+1)^2+(y-1)^2=25$ is

1) $-\dfrac{1}{4}$ 2) $\dfrac{1}{4}$ 3) -4 4) $-\dfrac{1}{2}$

64. Two circles whose radii are r and R and whose distance between the centres is 'd' cut each other orthogonally. Then the length of their common chord is

1) $\dfrac{2rR}{\sqrt{r+R}}$ 2) $\dfrac{rR}{\sqrt{r^2+R^2}}$ 3) $\dfrac{2rR}{\sqrt{r^2+R^2}}$ 4) $\dfrac{rR}{r^2+R^2}$

65. The focus and directrix of parabola are $(1,2)$ and $2x-3y+1=0$. Then the equation of the tangent at the vertex is

1) $4x-6y+5=0$ 2) $4x-6y+9=0$ 3) $4x-6y+11=0$ 4) $4x-6y+7=0$

66. Which of the following equations represents a parabola

1) $(x-y)^3=3$ 2) $\frac{x}{y}-\frac{y}{x}=0$ 3) $\frac{x}{y}+\frac{4}{x}=0$ 4) $(x+y)^2+3=0$

67. If a chord $4y=3x-48$ subtends an angle θ at the vertex of the parabola $y^2=64x$ then $\tan\theta$

1) $\frac{10}{9}$ 2) $\frac{13}{9}$ 3) $\frac{20}{9}$ 4) $\frac{16}{9}$

68. Given two fixed points A and B and AB = 6. Then simplest form of the equation to the locus of P such that PA+PB =8 is

1) $\frac{x^2}{16}+\frac{y^2}{7}=1$ 2) $\frac{x^2}{16}+\frac{y^2}{9}=1$ 3) $\frac{x^2}{9}+\frac{y^2}{16}=1$ 4) $\frac{x^2}{12}+\frac{y^2}{21}=1$

69. The distances from the foci to a points $P(x_1,y_1)$ on the ellipse $\frac{x^2}{9}+\frac{y^2}{25}=1$ are

4) $4\pm\frac{2}{3}y_1$ 2) $5\pm\frac{4}{5}y_1$ 3) $5\pm\frac{4}{5}x_1$ 4) $4\pm\frac{2}{3}x_1$

70. The locus of point of intersection of perpendicular tangents to the ellipse $\frac{(x-1)^2}{16}+\frac{(y-2)^2}{9}=1$ is

1) $(x-1)^2+(y-2)^2=25$ 2) $(x-1)^2+(y-2)^2=7$

3) $(x+1)^2+(y+2)^2=25$ 4) $(x+1)^2+(y+2)^2=7$

71. Find the value of' k ' if the angle between the straight lines represented by $2x^2+5xy+3y^2+6x+7y+4=0$ is $\tan^{-1}k$

1) $\pm\frac{1}{5}$ 2) $\frac{1}{5}$ only 3) $-\frac{1}{5}$ only 4) 0

72. The points on the ellipse $\frac{x^2}{25}+\frac{y^2}{9}=1$ whose eccentric angles differ by a right angle are

1) $(5\cos\theta,3\sin\theta),(5\sin\theta,3\cos\theta)$ 2) $(5\cos\theta,3\sin\theta),(-5\sin\theta,3\cos\theta)$

3) $(5\cos\theta,-3\sin\theta),(5\sin\theta,3\cos\theta)$ 4) $(25\cos\theta,-3\sin\theta),(5\sin\theta,3\cos\theta)$

73. If the latusrectum of a hyperbola subtends a right angle at its centre then its $e=$

1) $\frac{\sqrt{3}+1}{2}$ 2) $\frac{\sqrt{7}+1}{2}$ 3) $\frac{\sqrt{5}+1}{2}$ 4) $\frac{\sqrt{5}}{2}$

74. Equation of one of the tangents passing through $(2,8)$ to the hyperbola $5x^2-y^2=5$ is

1) $3x+y-14=0$ 2) $3x-y+2=0$ 3) $x+y+3=0$ 4) $x-y+6=0$

75. $\int\frac{\cos x}{\cos 3x}dx=$

1) $\frac{1}{2\sqrt{3}}\log\left|\frac{1+\tan x}{1-\tan x}\right|+c$ 2) $\frac{1}{2\sqrt{3}}\log\left|\frac{1+\sqrt{3}\tan x}{1-\sqrt{3}\tan x}\right|+c$

3) $\frac{1}{\sqrt{3}}\log\left|\frac{1+\sqrt{3}\tan x}{1-\sqrt{3}\tan x}\right|+c$ 4) $\frac{2}{\sqrt{3}}\log\left|\frac{1-\sqrt{3}\tan x}{1+\sqrt{3}\tan x}\right|+c$

76. $\int x^{1/3}\left(2+x^{2/3}\right)^{1/4}dx$ is equal to

1) $\frac{2}{3}\left(2+x^{2/3}\right)^{9/4}+\frac{12}{5}\left(2+x^{2/3}\right)^{5/4}+c$ 2) $\frac{2}{3}\left(2+x^{2/3}\right)^{9/4}-\frac{12}{5}\left(2+x^{2/3}\right)^{5/4}+c$

3) $\frac{1}{3}\left(2+x^{2/3}\right)^{9/4}-\frac{12}{5}\left(2+x^{2/3}\right)^{5/4}+c$ 4) $\frac{1}{3}\left(2+x^{2/3}\right)^{9/4}+\frac{12}{5}\left(2+x^{2/3}\right)^{5/4}+c$

77. If $\int_{\sqrt{2}}^{x} \frac{dx}{x\sqrt{x^2-1}} = \frac{\pi}{12}$, then $x =$

1) 1 2) $\frac{1}{2}$ 3) 2 4) -2

78. $\lim_{n\to\infty} \sum_{r=1}^{n} \frac{1}{\sqrt{4n^2-r^2}}$

1) $\frac{\pi}{2}$ 2) $\frac{\pi}{3}$ 3) $\frac{\pi}{6}$ 4) $\frac{\pi}{5}$

79. The area bounded by the lines $y = 2+x,\ y = 2-x$ and $x = 2$ is

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

80. I.F of $\left(1+x^3\right)\frac{dy}{dx} + 3x^2 y = \sin^2 x$

1) $1+x^3$ 2) $\frac{1}{1+x^3}$ 3) $3x^2$ 4) $\frac{1}{x^3}$

PHYSICS

81. If the determine formula of energy X Speed is $\left[M^a L^b T^c\right]$ then a, b , c are

1) $(1,3,-3)$ 2) $(1,2,2)$ 3) $(1,2,3)$ 4) $(1,3,-2)$

82. An aero plane flies 400m north and 300m south and flies 1200m upward, then net displacement is

1) 1400m 2) 1500m 3) 1200m 4)1100m

83. The dot product of unit vectors $\hat{n}_1$ *and* $\hat{n}_2$ that are parallel to $5\hat{i}+12\hat{j}$ *and* $3\hat{i}+4\hat{j}$ respectively is

1) 63/65 2) 63 3) 63/4225 4) 63/845

84. A book is lying on a table. What is the angle between the normal reaction acting on the book on the table and the weight of the book?

1) 0^0 2) 450 3) 90^0 4) 180^0

85. The potential energy of an object is $u(x) = (5x^2 - 4x^3)J$ where x is the position in meter . The position at which the force becomes zero is

1) 1/2 m 2) 5/6 m 3) 1/3 m 4) 2/3 m

86. A particle of mass m_1 collides with a particle of mass m_2 at rest after the elastic collision the two particles moves at an angle of 90^0 with respect to each other. The ratio m_2 / m_1 is

1) 1.0 2) 1.5 3) 2.0 4) 2.5

87. In carbon monide molecular the carbon and the oxygen atoms are separated by distance $1.2A^0$. The distance of the centre of mass from the carbon atom is

1) $0.48A^0$ 2) $0.51A^0$ 3) $0.56A^0$ 4) $0.69A^0$

88. Three point masses each of mass m are placed at the cornes of an c quilateral triangle of side b, the moment of inertia of the system about an axis coinciding with one side of the triangle is

1) $3mb^2$ 2) mb^2 3) $\left(\frac{3}{4}\right)mb^2$ 4) $\left(\frac{2}{3}\right)mb^2$

89. The orbital period of geostationary satellite is

1) 2 hr 2) 5 hr 3) 24 hr 4) 12 hr

90. A pendulum is oscillating at a frequency of 8 Hz. Suddenly the string of the pendulum is clamped at its midpoint the new frequency of oscillation is

1) 16 Hz 2) 13.8 Hz 3) 11.28 Hz 4) 5.7 Hz

91. Three wires A , B,C made of different materials alongated by 1.5,2.5,3.5mm under a load of 5 kg. The diameters of the wires are same. The most elastic material is

1) A 2) B 3) C 4) All of the above

92. Clouds appear to float in air due to

1) low density 2) air current 3) viscosity of air 4) Buoyancy

93. A rain drop of radius r is falling through air starting from rest The work done by all the forces on the drop, when it attained terminal velocity ,is proportional to

1) r^3 2) r^7 3) r^5 4) r^4

94. A soap bubble of initial radius 'R' is to be blown up. The surface tension of the soap film is T. The surface energy needed to double the diameter of the bubble is

1) $12\pi R^2T$ 2) $4\pi R^2T$ 3) $16\pi R^2T$ 4) $24\pi R^2T$

95. When 50 g of water at 10^0C is mixed with 50g of water at 100^0C. The resultant temperature is

1) 80^0C 2) 55^0C 3) 25^0C 4) 45^0C

96. The door an operating refrigerator is kept open as a result the temperature of the room will

1) remains unchanged 2) increase 3)decrease 4) depth on the contents inside the refrigerator

97. A diatonic gas (γ =1.4) does 300J work when it is expanded isobarically. The heat given to the gas in this process is

1) 1050 J 2) 950 J 3) 600 J 4) 550 J

98. Temperature of a cold reservoir of a Carnot engine is 127^0C. If the efficiency of the Carnot engine is 20% then the temperature of the hot reservoir is

1) 500^0C 2) 227^0C 3) 273^0C 4) 400^0C

99. If a gas has 'n' degrees of forcedown. Then the ratio of $\frac{CP}{CV}$ is

1) $\frac{n+2}{2}$ 2) $\frac{2n+1}{n}$ 3) $\left(\frac{n+2}{n}\right)$ 4) $\frac{n+4}{2n}$

100. Two closed pipes have the same fundamental frequency. One is filled with oxygen and the other with hydrogen at the same temperature. Ratio of their length respectively is

1) 1:4 2) 4:1 3) 1:2 4) 2:1

101. A ray of light incident at 30^0 from a medium of refractive index 2 into a medium of refractive index 1. Then angle of refraction is.

1) 30^0 2) 60^0 3) 45^0 4) 90^0

102. Two Convex lenses of focal lengths f1 and f2 from images with magnification m1 and m2, when used individually for an object kept at the same distance from the lenses . then f1\f2 is.

1) $\frac{m_1(1-m_1)}{m_2(1-m_2)}$ 2) $\frac{m_1(m_2-1)}{m_2(m_1-1)}$ 3) $\frac{m_2(1-m_1)}{m_1(1-m_2)}$ 4) $\frac{m_2(1-m_2)}{m_1(1-m_1)}$

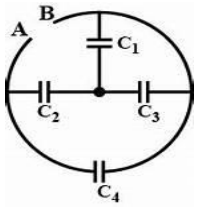
103. In a young's double slit experiment if the slit separation is twice the wave length of light used then the maximum number of inference maxima is.

1) 2 2) 3 3)5 4)7

104. A particle of mass m and charge q travelling with a velocity V along the x-axis enters a uniform electric Filed $\overline{E}$ directed along the Y-axis . what will be the trajectory of the particle?

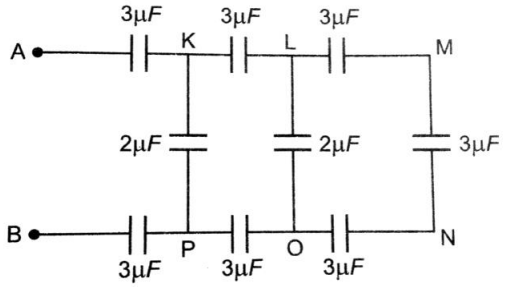
1) circular 2) Elliptical 3) parabolic 4) Helical

105. In the arrangement of capacitors shows in the fig. If each capacitor is 9PF, then the effective capacitors between the points A and B is



1)10 PF 2) 15 PF 3) 20 PF 4) 5 PF

106. The equivalent capacitance between A and B in the given circuit is



1) 3 μF 2) 1 μF 3) 2 μF 4) 1.5 μF

107. A cell can supply current of 1A and 0.5A via resistances of 2.5 Ω 10 Ω respectively. The internal resistance of the cell is.
1)2 Ω 2)3 Ω 3) 4 Ω 4) 5 Ω

108. Balancing point of a potentiometer shifts from a length of 60 Cm to 40 cm by shunting the cell with a 40m resistance what is the internal resistance of the cell?
1) 1 Ω 2) 2 Ω 3) 4 Ω 4) 6 Ω

109. A charged particle moves through a magnetic field perpendicular to its direction then
1) Kinetic energy changes but the momentum is constant
2) The momentum changes but the kinetic Energy is constant.
3) Both momentum and Kinetic energy of the particles are not constant.
4) Both momentum and kinetic energy of the particles are constant.

110. A voltmeter of 250 mv range has a resistance of 10 Ω is converted into an ammeter of 250 mA range. The value of necessary shunt is (nearly).
1)2 Ω 2) 0.1 Ω 3) 1 Ω 4) 10 Ω

111. The current in a coil changes from 3A to 1A in 0.1 sec. in coil of self-inductance of 8mH. The emf induced in the coil is
1) 16V 2) $1.6\times10^{-2}V$ 3) $16\times10^{-2}V$ 4) 2 V

112. The reactance of an inductor at 50 HZ is 10 Ω. The reactance of it at 200Hz
1) 10 Ω 2 40 Ω 4) 2.5 Ω 4 20 Ω

113. Practically ozone layer abords radiations of wave length.
1) less than $3\times10^{-7}m$ 2) greater than $3\times10^{-7}m$ 3) equal to $3\times10^{-7}m$ 4) all of the above.

114. If the wave length of a photon is 4000 A^0. Then its energy will be …….
1) $4.975\times10^{-19}J$ 2) $5.95\times10^{-19}J$ 3) $3.95\times10^{-19}J$ 4) $6.95\times10^{-19}J$

115. A photon of energy 4eV imparts all its energy to an electron that leaves a metal surface with1.1 ev of kinetic energy. The work function of the metal is.
1) 2.9 eV 2) 5.1 eV 3) 3.64 eV 4) 4.4 eV

116. The ratio of longest wave length lines in the Balmer and paschen series of hydrogen spectrum is.
1) $\frac{5}{36}$ 2) $\frac{7}{20}$ 3) $\frac{7}{144}$ 4) $\frac{5}{27}$

117. Which of the following is a emitted , when $^{239}_{94}Pu$ Decays into $_{94}Pu^{235}$?
1) Gamma ray 2) Neutron 3) Electron 4) Alpha particle.

118. For an n-p-n transistor structure which of the following statements is Not True?
1) Emitter is heavily doped and moderate in size
2) Base is lightly doped and thin in size
3) Collector is lightly doped and large in size
4) Collector is moderately doped and large in size

119. The logic operation performed by the following circuit is

1) NOR 2) AND 4) NAND 4) OR

120. The frequency suitable beyond the horizon communication using sky ware is
11)10 KHz 2) 10 MHz 3) 1 GHz 4) 1000GHz

CHEMISTRY

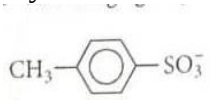
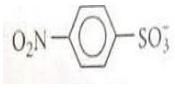
121. (I) $H_2O+O_3\rightarrow H_2O+2O_2$
(II) $H_2O_2+Ag_2O\rightarrow 2Ag+H_2O+O_2$
Role of hydrogen peroxide in the above reactions is respectively

1) Oxidising in (I) and reducing in (II) 2) reducing in (I) and oxidising in (II)
3) reducing in (I) and (II) 4) oxidising in (I) and (II)

122. If 10^{21} molecules are removed from 200 mg of CO_2, the number of moles of CO_2 left is

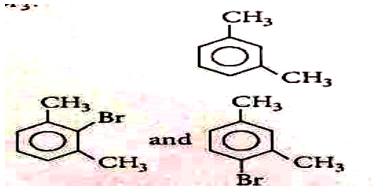
1) 2.88×10^{-3} 2) 28.8×10^{-3} 3) 0.288×10^{-3} 4) 1.66×10^{-2}

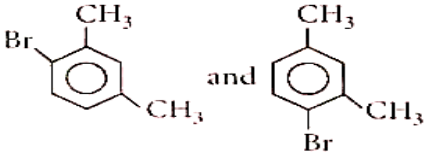
123. Leaving tendency of the following groups in decreasing order is

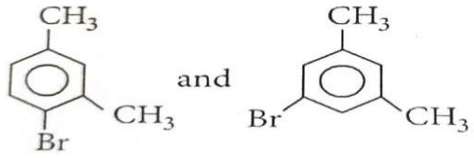
I. CI^- II.  *III*. OH^- IV. 

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

124. What products are formed when the following compound is treated with Br_2 in the presence of $FeBr_3$

1) 

2) 

3) 

4) None of these

125. *T e ions* $O^{2-}, F^-, Na^+, Mg^{2+}$ *and* AI^{3+} are isoelectronic. T eir ionic radii show

1) a decrease from O^{2-} *to* F^- and then increase from Na^+*to* AI^{3+}
2) a significant increase from O^{2-} *to* AI^{3+}
3) a significant decrease from O^{2-} *to* AI^{3+}
4) an increase from O^{2-} *to* F^- and then decrease from Na^+ *to* AI^{3+}.

126. Acidity of diprotic acids in aqueous solutions increases in the order

1) $H_2S < H_2Se < H_2Te$ 2) $H_2Se < H_2S < H_2Te$
3) $H_2Te < H_2S < H_2Se$ 4) $H_2Se < H_2Te < H_2S$

127. The correct order of increasing basicity of the given conjugate bases $(R = CH_3)$ *is*

(*A*) $RCOO^- < HC \equiv C^- < NH_2^- < R^-$
(*B*) $RCOO^- < HC \equiv C^- < R^- < NH_2^-$
(*C*) $R^- < HC \equiv C^- < RCOO^- < NH_2^-$
(*D*) $RCOO^- < NH_2^- < HC \equiv C^- < R^-$

128. A mong the following mixtures, dipole-dipole as the major interaction is present in
1) benzene and ethanol
2) acetonitrile and acetone
3) KCI and water
4) benzene and carbon tetrachloride.

129. The enthalpy of neutralization of NH_4OH and CH_3COOH is $-10.5\,kcal\ mol^{-1}$ and enthalpy of Neutralization of CH_3COOH with strong base is $-12.5\,kcal\ mol^{-1}$. *T* e enthalpy of ionization of NH_4OH Wiil be

1) $4.0\,kcal\ mol^{-1}$ 2) $3.0\,kcal\ mol^{-1}$ 3) $2.0\,kcal\ mol^{-1}$ 4) $3.2\,kcal\ mol^{-1}$

130. The correct order of the oxidation states of nitrogen in $NO, NO_2,$ *and* N_2O_3 *is*

1) $NO_2 < NO < N_2O_3 < N_2O$ 2) $N_2O < NO < N_2O_3 < NO$
3) $O_2 < N_2O_3 < NO < N_2O$ 4) $N_2O < N_2O_3 < NO < N_2O$

131. When $LiNO_3$ is heated, it gives oxide, Li_2O ,where as other alkali metal nitrates decompose to give

Corresponding

1) nitrite 2) peroxide 3) both nitrite and oxide 4) none of these

132. An explosion takes place when $conc.H_2SO_4$ is added to $KMnO_4$ which of the following is formed?

1) Mn_2O_7 2) $Mn\ O_2$ 3) $Mn\ SO_4$ 4) Mn_2O_3

133. Antiseptics and disinfectants either kill or prevent growth of micro-organisms. Identify which of the following Statement is not true

1) Dilute solution of boric acid and hydrogen peroxide are strong antiseptics.

2) Disinfectants harm the tissues.

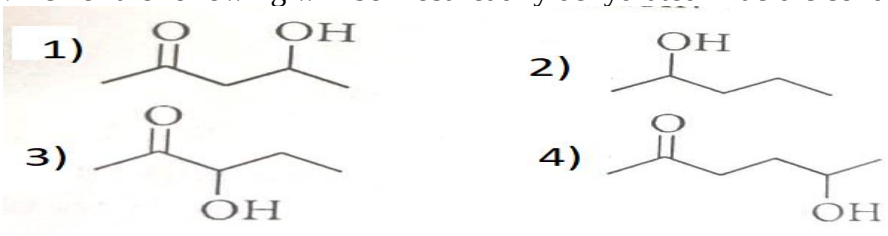
3) $A\ 0.2\%$ solution of phenol is an antiseptic while 1.0% solution is disinfectant.

4) Tincture of iodine is a powerful antiseptic.

134. When a liquid X is treated with Na_2CO_3 solution, a mixture of two salts Y and Z are produced in the solution. The mixture on acidification with sulphuric acid and distillation, produces the liquid X again Identify X.

1) Cl_2 2) Br_2 3) Hg 4) l_2

135. Which of the following will be most readily dehydrated in acidic condition



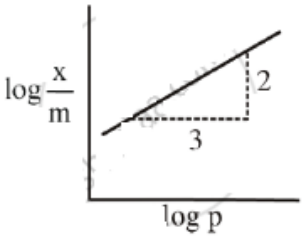
136. An element occurs in two crystalline forms $\alpha\ and\ \beta$. α-form has a fcc structure with $a = 3.68\ A$ and $\beta - form$ has a bcc structure with $a = 2.92\ A$ calculate the ratio of their densities.

1) 1:1 2) 1:2 3) 2:1 4) 2:3

137. The increasing order of atomic radii of the following group 13 elements is

1) $Al < Ga < In < TI$ 2) $Ga < Al < In < TI$ 3) $Al < In < Ga < TI$ 4) $Al < Ga < TI < In$

138. Adsorption of a gas follows Freundlich adsorption isotherm x is the mass of the gas adsorption on mass m of the adsorbent. The plot of $\log\frac{x}{m}$ versus log P is shown in the given graph $\frac{x}{m}$ is proportional to



1) $p^{2/3}$ 2) $p^{3/2}$ 3) p^3 4) p^2

139. $SiCl_4$ is easily hydrolysed but CCI_4 is not. This is because

1) bonding in $SiCI_4$ is ionic

2) silicon is non-metallic

3) silicon can extend its coordination number beyond four but carbon cannot

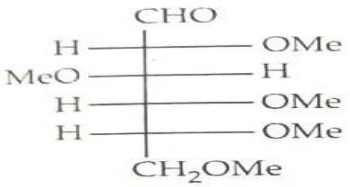
4) silicon can form hydrogen bonds but carbon cannot.

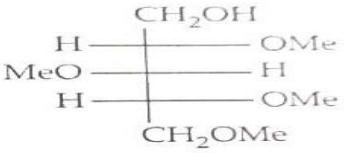
140. In which of the following coordination entities the magnitude of Δ_0 (CFSE in octahedral field) will be maximum

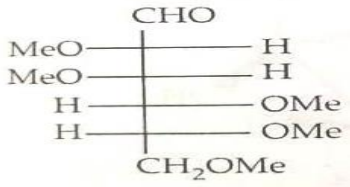
1) $\left[Co\left(C_2O_4\right)_3\right]^{3-}$ 2) $\left[Co\left(H_2O\right)_6\right]^{3-}$ 3) $\left[Co\left(NH_3\right)_6\right]^{3+}$ 4) $\left[Co\left(CN\right)_6\right]^{3-}$

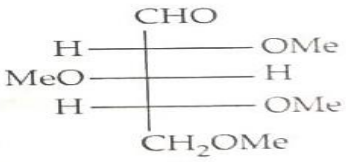
141. D-glucose $\xrightarrow[HCI]{CH_3CH_2SH} \xrightarrow[NaOH]{(CH_3)_2SO_4} \xrightarrow[CdCO_3]{HgCI_2} X$

The final product X is

1) 

2) 

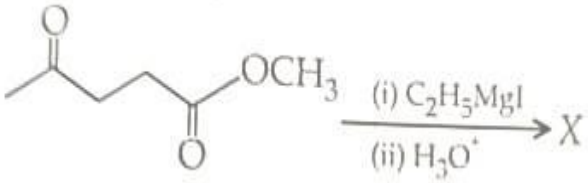
3) 

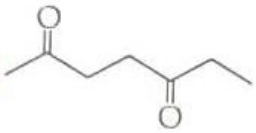
4) 

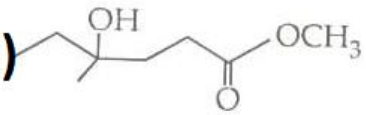
142. An amount of solid NH_4HS is placed in a flask already containing ammonia gas at a certain temperature and 0.50 atm Pressure. Ammonium hydrogen sulphide decomposes to yield NH_3 and H_2S gases in the flask. When the decomposition reaction reaches equilibrium, the total pressure in the flask rises to 0.84 atm. The Equilibrium constant for NH_4HS decomposition at this temperature is

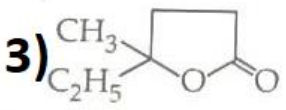
1) 0.30 2) 0.18 3) 0.17 4) 0.11

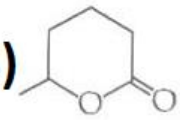
143. Give the structure of the compound X formed in the following reaction



1) 

2) 

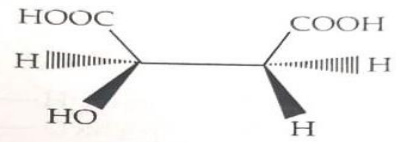
3) 

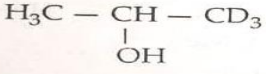
4) 

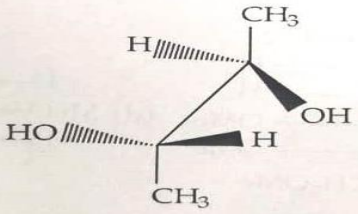
144. If S_1, S_2, S_3 *and* S_4 are the solubilities of $AgCI$ in water, in 0.01 M $CaCI_2$,in 0.01 M $NaCI$ and in 0.05M $AgNO_3$ respectively at a certain temperature, the correct order of solubility is

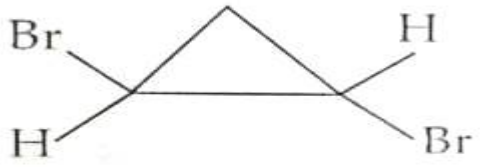
1) $S_1 > S_2 > S_3 > S_4$ 2) $S_1 > S_3 > S_2 > S_4$ 3) $S_1 > S_2 = S_3 > S_4$ 4) $S_1 > S_3 > S_4 > S_2$

145. Which of the following molecules will not show optical activity

1) 

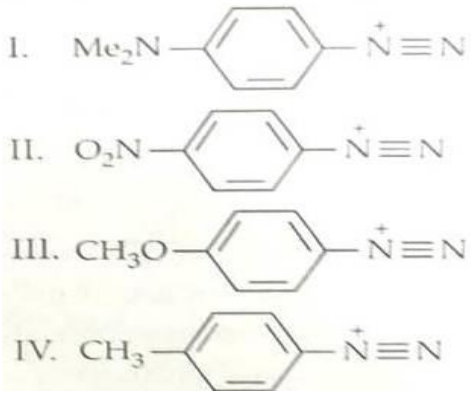
2) 

3) 

4) 

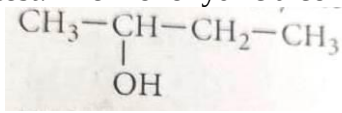
146. In Bohr series of lines of hydrogen spectrum, the third line from the red end corresponds to which one of the following inter orbit jumps of the electron, for Bohr orbits in an atom of hydrogen?
1) $3 \rightarrow 2$ 2) $5 \rightarrow 2$ 3) $4 \rightarrow 1$ 4) $2 \rightarrow 5$

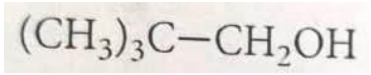
147. Consider the following ions:

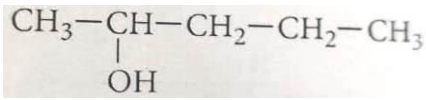


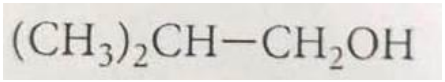
The reactivity order of these ions towards azo coupling reaction under similar conditions is
1) $I < IV < II < III$ 2) $I < III < IV < II$ 3) $III < I < II < IV$ 4) $III < I < IV < II$

148. 0.44 g of a monohydric alcohol when added to methyl magnesium iodide in ether liberates 112 cm^3 of Methane at $S.T.P$. with PCC the same alcohol forms a carbonyl compound that answers silver mirror test. The monohydric alcohol is

1) 

2) 

3) 

4) 

149. Consider a reaction $aG + bH \rightarrow products.$ When concentration of both the reactants G and H is doubled. The rate increases eight times. However, when concentration of G is doubled keeping the concentration of H Fixed. The rate is doubled. The overall order of the reaction is
1) 0 2) 1 3) 2 4) 3

150. Match the column I with column II and mark the appropriate choice.

Column I	Column II
1) Quick Lime	(I)setting fractured bones
2) plaster of Paris	(II)A constituent of chewing gum
3) Slaked lime	(III) manufacture of belching power
4) lime store	(IV) Manufacture of dyestuffs

(A) $(A) \rightarrow (i), (B) \rightarrow (iv), (C) \rightarrow (ii), (D) \rightarrow (iii)$
(B) $(A) \rightarrow (iv), (B) \rightarrow (i), (C) \rightarrow (iii), (D) \rightarrow (ii)$
(C) $(A) \rightarrow (ii), (B) \rightarrow (iii), (C) \rightarrow (i), (D) \rightarrow (iv)$
(D) $(A) \rightarrow (iii), (B) \rightarrow (ii), (C) \rightarrow (iv), (D) \rightarrow (i)$

151. The order of compounds of their reactivity towards HCN is
1) acetaldehyde <acetone<methyl tert-butyl ketone<di-tert-butyl ketone
2) di-tert-butyl ketone < methyl tert – butyl ketone < acetone < acetaldehyde
3) di-tert-butyl ketone < acetone <methyl tert-butyl ketone < acetaldehyde
4) acetone < acetaldehyde < di-tert-butyl ketone < methyl tert-butyl ketone.

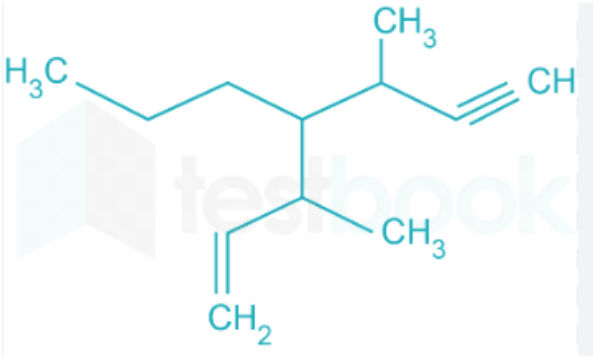
152. which of the following is a correct method to convert P-toluidine to p-toluic acid
1) Diazotisation, CuCN , H_2 / pd

2) $CHCI_3 / NaOH, KCN, Sn / HCI$

3) $Diazotisation, CuCN / KCN, H_2O / H^+$

4) $Diazotisation, NaCN, NaOH$

153 . The IUPAC name for the following compound is



1) 3-methyl-4-(3-methylprop-1-enyl)-heptyne 2)3,5-dimethyl-4-propylhept-6-en-l-yne

3)3-methyl-4-(1-methylprop-2-ynyl)-1-heptene 4) 3,5-dimethyl-4-propylhept-1-en-6-yne

154. The main reactions occurring in blast furnace during extraction of iron from haematite are

(I) $Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$

(II) $FeO + SiO_2 \rightarrow FeSiO_3$

(III) $Fe_2O_3 + 3C \rightarrow 2Fe + 3CO$

(IV) $CaO + SiO_2 \rightarrow CaSiO_3$

1) $I, II \text{ and } III$ 2) $I \text{ and } IV$ 3) $I, III \text{ and } IV$ 4) $II \text{ and } III$

155. A dihaloalkane 'X' having formula $C_3H_6CI_2$,on hydrolysis gives a compound, that can reduce Tollen's reagent. The compound 'X' is

1) 1,2-dichloropropane
2) 1,1-dichloropropane
3) 1,3-dichloropropane
4) 2,2-dichloropropane

156. An organic compound is estimated through Dumas method and was found to evolved 6 moles of CO_2 ,4 moles of H_2O and 1 mole of nitrogen gas. The formula of the compound is

1) C_6H_8N 2) $C_{12}H_8N$ 3) $C_{12}H_8N_2$ 4) $C_6H_8N_2$

157. Among the following species, identify the isostructural pairs $NF_3, NO_3^-, BF_3, H_3O^+, HN_3$

1) $\left[NF_3, NO_3^-\right] and \left[BF_3, H_3O^+\right]$ 2) $\left[NF_3, HN_3\right] and \left[NO_3^-, BF_3\right]$

3) $\left[NF_3, H_3O^+\right] and \left[NO_3^-, BF_3\right]$ 4) $\left[NF_3, H_3O^+\right] and \left[HN_3, BF_3\right]$

158. Vapour pressure of dilute aqueous solution of glucose is 750 mm of mercury at 373 K. The mole fraction of Solute is

1) 1/76 2) 1/7.6 3) 1/38 4) 1/10

159. The Principal products obtained on heating iodine with concentrated caustic soda solution are

1) $NaOI + NaI$ 2) $NaIO_3 + NaI$ 3) $NaOI + NaIO_3 + NaI$ 4) $NaIO_4 + NaI$

160. Formation of polyethylene from calcium carbide takes place as follows:

$CaC_2 + 2H_2O \rightarrow Ca(OH)_2 + C_2H_2$

$C_2H_2 + H_2 \rightarrow C_2H_4$

$nC_2H_4 \rightarrow (-CH_2 - CH_2 -)_n$

The amount of polyethylene obtained from 64 kg of CaC_2 *is*

1) 7 *kg* 2) 14 *kg* 3) 21 *kg* 4) 28 *kg*

KEY SHEET

MATHEMATICS

1	2	3	4	5	6	7	8	9	10
3	4	1	2	4	1	2	2	3	2
11	12	13	14	15	16	17	18	19	20
1	1	4	1	1	1	2	3	1	4
21	22	23	24	25	26	27	28	29	30
2	1	2	4	1	2	2	4	3	1
31	32	33	34	35	36	37	38	39	40
1	3	4	2	1	3	2	2	2	3
41	42	43	44	45	46	47	48	49	50
2	1	1	3	1	4	4	2	1	1
51	52	53	54	55	56	57	58	59	60
3	2	1	3	3	4	1	1	2	2
61	62	63	64	65	66	67	68	69	70
2	1	1	3	1	3	3	1	2	1
71	72	73	74	75	76	77	78	79	80
1	2	3	2	2	2	3	3	2	1

PHYSICS									
81	82	83.	84	85	86	87	88	89	90
1	3	1	4	2	2	3	3	3	3
91	92	93	94	95	96	97	98	99	100
1	4	2	4	2	2	1	2	3	1
101	102	103	104	105	106	107	108	109	110
3	2	1	3	2	2	4	2	1	3
111	112	113	114	115	116	117	118	119	120
3	2	1	1	1	2	4	3	2	2
CHEMISTRY									
121	122	123	124	125	126	127	128	129	130
3	1	1	2	3	1	1	2	3	4
131	132	133	134	135	136	137	138	139	140
1	1	1	2	1	1	3	1	3	4
141	142	143	144	145	146	147	148	149	150
1	4	3	2	3	2	2	2	4	2
151	152	153	154	155	156	157	158	159	160
2	3	3	2	2	2	3	1	2	4

SET-4

MATHS

1. If $A=(3,81)$ and $f:A\to B$ is a surjection defined by $f(x)=\log_3 x$ then $B=$

   1) $[1,4]$ 2) $(1,4]$ 3) $(1,4)$ 4) $[1,\infty)$

2. If $f(x)=\dfrac{x}{\sqrt{1+x^2}}$ then $fofof(x)=$

   1) $\dfrac{x}{\sqrt{1+3x^2}}$ 2) $\dfrac{x}{\sqrt{1-x^2}}$ 3) $\dfrac{2x}{\sqrt{1+2x^2}}$ 4) $\dfrac{x}{\sqrt{1+x^2}}$

3. $\forall n\in N,\dfrac{n^4}{24}+\dfrac{n^3}{4}+\dfrac{11n^2}{24}+\dfrac{n}{4}$ is a

   1) Rational Number 2) Integer 3) Natural Number 4) Real Number

4. If A is a square matrix of order 3 then $\left|Adj\,(Adj\,A^2)\right|=$

   1) $|A|^2$ 2) $|A|^4$ 3) $|A|^8$ 4) $|A|^{16}$

5. Given $a_i^2+b_i^2+c_i^2=1(i=1,2,3)$ and $a_i a_j+b_i b_j+c_i c_j=0(i\neq j,i,j=1,2,3)$ then the value of

   $\begin{vmatrix} a_1 & a_2 & a_3 \\ b_1 & b_2 & b_3 \\ c_1 & c_2 & c_3 \end{vmatrix}$ is

   1) 0 2) $\dfrac{1}{2}$ 3) ±1 4) 2

6. The system of equation $3x+2y+z=6,3x+4y+3z=14$ and $6x+10y+8z=a$, has infinite number of solutions, if a is equal to

   1) 8 2) 12 3) 24 4) 36

7. Matrix A is given by $A=\begin{bmatrix} 6 & 11 \\ 2 & 4 \end{bmatrix}$ then the determinant of $A^{2015}-6A^{2014}$ is

   1) 2^{2016} 2) $(-11)2^{2015}$ 3) $-2^{2015}\times 7$ 4) $(-9)2^{2014}$

8. If $\bar{p}=\bar{i}+a\bar{j}+\bar{k}$ and $\bar{q}=\bar{i}+\bar{j}+\bar{k}$, then $\left|\bar{p}+\bar{q}\right|=\left|\bar{p}\right|+\left|\bar{q}\right|$ is true for

   1) $a=-1$ 2) $a=1$ 3) all real values of 'a' 4) for no real values of 'a'

9. The vector $\bar{c}$ directed along the internal bisector of the angle between the vectors $2\bar{i}+3\bar{j}-6\bar{k}$ and $-2\bar{i}-\bar{j}+2\bar{k}$ with $\left|\bar{c}\right|=10\sqrt{21}$ is __

   1) $\pm\left(-8\bar{i}+2\bar{j}-4\bar{k}\right)$ 2) $\pm10\left(-4\bar{i}+\bar{j}-2\bar{k}\right)$

   3) $\pm\left(-12\bar{i}+3\bar{j}-6\bar{k}\right)$ 4) $\pm\left(12\bar{i}+3\bar{j}+6\bar{k}\right)$

10. The orthogonal projection of $\bar{a}=2\bar{i}+3\bar{j}+3\bar{k}$ on $\bar{b}=\bar{i}-2\bar{j}+\bar{k}$ (where $\bar{i}$, $\bar{j}$, $\bar{k}$ are unit vectors along three mutually perpendicular directions) is

1) $\frac{-\bar{i}+2\bar{j}-\bar{k}}{6}$ 2) $\frac{-\bar{i}+2\bar{j}-\bar{k}}{\sqrt{6}}$ 3) $\bar{i}-2\bar{j}+\bar{k}$ 4) $-\bar{i}+2\bar{j}-\bar{k}$

11. If $\bar{A}.(\bar{B}+\bar{C})=\bar{B}.(\bar{C}+\bar{A})=\bar{C}.(\bar{A}+\bar{B})=0$ and $|\bar{A}|=3,|\bar{B}|=4$ and $|\bar{C}|=5$ then $|\bar{A}+\bar{B}+\bar{C}|=$

1) 5 2) $5\sqrt{2}$ 3) $5/\sqrt{2}$ 4) $\sqrt{2}$

12. The angle between the plane passing through the points $A(0,0,0),B(1,1,1),C(3,2,1)$ & the plane passing through $A(0,0,0),B(1,1,1),D(3,1,2)$ is

1) 90^0 2) 45^0 3) 120^0 4) 30^0

13. If $\bar{a}=2\bar{i}+2\bar{j}+\bar{k},\bar{b}=5\bar{i}+\bar{j}+2\bar{k}$ then $|\bar{a}\times\bar{b}|^2+(\bar{a}.\bar{b})^2=$

1) 270 2) 120 3) 170 4) 110

14. If $0\le x\le\pi,81^{\sin^2 x}+81^{\cos^2 x}=30$ then $x=$

1) $\frac{\pi}{6}$ 2) $\frac{\pi}{4}$ 3) $\frac{\pi}{15}$ 4) $\frac{\pi}{8}$

15. In a $\Delta PQR,\angle R=\frac{\pi}{2}$ if $\tan\left(\frac{P}{2}\right)$ and $\tan\left(\frac{Q}{2}\right)$ are the roots of the equation $ax^2+bx+c=0(a\neq 0)$ then

1) $a+b=c$ 2) $b+c=a$ 3) $a+c=b$ 4) $b=c$

16. The minimum and maximum values of $\sin^2(60^0-x)+\sin^2(60^0+x)$ are

1) $-\frac{1}{2},\frac{1}{2}$ 2) $\frac{1}{2},1$ 3) $\frac{1}{2},\frac{3}{2}$ 4) $\frac{3}{2},2$

17. If $0\le x\le 2\pi$ and $|\cos x|\le\sin x,$ then

1) $x\in\left[0,\frac{\pi}{4}\right]$ 2) $x\in\left[\frac{\pi}{4},2\pi\right]$ 3) $\left[\frac{\pi}{4},\frac{3\pi}{4}\right]$ 4) $[0,\pi]$

18. If $x^2+y^2+z^2=r^2$ then $\tan^{-1}\left(\frac{xy}{zr}\right)+\tan^{-1}\left(\frac{yz}{xr}\right)+\tan^{-1}\left(\frac{xz}{yr}\right)=$

1) π 2) $\frac{\pi}{2}$ 3) 0 4) $\frac{\pi}{4}$

19. If r_1,r_2,r_3 are the radii of the escribed circles of a ΔABC and if r is the radius of its incircle then $r_1r_2r_3-r(r_1r_2+r_2r_3+r_3r_1)=$

1) 0 2) 1 3) 2 4) 3

20. In an equilateral triangle $r:R:r_1$ is

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

21. If $\left|z-\frac{4}{z}\right|=2$ then the maximum value of $|z|$ is

1) $\sqrt{5}$ 2) $\sqrt{5}+1$ 3) $\sqrt{5}-1$ 4) $-\sqrt{5}$

22. Let $A=\frac{2}{\sqrt{3}}e^{-i\frac{\pi}{6}},B=\frac{2}{\sqrt{3}}e^{i\frac{\pi}{2}},C=\frac{2}{\sqrt{3}}e^{-i\frac{5\pi}{6}}$ be three points forming a triangle ABC in the Gussain plane then triangle ABC is

1) equilateral 2) isosceles 3) scalene 4) Right angled

23. If $\log_{\sqrt{3}}\left|\frac{|z|^2-|z|+1}{|z|+2}\right|<2$ then locus of z is

1) a circle 2) a straight line 3) interior of the circle 4) ellipse

24. If α,β are the roots of the equation $x^2-2x+4=0$, then $\alpha^5+\beta^5=$

1) 64 2) 32 3) –32 4) –64

25. The minimum value $|x|+\left|x+\frac{1}{2}\right|+|x-3|+\left|x-\frac{5}{2}\right|$ is

1) 2 2) 4 3) 6 4) 4

26. The equation $(x-3)^9+\left(x-3^2\right)^9+\left(x-3^3\right)^9+...+\left(x-3^9\right)^9=0$ has

1) all the roots are real 2) one real and 8 imaginary roots

3) real roots namely $x=3,3^2,.....3^9$ 4) five real and 4 imaginary roots.

27. If α,β,γ are the roots of the equation $x^3-x+2=0$ then the equation whose roots are $\alpha\beta+\frac{1}{\gamma},\beta\gamma+\frac{1}{\alpha},\gamma\alpha+\frac{1}{\beta}$ is

1) $2y^3+y^2+1=0$ 2) $2y^3-y^2+1=0$ 3) $y^3+y^2+1=0$ 4) $2y^3+y^2-1=0$

28. Number of real roots of the equation $\left(x^2-5x+1\right)\left(x^2+x+1\right)+8x^2=0$

1) 1 2) 2 3) 3 4) 4

29. A basket contains 4 oranges, 5 Apples, 6 Mangoes. The number of ways a person make selection of fruits from the basket is

1) 209 2) 210 3) 211 4) 212

30. A class contains 4 boys and 'g' girls. Every Sunday five students, including at least three boys go for a picnic to Zoo Park, a different group being sent every week. During, the picnic, the class teacher gives each girl in the group a doll. If the total number of dolls distributed was 85, then value of 'g' is

1) 15 2) 12 3) 8 4) 5

31. The number of ways in which 52 cards can be divided into 4 sets of 13 each is

1) $\frac{52!}{(13!)^4}$ 2) $\frac{52!}{4!(13!)^4}$ 3) $\frac{52!}{4^{13}}$ 4) $\frac{52!}{13!4^{13}}$

32. $\frac{7}{5}\left(1+\frac{1}{10^2}+\frac{1.3}{1.2}.\frac{1}{10^4}+\frac{1.3.5}{1.2.3}.\frac{1}{10^6}+.....\infty\right)=$

1) $\sqrt{2}$ 2) $2\sqrt{2}$ 3) $2^{1/3}$ 4) $\sqrt{\frac{2}{3}}$

33. Coefficient of x^2 in the expansion of $\left(1+3x-2x^3\right)^{10}$

1) 62640 2) 64620 3) 65640 4) 62330

34. Coefficient of x^4 in the expansion of $\frac{1}{(x+1)(x+2)}$

1) $\frac{1}{32}$ 2) $\frac{11}{32}$ 3) $\frac{21}{32}$ 4) $\frac{31}{32}$

35. The mean of two samples of sizes 200 and 300 were found to be 25, 10 respectively. Their standard deviations were 3 and 4 respectively. The variance of combined sample of size 500 is

1) 64 2) 65.2 3) 67.2 4) 64.2

36. Suppose a population A has 100 observations 101,102……, 200 and another population B has 100 observations 151, 152, ……. 250. If V_A and V_B represent the variances of the two populations, respectively, then V_A/V_B is

1) 1 2) $9/4$ 3) $4/9$ 4) $2/3$

37. If the letters of word 'PROBABILITY' are arranged at random. The probability that

1) relative position of vowels and consonants remains unaltered.

2) the order of vowels remains the same.

3) the order of vowels and consonants remains the same in the same order is

1) $\frac{4!7!}{11!}, \frac{1}{12}, \frac{(2!2!)}{(4!7!)}$ 2) $\frac{4!7!}{11!}, \frac{1}{11}, \frac{(2!2!)}{(4!7!)}$

3) $\frac{4!7!}{11!}, \frac{1}{10}, \frac{(2!2!)}{(4!7!)}$ 4) $\frac{4!7!}{11!}, \frac{1}{21}, \frac{(2!2!)}{(4!7!)}$

38. Let S be the sample space of the random experiment of throwing simultaneously two unbiased dice with six faces (number 1 to 6) and let $E_k = \{(a,b) \in S : ab = k\}$ for $k \geq 1$. If $p_k = P(E_k)$ for $k \geq 1$ then correct among the following, is

1) $p_1 < p_{30} < p_4 < p_6$ 2) $p_{36} < p_6 < p_2 < p_4$

3) $p_1 < p_{11} < p_4 < p_6$ 4) $p_{36} < p_{11} < p_6 < p_4$

39. E_1, E_2 are events of a sample space such that

$P(E_1) = \frac{1}{4}, P\left(\frac{E_2}{E_1}\right) = \frac{1}{2}, P\left(\frac{E_1}{E_2}\right) = \frac{1}{4}, Then\ P\left(\frac{\overline{E_1}}{E_2}\right) =$

1) $\frac{1}{3}$ 2) $\frac{1}{4}$ 3) $\frac{2}{3}$ 4) $\frac{3}{4}$

40. In a business venture a man can make a or profit of Rs. 2000/- with probability of 0.4 or have loss of Rs. 1000/- with probability 0.6. His expected profit is

1) Rs. 800 2) Rs. 600 3) Rs. 200 4) Rs. 400

41. The vertices of a triangle are $\left(1, \sqrt{3}\right)$, $\left(2\cos\theta, \sin\theta\right)$ and $\left(2\sin\theta, -2\cos\theta\right)$ where $\theta \in R$. The locus of orthocenter of the triangle is

1) $\left(x-1\right)^2 + \left(y-\sqrt{3}\right)^2 = 4$ 2) $\left(x-2\right)^2 + \left(y-\sqrt{3}\right)^2 = 4$

3) $\left(x-1\right)^2 + \left(y-\sqrt{3}\right)^2 = 8$ 4) $\left(x-2\right)^2 + \left(y-\sqrt{3}\right)^2 = 8$

42. If the square ABCD where $A(0,0), B(2,0), C(2,2)$ and $D(0,2)$ undergoes the following three transformations successively

i) $f_1(x,y) \to (y,x)$ ii) $f_2(x,y) \to (x+3y, y)$ iii) $f_3(x,y) \to \left(\frac{x-y}{2}, \frac{x+y}{2}\right)$

then the final figure is:

1) square 2) parallelogram 3) rhombus 4) rectangle

43. The acute angle bisector between the lines $3x-4y-5=0, 5x+12y-26=0$ is

1) $7x-56y+32=0$ 2) $9x-3y+13=0$ 3) $14x-112y+65=0$ 4) $7x-13y+9=0$

44. The line joining the points $A(3,0)$ and $B(5,2)$ is rotated about A in the anticlockwise direction through an angle of 15^0. If B goes to C in the new position now the line joining A and C is rotated about A in the anticlockwise direction through an angle of 45^0 of C goes to D in the new position, then the coordinates of D are

1) $\left(4-\sqrt{3}, \sqrt{3}-1\right)$ 2) $\left(4+\sqrt{3}, \sqrt{3}-1\right)$ 3) $\left(4-\sqrt{3}, \sqrt{3}+1\right)$ 4) $\left(4+\sqrt{3}, \sqrt{3}+1\right)$

45. If $4a^2 + 9b^2 - c^2 + 12ab = 0$ then the family of straight lines $ax+by+c=0$ is concurrent at

1) $(2,3)$ or $(-2,-3)$ 2) $(2,-3)$ or $(-2,6)$ 3) $(-2,-4)$ or $(-2,3)$ 4) $(2,5)$ or $(-1,-5)$

46. In a ΔABC the mid points of the sides AB, BC, CA are respectively $(l,0,0), (0,m,0)$ and $(0,0,n)$. Then $\frac{AB^2 + BC^2 + CA^2}{l^2 + m^2 + n^2} =$

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

47. The angle between the diagonals of the parallelogram formed by the points $(1,2,3), (-1,-2,-1), (2,3,2), (4,7,6)$ is

1) $\cos^{-1}(7)$ 2) $\cos^{-1}\left(\frac{7}{\sqrt{155}}\right)$ 3) $\cos^{-1}\left(\frac{7}{\sqrt{465}}\right)$ 4) $\cos^{-1}\left(\frac{7}{465}\right)$

48. A variable plane intersects the coordinate 'p' from O (0,0,0). Then the locus of the centroid of the tetrahedron OABC is

1) $\frac{1}{x^2}+\frac{1}{y^2}+\frac{1}{z^2}=\frac{1}{p^2}$ 2) $\frac{1}{x^2}+\frac{1}{y^2}+\frac{1}{z^2}=\frac{4}{p^2}$

3) $\frac{1}{x^2}+\frac{1}{y^2}+\frac{1}{z^2}=\frac{16}{p^2}$ 4) $\frac{1}{x^2}+\frac{1}{y^2}+\frac{1}{z^2}=16p^2$

49. $\lim_{x\to 2^+}\left(\frac{[x]^3}{3}-\left[\frac{x}{3}\right]^3\right)^x$ is (where [ ] is GIF)

1) 0 2) $\frac{64}{27}$ 3) $\frac{8}{3}$ 4) $\frac{10}{3}$

50. $\lim_{x\to\infty}\left(\frac{a^{1/x}+b^{1/x}+c^{1/x}}{3}\right)^x=$ (where a, b, c are real and non – zero)

1) 0 2) $(abc)^{1/3}$ 3) $(abc)^{-1/3}$ 4) 1

51. Let $f:R\to R$ be defined by $f(x)=\begin{cases}\alpha+\frac{\sin[x]}{x} & ,if \quad x>0\\ 2 & ,if \quad x=0\\ \beta+\left[\frac{\sin x-x}{x^3}\right] & ,if \quad x<0\end{cases}$ where [x] denotes the integral part of x. If f continuous $x=0$, then $\beta-\alpha=$

1) -1 2) 1 3) 0 4) 2

52. Let $f(x)=a\sin|x|+be^{|x|}$ is differentiable when

1) $a=-b$ 2) $a=b$ 3) $a=0$ 4) $b=0$

53. If $\frac{d}{dx}\left(\frac{1+x^2+x^4}{1+x+x^2}\right)=ax+b,$ then $(a,b)=$

1) $(-1,2)$ 2) $(-2,1)$ 3) $(2,-1)$ 4) $(1,2)$

54. Let $f(x)=\begin{vmatrix}\cos x & x & 1\\ 2\sin x & x^2 & 2x\\ \tan x & x & 1\end{vmatrix}$ then $\lim_{x\to 0}\frac{f^1(x)}{x}=$

1) 2 2) -2 3) -1 4) 1

55. The focal length of a mirror is given by $\frac{1}{v}-\frac{1}{u}=\frac{2}{f}$. If equal errors α are made in measuring u and v. then relative error in f is

1) $\frac{2}{\alpha}$ 2) $\alpha\left(\frac{1}{u}+\frac{1}{v}\right)$ 3) $\alpha\left(\frac{1}{u}-\frac{1}{v}\right)$ 4) $\frac{3}{\alpha}$

56. A point 'P' is moving with constant velocity V along a line AB. O is a point on the line perpendicular to AB at A and at a distance "l" from A. The angular velocity of P about O is

1) $\frac{lv}{op}$ 2) $\frac{lv}{op^2}$ 3) $\frac{lv^2}{op}$ 4) $\frac{op^2}{lv}$

57. Length of the normal to the curve at any point on the curve $y=\frac{a\left(e^{x/a}+e^{-x/a}\right)}{2}$ varies as

1) x 2) x^2 3) y 4) y^2

58. Let $h(x)=f(x)-[f(x)]^2+[f(x)]^3$ for every real number x then

1) h is increasing whenever f is increasing
2) h is increasing whenever f is decreasing
3) h is decreasing whenever f is increasing
4) Nothing can be said in general

59. If $-4\le x\le 4$ then critical points of $f(x)=x^2-6|x|+4$ are

1) $3,-2$ 2) $6,-6$ 3) $3,-3,0$ 4) $0,1,3$

60. The value of θ in the Lagrange's mean value theorem for $f(x)=x^3, a=1, h=1/2$ is

1) $\frac{1}{3}$ 2) $\sqrt{\frac{19}{56}}$ 3) $\sqrt{\frac{19}{3}}+2$ 4) $\sqrt{\frac{19}{3}}-2$

61. The least distance of the line $8x-4y+73=0$ from the circle $16x^2+16y^2+48x-8y-43=0$

1) $\sqrt{5}/2$ 2) $2\sqrt{5}$ 3) $3\sqrt{5}$ 4) $4\sqrt{5}$

62. If $(1,1),(k,2)$ are conjugate points with respect to the circle $x^2+y^2+8x+2y+3=0$, then k =

1) -12 2) $-12/7$ 3) $-12/5$ 4) -4

63. The center of the circle circumscribing the square whose three sides are $3x+y=22, x-3y=14$ and $3x+y=62$ is

1) $\left(\frac{3}{2},\frac{27}{2}\right)$ 2) $(16,-6)$ 3) $(27,3)$ 4) $\left(1,\frac{2}{3}\right)$

64. The lengths of the tangent drawn from any point on the circle $15x^2+15y^2-48x+64y=0$ to the two circles $5x^2+5y^2-24x+32y+75=0$ and $5x^2+5y^2-48x+64y+300=0$ are in the ratio of

1) $1:2$ 2) $2:3$ 3) $3:4$ 4) $4:5$

65. Two circles of radii r and R intersect at an acute angle θ. The length of their common chord is

1) $\frac{2rR\sin\theta}{\sqrt{r^2+R^2-2rR\cos\theta}}$ 2) $\frac{2rR\sin\theta}{\sqrt{r^2+R^2}}$ 3) $\frac{2rR\sin\theta}{\sqrt{R^2-r^2}}$ 4) $\frac{2rR\sin\theta}{\sqrt{r^2+R^2+2rR\cos\theta}}$

66. If the join of ends of the latusrectum of $x^2=8y$ subtends an angle θ at the vertex of the parabola then $\cos\theta=$

1) $\frac{-4}{5}$ 2) $\frac{-2}{3}$ 3) $\frac{-3}{5}$ 4) $\frac{-1}{5}$

67. The focus of a parabola is $(1,2)$ and the point of intersection of the directrix and axis is $(2,3)$. Then the equation of the parabola is

1) $(x-1)^2+(y-2)^2=\frac{1}{4}(x+y-5)^2$ 2) $(x-1)^2+(y-2)^2=\frac{1}{2}(x+y-5)^2$

3) $(x-1)^2+(y-2)^2=\frac{1}{5}(x+y-5)^2$ 4) $(x-1)^2+(y-2)^2=\frac{1}{25}(x+y-5)^2$

68. The eccentricity of the conic represented by $\sqrt{(x+2)^2+y^2}+\sqrt{(x-2)^2+y^2}=8$ is

1) $1/3$ 2) $1/2$ 3) $1/4$ 4) $1/5$

69. A bridge is in the shape of a semi ellipse it is 400mts long and has a maximum height 10mts at the middle point. The height of the bridge at a point distant 80mts. from one end is

1) 4mts 2) 2mts 3) 8mts 4) 6mts

70. Let the foci of the ellipse $\frac{x^2}{16}+\frac{y^2}{7}=1$ and the hyperbola $\frac{x^2}{144}-\frac{y^2}{\alpha}=\frac{1}{25}$ coincide. Then the length of the latus rectum of the hyperbola is

1) $\frac{32}{9}$ 2) $\frac{18}{5}$ 3) $\frac{27}{4}$ 4) $\frac{27}{10}$

71. If $\int\frac{\sin 2x}{a^2\cos^2 x+b^2\sin^2 x}dx=k.\log|a^2\cos^2 x+b^2\sin^2 x|+c$, then $k=$

1) $\frac{1}{b^2-a^2}$ 2) $\frac{1}{\left(b^2-a^2\right)^2}$ 3) $\frac{1}{a^2-b^2}$ 4) $\frac{1}{a^2+b^2}$

72. If $\int \frac{1}{\sqrt{x^2+x+1}}dx = a\sinh^{-1}(bx+c)+d$, then descending order of a,b,c is

1) a,b,c 2) b,c,a 3) b,a,c 4) c,a,b

73. $\int \frac{\sin^2 x.\sec^2 x+2\tan x.\sin^{-1} x.\sqrt{1-x^2}}{\sqrt{1-x^2}(1+\tan^2 x)}dx =$

1) $\left(\cos^2 x\right).\left(\sin^{-1} x\right)+c$ 2) $\left(\sin^2 x\right).\left(\sin^{-1} x\right)+c$

3) $\left(\sec^2 x\right).\left(\cos^{-1} x\right)+c$ 4) $\left(\sec^2 x\right).\left(\tan^{-1} x\right)+c$

74. $\int\left(1+x-x^{-1}\right)e^{x+x^{-1}}dx =$

1) $(x+1)e^{x+x^{-1}}+c$ 2) $(x-1)e^{x+x^{-1}}+c$ 3) $-xe^{x+x^{-1}}+c$ 4) $xe^{x+x^{-1}}+c$

75. Statement – I: $f(x)=\int_1^x \frac{\log t dt}{1+t+t^2}(x>0)$ then $f(x)=-f\left(\frac{1}{x}\right)$

Statement – II: $f(x)=\int_1^x \frac{\log t dt}{1+t}$ then $f(x)+f\left(\frac{1}{x}\right)=\frac{1}{2}(\log x)^2$

1) Statement – I is true, Statement – II is true;
Statement – II is a correct explanation for Statement – I
2) 1) Statement – I is true, Statement – II is true;
Statement – II is NOT a correct explanation for Statement – I
3) Statement – I is True, Statement – II is False.
4) Statement – I is False, Statement – II is True.

76. $\int_1^{32} \frac{dx}{x^{1/5}\sqrt{1+x^{4/5}}}$

1) $\frac{2}{5}\left(\sqrt{17}+\sqrt{2}\right)$ 2) $\frac{2}{5}\left(\sqrt{17}-\sqrt{2}\right)$ 3) $\frac{5}{2}\left(\sqrt{17}-\sqrt{2}\right)$ 4) $\frac{5}{2}\left(\sqrt{17}+\sqrt{2}\right)$

77. Area of the region $\left\{(x,y)/x^2+y^2\le 1\le x+y\right\}$ **is**

1) $\frac{\pi}{4}+\frac{1}{2}$ 2) $\frac{\pi}{4}-\frac{1}{2}$ 3) $\frac{\pi}{4}+\frac{3}{4}$ 4) $\pi+1$

78. The differential equation representing the family curves $y^2=2c\left(x+\sqrt{c}\right)$ when 'c' is a parameter is of

1) degree 4 2) order 2 3) degree 3 4) degree 1

79. The solution to the D.E $\frac{xdx}{x^2+y^2}=\left(\frac{y}{x^2+y^2}-1\right)dx$ is

1) $y=x\cos t(c-x)$ 2) $\cos^{-1}\left(\frac{y}{x}\right)=-x+c$ 3) $y=x\tan(c-x)$ 4) $\frac{y^2}{x^2}=x\tan(c-x)$

80. At present a firm is manufacturing 2000 items. It is estimated that the rate of change of production P wrt additional number of workers x is given by $\frac{dp}{dx}=100-12\sqrt{x}$. If the firm employees 25 more workers, then the new level of production of items is

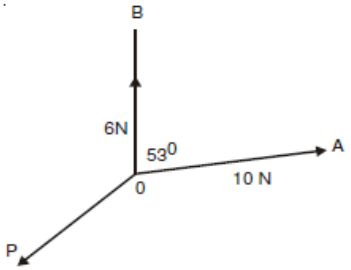
1) 2500 2) 3000 3) 3500 4) 4000

PHYSICS

81. The Richardson equation is given by $I=AT^2e^{(-B/KT)}$. The dimensional formula for AB^2 is same as that for (A and B are constant)

1) IT^{-2} 2) $k\,T$ 3) Ik^2 4) Ik^2/T

82. If the system is in equilibrium ($\cos 53^\circ = 3/5$), then the value of ′ P ′ is



1) 16N 2) 4N 3) $\sqrt{208}N$ 4) $\sqrt{232}N$

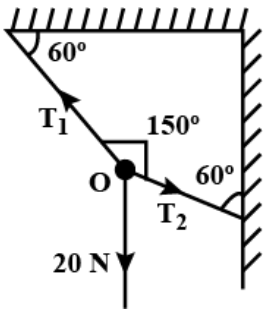
83. A body is thrown up in a lift with an upward velocity u relative to the lift from its floor and the time of flight is found to be t. The acceleration of the lift will be

1) $\frac{u-gt}{2}$ 2) $\frac{u+gt}{2}$ 3) $\frac{2u-gt}{t}$ 4) $\frac{u}{t}-g$

84. A ball is thrown with a velocity u making an angle 'θ' with the horizontal. Its velocity vector will be normal to its initial velocity (u) after a time interval of

1) $\frac{u\sin\theta}{g}$ 2) $\frac{u}{g\cos\theta}$ 3) $\frac{u}{g\sin\theta}$ 4) $\frac{u\cos\theta}{g}$

85. If ′O′ is at equilibrium then the values of the tension T_1 and T_2 respectively.



1) 20N,30N 2) $20\sqrt{3}N, 20N$ 3) $20\sqrt{3}N, 20\sqrt{3}N$ 4) $10N, 30N$

86. A body is moving down a long inclined plane of angle of inclination θ.the coefficient of friction between the body and the plane varies as $\mu = 0.5x$, where x is the distance moved down the plane. The body will have the maximum velocity when

1) $x = 2\tan\theta$ 2) $x = \frac{2}{\tan\theta}$ 3) $x = \sqrt{2}\cot\theta$ 4) $x = \frac{\sqrt{2}}{\cot\theta}$

87. The PE of a 2 kg particle, free to move along x-axis is given by $V(X) = \left(\frac{X^3}{3} - \frac{X^2}{2}\right)J$. The total mechanical energy of the particle is 4 J. Maximum speed of particle (in ms^{-1}) is

1) $\frac{1}{\sqrt{2}}$ 2) $\sqrt{2}$ 3) $\frac{3}{\sqrt{2}}$ 4) $\frac{5}{\sqrt{6}}$

88. A tennis ball bounces down a flight of stairs, striking each step in turn and rebounding to the half of height of the step. The coefficient of restitution is

1) $\frac{1}{2}$ 2) $\frac{1}{\sqrt{2}}$ 3) $\left(\frac{1}{\sqrt{2}}\right)^{1/2}$ 4) $\left(\frac{1}{\sqrt{2}}\right)^{1/4}$

89. The radius of a solid sphere is R and its density D. When it is made to rotate about an axis passing through any diameter of sphere, then the expression for its moment of inertia is

1) $\frac{8}{7}\pi DR^5$ 2) $\frac{8}{15}\pi DR^5$ 3) $\frac{28}{15}\pi DR^5$ 4) $\frac{28}{5}\pi DR^5$

90. The coefficient of linear expansion of an inhomogeneous rod change linearly from α_1 to α_2 from one end to the other end of the rod. The effective coefficients of linear expansion of rod is

1) $\alpha_1+\alpha_2$ 2) $\frac{\alpha_1+\alpha_2}{2}$ 3) $\sqrt{\alpha_1\alpha_2}$ 4) $\alpha_1-\alpha_2$

91. In two vessels of same volume, atomic hydrogen and helium at pressure 1 atm and 2 atm are filled. If the temperature of both the samples is same, then average speed of hydrogen atom (C_H) will be related to helium (C_{He}) as

1) $C_H=\sqrt{2}C_{He}$ 2) $C_H=C_{He}$ 3) $C_H=2C_{He}$ 4) $C_H=\frac{C_{He}}{2}$

92. The heat energy required to vapourise 5kg of water at 373 K is

1) 2700 kcal 2) 1000 kcal 3) 27 kcal 4) 270 kcal

93. A man of 60 kg gains 1000 cal of heat by eating 5 mangoes. His efficiency is 56%. The height to which he can jump by using this energy is $g=9.8m/s^2, J=4.2J/cal$

1) 4m 2) 20 m 3) 28 m 4) 0.2 m

94. Three rods A, B and C have the same dimensions. Their thermal conductivities K_A, K_B and K_C respectively. A and B are placed end to end, with the free ends kept at a certain temperature difference. C is placed separately with its ends kept at same temperature difference. The two arrangements conduct heat at the same rate K_C must be equal to

1) K_A+K_B 2) $\frac{K_A+K_B}{K_AK_B}$ 3) $\frac{1}{2}(K_A+K_B)$ 4) $\frac{K_AK_B}{K_A+K_B}$

95. Mass M = 1 unit is divided into two parts X and (1 - X). For a given separation the value of X for which the gravitational force between them becomes maximum is

1) $1/2$ 2) $3/5$ 3)1 4) 2

96. A simple pendulum of length l is connected to the ceiling of a vehicle that is moving down along a smooth inclined plane 4 in 5. then its period of oscillation is

1) $2\pi\sqrt{\frac{5l}{4g}}$ 2) $2\pi\sqrt{\frac{4l}{5g}}$ 3) $2\pi\sqrt{\frac{5l}{3g}}$ 4) $2\pi\sqrt{\frac{3l}{5g}}$

97. An aluminium wire and a steel wire of the same length and cross-section are joined end to end. The composite wire is hung from a rigid support and a load is suspended from the free end. If the increase in the length of the composite wire is 2.7 mm, then the increase in the length of each wire is {in mm).

1) 1.7,1 2) 1.3,1.4 3) 1.5,1.2 4) 2.1,0.6

98. The excess pressure inside a spherical soap bubble of radius 1 cm is balanced by a column of oil (specific gravity =0.8),2 mm high, the surface tension of the bubble is

1) $3.92N/m$ 2) $0.0392N/m$ 3) $0.392N/m$ 4) $0.00392N/m$

99. A tuning fork produces 6 beats/sec with sonometer wire when its tensions are either 169N or 196N. The frequency of that fork is

1) 162 Hz 2) 190 Hz 3) 200 Hz 4) 80 Hz

100. A ray reflected successively from two plane mirrors inclined at a certain angle undergoes a deviation of 300^0. The number of observable images

1) 60 2) 12 3) 11 4) 5

101. An equiconvex lens is cut into two equal parts along a plane perpendicular to the principal axis. If the power of the original lens is 4D, the power of one of the two parts is

1) 2D 2) 3D 3) 4D 4) 5D

102. In Young's double slit experiment, the 8th maximum with wavelength λ_1 is at a distance d_1 from the central maximum and the 6th maximum with wavelength λ_2 is at a distance d_2 .from central maximum Then (d_1/d_2) is equal to

1) $\frac{4}{3}\left(\frac{\lambda_2}{\lambda_1}\right)$ 2) $\frac{4}{3}\left(\frac{\lambda_1}{\lambda_2}\right)$ 3) $\frac{3}{4}\left(\frac{\lambda_2}{\lambda_1}\right)$ 4) $\frac{3}{4}\left(\frac{\lambda_1}{\lambda_2}\right)$

103. An electric field is expressed as $\vec{E} = 2\hat{i} + 3j$. the potential difference $(V_A - V_B)$ between two points A and B whose position vectors are given $r_A = \hat{i} + 2j$ and $r_B = 2\hat{i} + j + 3k$ is---V

1) -1 2) -2 3) $+1$ 4) $+2$

104. Two thin infinite parallel sheets (conducting) have charged uniformly and surface densities are $+\sigma$ and $-\sigma$ after negative charge plate is grounded. Electric field in the space between the two sheets is

1) $\sigma/\in_0$ 2) $\sigma/2\in_0$ 3) $2\sigma/\in_0$ 4) Zero

105. He capacity of a parallel plate condenser with air medium is 60μF having distance of separation d. If the space between the plates is filled with two slabs each of thickness d/2 and dielectric constants 4 and 8, the effective capacity becomes is $n \times 40\mu F$ Find n

1) 8 2) 10 3) 12 4) 14

106. Find the value of colour coded resistance shown in fig

1) $520 \pm 10\%$ 2) $5200 \pm 10\%$ 3) $52000 \pm 10\%$ 4) $52000 \pm 1\%$

107. Two electric bulbs rated P_1 watt and V volt, P_2 watt and V volt are connected in series, Across V-volt supply. the total power consumed is

1) $\frac{P_1 + P_2}{2}$ 2) $\sqrt{P_1.P_2}$ 3) $\frac{P_1.P_2}{P_1 + P_2}$ 4) $(P_1 + P_2)$

108. The magnetic field $\overline{dB}$ due to a small current element $\overline{dl}$ at a distance $\vec{r}$ and carrying current 'i' is

1) $\overline{dB} = \frac{\mu_0}{4\pi} i \left(\frac{\overline{dl} \times \vec{r}}{r} \right)$ 2) $\overline{dB} = \frac{\mu_0}{4\pi} i^2 \left(\frac{\overline{dl} \times \vec{r}}{r^2} \right)$

3) $\overline{dB} = \frac{\mu_0}{4\pi} i^2 \left(\frac{\overline{dl} \times \vec{r}}{r} \right)$ 4) $\overline{dB} = \frac{\mu_0}{4\pi} i \left(\frac{\overline{dl} \times \vec{r}}{r^3} \right)$

109. A proton enters a magnetic field with a velocity of $2.5X10^7 ms^{-1}$ making an angle 30° with the magnetic field. The force on the proton is $(B = 25T)$

1) $1.25X10^{-11} N$ 2) $2.5X10^{-11} N$ 3) $5.0X10^{-11} N$ 4) $7.5X10^{-11} N$

110. In which of the following cases the emf is induced due to time varying magnetic fled (induced field emf)?
Case I A magnet is moving along the axis of a conducting coil
Case II A loop having varying area (due to moving jumper) is placed in a magnetic field
case III The resistance of the coil is changing, which is connected to an ideal battery.
case IV a current carrying wire is approaching a conducting ring

1) I,II and III only 2) I,III and IV only 3) I,II and IV only 4) All the four

111. In R-L-C series circuit, we have same current at angular frequencies ω_1 and ω_2 The resonant frequency of circuit is

1) $\frac{\omega_1^2}{\omega_2}$ 2) $\frac{\omega_2^2}{\omega_1}$ 3) $\sqrt{\omega_1 \omega_2}$ 4) $\omega_1 + \omega_2$

112. The relative permeability of glass is 3/8 and the dielectric constant of glass is 8. The refractive index of glass is

1) 1.732 2) 1.327 3) 1.682 4) 2.582

113. In Davisson and Germar experiment, the intensity of the scattered beam of electrons is maximum for diffraction angle 50° at 54V potential difference with nickel crystal Then de-Broglie wavelength of electron is (approximately)

1) 1.67 A^0 2) 2 A^0 3)1 A^0 4) 0.2 A^0

114. What is the minimum energy that must be given to a H atom in ground state so that it can emit an H_γ line in Balmer series.

1) 10.2 eV 2) 12.1 eV 3) 2.85 eV 4) 13.6 eV

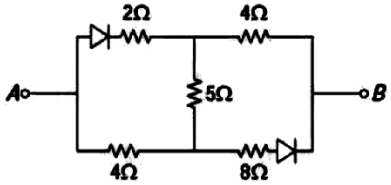
115. After a certain lapse of time, the fraction of radioactive polonium undecayed is found to be 12.5% of initial quantity. The duration of this time lapse is (if the half-life of polonium is 138 days)

1) 414days 2) 407 days 3) 421 days 4) 410 days

116. At a temperature of $30^{\circ}C$, the susceptibility of a ferromagnetic material is found to be 'χ'. its susceptibility at $333^{\circ}C$ is

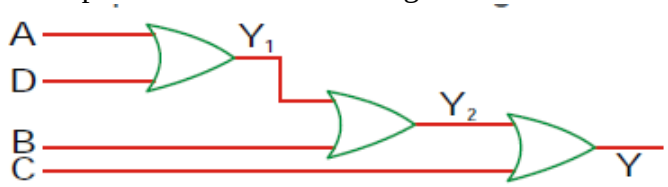
1) χ 2) $\frac{\chi}{2}$ 3) 2χ 4) 11.1χ

117. The equivalent resistance of the circuit across AB is given by



1) 4Ω 2) 13Ω 3) 4Ω *or* 13Ω 4) 4Ω *zero*

118. The expression of Y in following circuit is



1) $ABCD$ 2) $A+BCD$ 3) $A+B+C+D$ 4) $AB+CD$

119. Digital signals
(i) do not provide a continuous set of values
(ii) represent values as discrete steps
(iii) can utilize binary system
(iv) can utilize decimal as well as binary systems
The true option is.

1) (I)&(II) only 2) (II)&(III) only
3) (I), (II)&(III) only 4) (I), (II), (III) & (IV)

120. The separation L between the objective $(f_0 = 0.5cm)$ and the eye piece $(f_e = 5cm)$ of a compound microscope is 7cm. Where should a small object be placed, so that the eye is least strained?

1) 0.5 cm 2) $\frac{3}{2}cm$ 3) $\frac{2}{3}cm$ 4) $\frac{1}{3}cm$

CHEMISTRY

121. The minimum number of quantum numbers required to specify an orbital in an atom is

1) 1 2) 4 3) 2 4) 3

122. The set of species having only fractional bond order values is

1) C_2^{2-}, N_2, O_2^{2-} 2) O_2^+, O_2^-, N_2^+ 3) O_2^{2+}, O_2, C_2^{2-} 4) Li_2, H_2^+, C_2

123. The increasing order of acidic strength among the following compounds

I. Benzoic acid II. 4–Nitrobenzoic acid
III. 3,4–Dintrobenzoic acid IV. 4–Methoxybenzoic acid

1) $I < II < III < IV$ 2) $I < IV < II < III$
3) $IV < I < II < III$ 4) $IV < I < III < II$

124. Which of the following outer octahedral complexes have same number of unpaired electrons?

A. $[MnCl_6]^{3-}$ B. $[FeF_6]^{-3}$ C. $[CoF_6]^{3-}$ D. $[Ni(NH_3)_6]^{2+}$

1) A, C 2) A, B 3) B, C 4) A, D

125. The set with only ambidentate ligands in the following

1) NO_3, Br, C_2O_4 2) NO_2, CN, SCN 3) NO_2, C_2O_4, NH_3 4) SCN , CO, NH_3

126. $KMnO_4$ oxidises $S_2O_3^{2-}$ to SO_4^{2-} in medium x and NO_3^- in medium y, x and y are respectively.

1) Acidic, basic 2) Acidic, Acidic 3) Acidic, neutral 4) Neutral, acidic

127. Which one of the following reactions does not take place?

1) $2CuSO_4(aq) + 4KI\ (aq) 2CuI_2 + 2K_2SO_4$

2) $2CuSO_4(aq) + 4KCI\ (aq) 2CuCl_2 + 2K_2SO_4$

3) $CuSO_4(aq) + Zn\ (aq) ZnSO_4(aq) + Cu\ (s)$

4) $2CuSO_4(aq) + 4KF\ (aq) 2CuF_2 + 2K_2SO_4$

128. The reduction potential of hydrogen electrode at 25^0C in a neutral solution is $\left(p_{H_2} = 1bar\right)$

1) $0.059V$ 2) $-0.059V$ 3) $-0.413V$ 4) $0.0V$

129. A commercial sample of H_2O_2 marked as 100 volume hydrogen peroxide means

1) $1ml$ of H_2O_2 will give 100 ml of O_2 at STP

2) $1L$ of H_2O_2 will give 100 ml of O_2 at STP

3) 1 1 of the H_2O_2 will give 22.4 ml of O_2 at STP

4) $1ml$ of H_2O_2 will give 1 mole of O_2 at STP

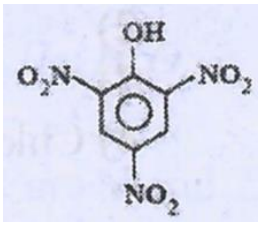
130. Observe the following solutions, how many of them are acidic

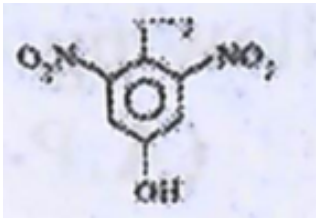
A. Black coffee B. $0.2M$ $NaOH$ C. Lemon juice

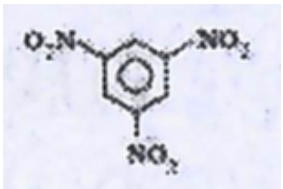
D. Lime water E. Human saliva F. Tomato juice

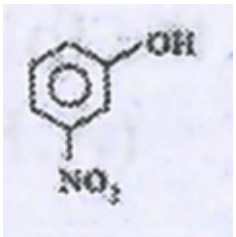
1) A, B, C 2) C, D, E, F 3) B, D only 4) A, C, E, F

131. An organic compound A (C_6H_7N) on reaction with $NaNO_2 / HCl$ at $273-278\,K$ followed by warming with water gave B. B reacts with conc. HNO_3 to give C. What is C?

1) 

2) 

3) 

4) 

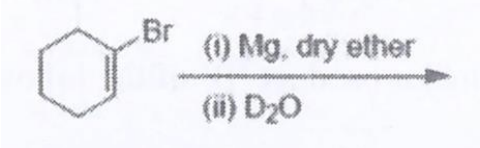
132. Geo metrical isomerism can be found in which of the following?

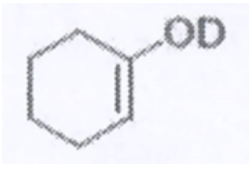
1) Butyric acid 2) Aspartic acid 3) Palmitic acid 4) Cinnamic acid

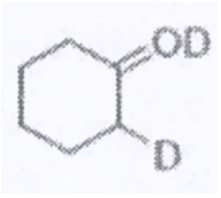
133. Steam distillation process cannot be used for purifying which of the following?

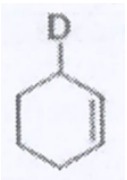
1) Aniline 2) p-nitrophenol 3) Toluene 4) Nitrobenzene

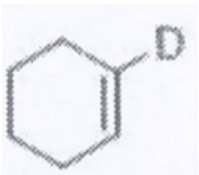
134. The major product of the following reaction is



1) 

2) 

3) 

4) 

135. Which of the following compounds do not have sp^3 carbon atom (s)?
I) Acetone II) Acetic III) Buta-1, 3-diene IV) Propyne V) Naphthalene
1) I,II only 2) II, III only 3) IV, V only 4) III, V only

136. Identify the ortho and para direction groups towards aromatic electrophilic substitution reactions from the following list

$-OH$	$-CN$	$-CO_2H$	$-OCH_3$	$-NHCOCH_3$	$-CHO$
I	II	III	IV	V	VI

1) I, IV, V 2) II, III, VI 3) I, II, IV 4) IV, V, VI

137. Choose the incorrect statement among the following
A. The reactivity of aromatic aldehydes and ketones is less that of aliphatic carbonyl compounds towards nucleophilic addition reactions
B. Benzaldehyde does not give Fehling's test.
C. The H atoms in ethanal are acidic in nature
D. " p – Nitro benzaldehyde' is less reactive than "benzaldehyde" towards nucleophilic addition reaction
1) A 2) B 3) C 4) D

138. In the given reactions, 'X' and 'Y' respectively are
$C_6H_5CH_2NH_2 \xleftarrow{X} C_6H_5CONH_2 \xrightarrow{Y} C_6H_5NH_2$
1) $LiA1H_4, H_2O$; Br_2 / OH
2) Br_2 / OH^-; $LiA1H_4, H_2O$
3) Br_2 / H^+; $NaBH_4$
4) $NaBH_4$; Br_2 / H^+

139. In which of the following pairs the polymer correctly matched with the forces possessed by them
A. Neoprene---- Weak intermolecular forces
B. Terylene---- Hydrogen bonding
C. Polystyrene---- Very weak intermolecular forces
D. Polythene---- Hydrogen bonding
1) B,C 2) C,D 3) A,B 4) A,D

140. Identify A and B form the following reaction
$NaNO_3 \xrightarrow{\Delta} xA + yB$
1) $NaNO_2, O_2$ 2) Na_2O, NO_2 3) Na_2O, NO 4) Na, NO_2

141. Energy levels A,B,C of a certain atoms corresponding to increasing values of energy level i.e., $E_A < E_B < E_C$. If λ_3 are the wavelengths of radiations corresponding to the transitions C to B, B to A and C to A respectively which of the following statement is correct?
1) $\lambda_3 = \lambda_1 + \lambda_2$ 2) $\lambda_3 = \frac{\lambda_1\lambda_2}{\lambda_1 + \lambda_2}$ 3) $\lambda_1 + \lambda_2 + \lambda_3 = 0$ 4) $\lambda_3^2 = \lambda_1^2 + \lambda_2^2$

142. In which of the following molecules / ions all the bonds not equal?
1) XeF_4 2) BF_4 3) SF_4 4) SiF_4

143. Which of the following contains maximum number of molecules
1) 4 gm of hydrogen 2) 22. 4 liters of oxygen at S.T.P.
3) Carbon Dioxide obtained by heating 1 mole of calcium carbonate 4) 4 gm of helium

144. Oxidation number of carbon in carbon suboxide (C_3O_2)

1) $\frac{+2}{3}$ 2) $\frac{+4}{3}$ 3) $+4$ 4) $\frac{-4}{3}$

145. Two vessels of equal volume contain separately equal amounts of H_2 and CH_4. If the first vessel is at $300K$ and second vessel is at $600K$, then the ratio of pressure inside them is

1) $1:2$ 2) $2:1$ 3) $4:1$ 4) $8:1$

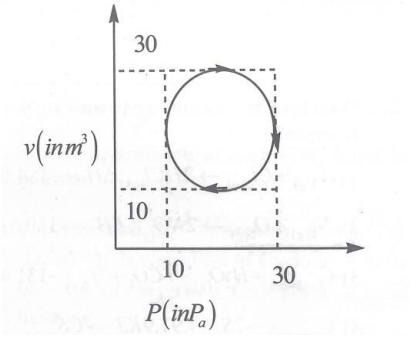
146. Oxygen is present in a flask of $1.12L$ capacity at a pressure of 7.6×10^{-10} mm of Hg at 0^0C. The number of oxygen molecules in the flask is

1) 1.5×10^{10} 2) 3×10^{12} 3) 3×10^{10} 4) 6×10^{12}

147. The work done is heating one mole of an ideal gas at constant pressure from 15^0C to 25^0C is

1) $+19.87cal$ 2) $-198.7cal$ 3) $+198.7cal$ 4) $-19.87cal$

148. A system works under cyclic process as follows.



Heat absorbed during the process is

1) $\frac{22}{7}\times10^2\,J$ 2) $\frac{22}{7}\times10^3\,J$ 3) $\frac{22}{7}\times10^4\,J$ 4) $\frac{22}{7}\times10^5\,J$

149. For the homogeneous reaction $4NH_{3_{(g)}}+5O_{2_{(g)}}$ $4NO_{(g)}+6H_2O_{(g)}$ the equilibrium constant K_c has the unit of

1) $(Conc)^{-1}$ 2) $Conc$ 3) $(Conc)^{+10}$ 4) It is dimensionless

150. The pH of a solution at 25^0C is 2. If its pH is to be changed to 4, then conc. of H^+ of the original has to be

1) Doubled 2) Halved 3) Increased by 100 times 4) Decreased by 100 times

151. When CO_2 is passed into brine solution saturated with ammonia we get

1) NH_HHCO_3 2) $(NH_4)_2CO_3$ 3) $NaHCO_3$ 4) Na_2CO_3

152. Which of the following is/are correct?

1) Al_2O_3 reacts with CaO but not with SiO_2

2) Thermal stability of carbonates; $BeCO_3 > MgCO_3 > CaCO_3 > SrCO_3 > BaCO_3$

3) Solubility of sulphates: $BeSO_4 > MgSO_4 > CaSO_4 > SrSO_4 > BaSO_4$

4) $BeCl_2$ fors acidic solution in water while $BaCl_2$ forms neutral solution.

153. $H_3BO_3 \xrightarrow{375K} A \xrightarrow{Red\ Heat} B_2O_3$

$H_3BO_3 \xrightarrow{435K} A \xrightarrow{Red\ Heat} B_2O_3$

The compounds A & B are

1) Orthoboric acid, metaboric acid 2) Metaboric acid, Tetra boric acid

3) Tetra boric acid, Metaboric acid 4) Tetra boric acid, orthoboric acid

154. The element that liberates H_2 gas with steam

1) C 2) Si 3) Sn 4) Ge

155. In which of the following reactions, H_2O_2 acts as a reducing reagent?

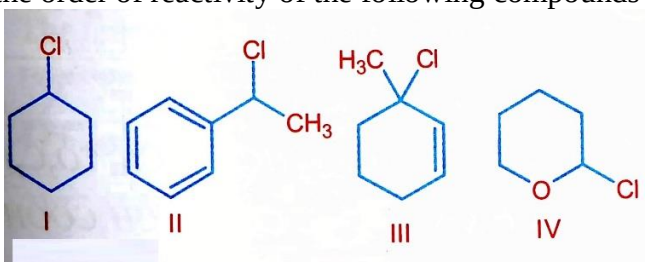
1) $PbO_{2(s)}+H_2O_{2(aq)} \rightarrow PbO_{(s)}+H_2O_{(l)}+O_{2(g)}$

2) $Na_2SO_{3(ag)}+H_2O_{2(aq)}+ \rightarrow Na_2SO_{4(aq)}+H_2O_{(l)}$

3) $2KI_{(aq)}+H_2O_{2(aq)} \rightarrow 2KOH_{(aq)}+I_{2(s)}$

4) All the above

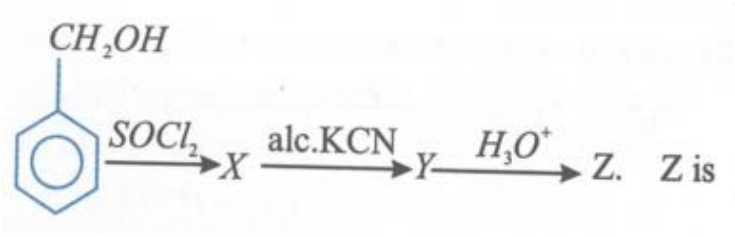
156. What is the order of reactivity of the following compounds towards very dilute aqueous



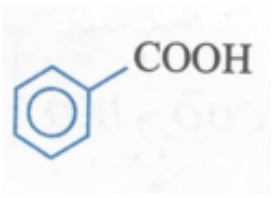
NaOH ?

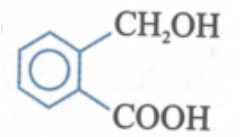
1) $I < III < II < IV$ 2) $II < I < III < IV$ 3) $IV < II < III < I$ 4) $III < II < I < IV$

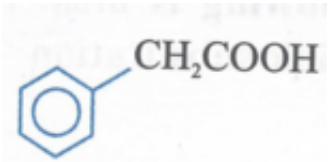
157.

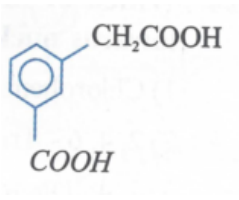


Z is

1) 

2) 

3) 

4) 

158. $CH_3CH_2CH_2OH + PBr_3 \rightarrow A$

$CH_3CH_2CH_2OH + Na \rightarrow B, \quad A + B \rightarrow C$. Product 'C' is

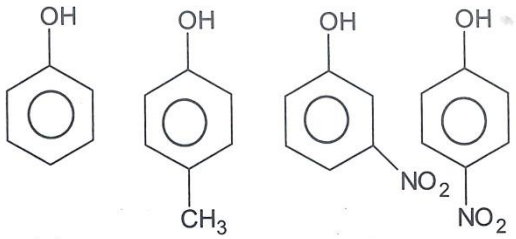
1) $(CH_3CH_2CH_2)_2O$ 2) $CH_3 - CH = CH_2$ 3) both 1 & 2 4) $(CH_3CH_2)_2O$

159. $C_6H_5 - O - CH_3 + HI_{(excess)} \rightarrow$

1) CH_3OH and C_6H_5I 2) CH_3I and C_6H_5OH

3) CH_3I and C_6H_5I 4) C_6H_6 and CH_4

160. In the following compounds, the decreasing order of acidity is



1) $I > IV > III > II$ 2) $II > IV > I > II$

3) $II > I > III > IV$ 4) $IV > III > I > II$

KEY SHEET

MATHS									
01	02	03	04	05	06	07	08	09	10
3	1	3	3	3	4	3	2	2	1
11	12	13	14	15	16	17	18	19	20
2	3	1	1	1	3	3	2	1	3
21	22	23	24	25	26	27	28	29	30
2	1	3	2	3	2	4	2	1	4
31	32	33	34	35	36	37	38	39	40
2	1	1	4	3	1	1	1	4	3
41	**42**	**43**	**44**	**45**	**46**	**47**	**48**	**49**	**50**
3	2	3	3	1	3	3	1	3	2
51	**52**	**53**	**54**	**55**	**56**	**57**	**58**	**59**	**60**
2	1	3	2	2	2	4	1	3	4
61	**62**	**63**	**64**	**65**	**66**	**67**	**68**	**69**	**70**
2	3	2	1	4	3	2	2	3	4
71	**72**	**73**	**74**	**75**	**76**	**77**	**78**	**79**	**80**
1	3	2	4	4	3	2	3	3	3
PHYSICS									
81	**82**	**83.**	**84**	**85**	**86**	**87**	**88**	**89**	**90**
3	3	3	3	2	1	4	2	2	2
91	**92**	**93**	**94**	**95**	**96**	**97**	**98**	**99**	**100**
3	1	1	4	1	3	4	2	1	3
101	**102**	**103**	**104**	**105**	**106**	**107**	**108**	**109**	**110**
1	2	1	1	1	3	3	4	3	2
111	**112**	**113**	**114**	**115**	**116**	**117**	**118**	**119**	**120**
3	1	1	3	1	2	3	3	3	3
CHEMISTRY									
121	122	123	124	125	126	127	128	129	130
4	2	3	1	2	4	1	3	1	4
131	132	133	134	135	136	137	138	139	140
1	4	2	4	4	1	4	1	3	1
141	**142**	**143**	**144**	**145**	**146**	**147**	**148**	**149**	**150**
2	3	1	2	3	3	4	3	2	4
151	**152**	**153**	**154**	**155**	**156**	**157**	**158**	**159**	**160**
3	4	2	3	1	1	3	1	2	4