EAMCET - ENGINEERING

Model Grand Test - 2017

GRAND TEST **Exam Date: 00-00-2017**

Name of the Candidate : _____

(in capital letters)

Roll Number : _____

Important Instructions: **Read carefully before Answering**

1. Separate Optical Mark Reader (OMR) Answer Sheet is supplied to you along with Question Paper Booklet. Please read and follow the instructions on the OMR Sheet for marking the responses and also the required data.
2. Candidates should write the Hall Ticket Number only in the space provided on this page and the OMR Sheet. Do not write the Hall Ticket Number anywhere else.
3. Immediately on opening the Question Paper Booklet please check for (i) Serial number of the questions (1 – 160), (ii) The number of pages, and (iii) Correct Printing. In case of any defect, please report to the invigilator and ask for replacement with the same within five minutes from the commencement of the test.
4. Electronic gadgets like Cell Phone, Pager, Calculator, Electronic watches and Mathematical / Log. Tables are not permitted into the examination hall.
5. Darken the appropriate circles of 1, 2, 3 or 4 in the OMR sheet corresponding to correct or the most appropriate answer to the concerned question number in the sheet. Darkening of more than one circle against any question automatically gets invalidated.
6. Rough work should be done only in the space provided for this purpose in the Question Paper Booklet.
7. Once the candidate enters the Examination Hall, he/she shall not be permitted to leave the Hall till the end of the Examination.
8. Ensure that the Invigilator puts his/her signature in the space provided on Question Paper Booklet and the OMR Answer Sheet. Candidate should sign in the space provided on the OMR Answer Sheet.
9. Each question carries One Mark. Choose the correct or appropriate answer from the given options to the following questions and darken, with blue / black ball point pen the corresponding digit 1, 2, 3 or 4 in the circle pertaining to the question number concerned in the OMR Answer Sheet, separately supplied to you.

MATHEMATICS

1. **If** $\frac{2\sin^{-}}{1+\cos^{-}+\sin^{-}}=P$ **then** $\frac{1-\cos^{-}+\sin^{-}}{1+\sin^{-}}=$

1) P 2) $\frac{1}{P}$ 3) $\frac{2}{P}$ 4) None

2. **If 2 TanA TanB=1** $\Rightarrow \frac{\cos(A-B)}{\cos(A+B)}$

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

3. **If A=**340° **then** $\sqrt{1-\sin A}-\sqrt{1+\sin A}=$

1) 2cosA/2 2) 2sinA/2 3) -2cosA/2 4) -2sinA/2

4. **Value of** $\sqrt{3}\cot 20^\circ-4\cos 20^\circ$ **is**

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

5. **Period of** $kx-[kx]$ **is where** $[\bullet]$ **is greatest integer function**

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

6. $2^{3n}-7n-1$ **is divisible by**

1) 64 2) 36 3) 49 4) 25

7. **If** $\begin{vmatrix} x^2+3x & x-1 & x+3 \\ x+1 & 2-x & x-4 \\ x-3 & x+4 & 3x \end{vmatrix}=px^4+qx^3+rx^2+sx+t$ **then t=**

1) 18 2) -18 3) 21 4) -9

8. **If A is a square matrix such that A(adj A) =** $\begin{bmatrix} 4 & 0 & 0 \\ 0 & 4 & 0 \\ 0 & 0 & 4 \end{bmatrix}$ **then |adj A|=**

1) 8 2) 16 3) 64 4) 32

9. **If** $f(x+2y,x-2y)=xy$ **then** $f(x,y)=$

1) $\frac{x^2-y^2}{2}$ 2) $\frac{x^2+y^2}{2}$ 3) $\frac{x^2-y^2}{4}$ 4) $\frac{x^2-y^2}{8}$

10. **The domain of the function defined by** $f(x)=(7-x)_{p_{(x-3)}}$

1) {3,7} 2) {3,4,5,6,7} 3) {3,4,5} 4) Z

11. **If** $2\sin x+1\geq 0$ **and** $x\in[0,2\circledR]$ **then** $x\in$

1) $\left[0,\frac{7\circledR}{6}\right]$ 2) $\left[0,\frac{7\circledR}{6}\right]\cup\left[\frac{11\circledR}{6},2\circledR\right]$ 3) $\left[\frac{11\circledR}{6},2\circledR\right]$ 4) R

12. $Sin^{-1}(\sin 10)=$

1) 10 2) 10-3® 3) 3® -10 4) 3® +10

13. **If** $\sinh^{-1}(p)=\log_e(5+\sqrt{26})$ **then p=**

1) 5 2) 3 3) $\sqrt{26}$ 4) 2

14. **In** ΔABC**, if** $a^2+b^2+c^2=ca+ab\sqrt{3}$ **then the triangle is**

1) Equilateral 2) Right angled isosceles
3) Right angle 4) Obtuse angled

15. **A flag staff of height** $(\sqrt{3}+1)$ **mts over a tower of height 10mts throw a shadow of** $(\sqrt{3}-1)$ **mts on the ground. Hence the elevation of sun is**

1) 15° 2) 30° 3) 60° 4) 75°

16. **If** $\overline{OA}=\bar{a}$, $\overline{OB}=\bar{b}$ **if** $\overline{OC}=\frac{1}{4}\bar{a}+\frac{1}{2}\bar{b}$ **then**

1) C lies outside ΔOAB but inside $\lfloor AOB$ 2) C lies outside ΔOAB but inside $\lfloor OAB$
3) C lies outside ΔOAB 4) C lies inside ΔOAB

17. **A unit vector parallel to the** xy **plane and perpendicular to the vector 4i-3j+k is**

1) $\pm\frac{1}{5}(3i+4j)$ 2) $\pm\frac{1}{5}(4i-3j)$ 3) $\pm(3i+4j)$ 4) $\pm\frac{1}{5}(3i-4j)$

18. **The perpendicular distance of any point** $\bar{a}$ **to the line** $\bar{r}=\bar{b}+t\bar{c}$

1) $\frac{(\bar{a}-\bar{b})x\bar{c}}{c}$ 2) $\frac{|(\bar{a}-\bar{b})x\bar{c}|}{|c|}$ 3) $\frac{|\bar{a}-\bar{b}|}{|\bar{c}|}$ 4) $\frac{|(\bar{a}-\bar{b})x\bar{c}|}{|\bar{a}|}$

19. **If** $\bar{x}=\frac{(\bar{a}x\bar{b})-\bar{a}\,x(\bar{a}x\bar{b})}{(\bar{a}x\bar{b})^2}$ **then** $[\bar{x}\ \ \bar{a}\ \ \bar{b}]=$

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

20. **If** $\sim$, **are the roots of** $ax^2+bx+c=0$ **then the equation whose roots are** $\frac{1}{a\sim+b},\frac{1}{a\ \ +b}$ **is**

1) $acx^2+bx+1=0$ 2) $acx^2+bx-1=0$
3) $acx^2-bx-1=0$ 4) $acx^2-bx+1=0$

21. **1,2,3 are the roots of** $ax^3+bx^2+cx+d=0$ **then the roots of** $ax\sqrt{x}+bx+c\sqrt{x}+d=0$ **are**

1) 2,3,4 2) 1,4,9 3) 2,4,6 4) $1,\sqrt{2},\sqrt{3}$

22. **If** $\frac{x^3}{(x-a)(x-b)(x-c)}=1+\frac{A}{x-a}+\frac{B}{x-b}+\frac{C}{x-c}$ **then A=**

1) $\frac{a^3}{(c-b)(c-a)}$ 2) $\frac{a^3}{(b-c)(b-a)}$ 3) $\frac{a^3}{(a-b)(a-c)}$ 4) 1

23. **Maximum number of points into which 4 circles and 4 straight lines intersect is**

1) 26 2) 50 3) 56 4) 72

24. **The number of ways in which 12 identical things can go into 5 purses no purse being empty is**

1) ${}^{11}C_5$ 2) ${}^{12}C_5$ 3) ${}^{11}C_4$ 4) ${}^{12}C_4$

25. The number of rectangles (including squares) on a chess board

1) 1296 2) 784 3) 1008 4) 1092

26. If $\frac{3-5x}{(1-x)^2}$ is expanded in a series of ascending powers of x then the coefficient of x^{100}

1) -196 2) -197 3) -198 4) -199

27. No. of terms in $(1+3x+3x^2+x^3)^6$ is

1) 17 2) 19 3) 21 4) 16

28. $\sqrt{8-6i}$ =

1) $\pm(5-i)$ 2) $\pm(2+i)$ 3) $\pm(3-i)$ 4) $\pm(1+i)$

29. If |Z+3|$\leq$2 then the maximum value of |Z-2| is

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

30. If ~, are the roots of the equation $x^2-x+1=0$ then ~^{5} + ^{5}

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

31. The varience of first 20 natural numbers is

1) $\frac{133}{4}$ 2) $\frac{379}{12}$ 3) $\frac{133}{2}$ 4) $\frac{399}{4}$

32. An unbased coin is tossed n times. The probability that head will present itself, even number of times is

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

33. The probability of getting 13 cards of the same suit by a particular hand at a game of bridge is

1) $\frac{13_{c_{13}}}{52_{c_{13}}}$ 2) $\frac{4_{c_1}}{52_{c_{13}}}$ 3) $\frac{4_{c_1}\times 13_{c_{12}}}{52_{c_{13}}}$ 4) $\frac{4_{c_1}\times 13_{c_{11}}}{52_{c_{13}}}$

34. P(A) = $\frac{3}{8}$, P(B) = $\frac{5}{8}$ and $P(A\cap B)=\frac{1}{4}$ then $P\left(\frac{\overline{A}}{B}\right)$ =

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

35. If P(X= X)=c$\left(\frac{2}{3}\right)^x$, X =1,2,3,4…..∞ is a probability mass function then the value of c is

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

36. The least number of times a fair coin is to be tossed in order that the probability of getting at least one head is at least 0.99 is

1) 5 2) 6 3) 7 4) 8

37. If for a poisson variable X, p(X=1)=2p(X=2) then the parameter a is

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

38. **The coefficient of x in $\left(x^2+\frac{a}{x}\right)^5$ is 270 then a =**

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

39. **If ~, are two roots of $2x^2+x+3=0$ then $\frac{(1-\sim)(1-\ )}{(1+\sim)(1+\ )}$ is**

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

40. **If ~, ,¥ are the roots of $x^3+2x^2-3x-1=0$ then $\sim^{-2}+\ ^{-2}+¥^{-2}$ is**

1) 12 2) 13 3) 14 4) 15

41. **The line joining two points $A(2,0)$ and $B(3,1)$ is rotated about A in anticlockwise direction through an angle 15^0. If B goes to C then C =**

1) $\left(\frac{4+\sqrt{2}}{2},\sqrt{6}\right)$ 2) $\left(\frac{6+\sqrt{2}}{2},\frac{\sqrt{6}}{2}\right)$ 3) $\left(\frac{2+\sqrt{2}}{2},\frac{\sqrt{6}}{2}\right)$ 4) $\left(\frac{4+\sqrt{2}}{2},\frac{\sqrt{6}}{2}\right)$

42. **The point $(4,1)$ undergoes the following three transformations successively**

i) Reflection about the line $y=x$

ii) Transformation through a distance of 2 units along the +ve direction of the axis.

iii) Rotation through an angle $\frac{®}{4}$ about the origin in the anticlockwise direction. The final position of the point is given by the co-ordinates.

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

43. **Equation of the line on which the length of the perpendicular from origin is 5 and the angle which this perpendicular makes with the x axis is 60^0**

1) $x+\sqrt{3}y=12$ 2) $\sqrt{3}x+y=10$ 3) $x+\sqrt{3}y=8$ 4) $x+\sqrt{3}y=10$

44. **If the straight line drawn through the point $P\left(\sqrt{3},2\right)$ making an angle $\frac{®}{6}$ with $x-$ axis meets the line $\sqrt{3}x-4y+8=0$ at Q. Then PQ is**

1) 4 2) 5 3) 6 4) 9

45. **The angle between the diagonals of a quadrilateral formed by the lines $\frac{x}{a}+\frac{y}{b}=1,\ \frac{x}{b}+\frac{y}{a}=1,\ \frac{x}{a}+\frac{y}{b}=2,\ \frac{x}{b}+\frac{y}{a}=2$ is**

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

46. **The sum of the intercepts cut off by the axes on lines $x+y=a, x+y=ar,\ x+y=ar^2,$..... where $a\neq 0$ and $r=\frac{1}{2}$**

1) $2a$ 2) $a\sqrt{2}$ 3) $2\sqrt{2}a$ 4) A

47. **If a,b,c form a G P with common ratio r, the sum of the ordinates of the points of intersection of the line $ax+by+c=0$ and the curve $x+2y^2=0$ is**

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

48. **If the lengths of the tangents from two points A,B to a circle are 6,7 respectively. If A,B are conjugate points then $AB=$**

1) 5 2) $\sqrt{85}$ 3) $\sqrt{85}/2$ 4) 5/2

49. **If a circle passes through the points of intersection of the axes with the line $ax-y+1=0$ and $x-2y+3=0$ then a =**

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

50. **If the normals at t_1 and t_2 on $y^2 = 4ax$ meet again on the parabola then t_1t_2 =**

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

51. **The shortest distance between the line y - x = 1 and the curve $x = y^2$ is**

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

52. **The equation of the latusrecta of the ellipse $9x^2+4y^2-18x-8y-23=0$ are**

1) $y=\pm\sqrt{5}$ 2) $x=\pm\sqrt{5}$ 3) $y=1\pm\sqrt{5}$ 4) $x=-1\pm\sqrt{5}$

53. **If the line $lx+my=1$ is a normal to the hyperbola $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$ then $\frac{a^2}{l^2}-\frac{b^2}{m^2}=$**

1) a^2-b^2 2) a^2+b^2 3) $\left(a^2+b^2\right)^2$ 4) $\left(a^2-b^2\right)^2$

54. **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

55. **The product of the lengths of the perpendiculars from any point of the hyperbola $x^2-y^2=8$ to its asymptotes is**

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

56. **If the distance between the centres of two circles of radii 3,4 is 25 then the length of the transverse common tangent is**

1) 24 2) 12 3) 26 4) 13

57. **I.F of $(1+2xy)\frac{dy}{dx}=y^3$ is**

1) 2/y 2) $e^{2/y}$ 3) 2x 4) e^{x^2}

58. $\lim_{n\to\infty}\frac{1}{n}\sum_{r=1}^{2n}\frac{r}{\sqrt{n^2+r^2}}$ **equals to**

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

59. $\int_0^{®} \frac{dx}{1+3^{\cos x}}$ **is equal to**

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

60. $\int_0^{\pi/2} \frac{dx}{a^2\cos^2 x + b^2 \sin^2 x} =$

1) $\frac{\pi}{ab}$ 2) $\frac{\pi}{2ab}$ 3) πab 4) $\pi^2 ab$

61. The area of the region bounded by the curve $y = 2x - x^2$ **and the line y = x is**

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

62. The area bounded by the y -axis , y = cos x and y = sin x, $0 \le x \le ® / 2$ **is**

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

63. $\int \sqrt{\frac{\cos x - \cos^3 x}{1-\cos^3 x}} dx =$

1) $-\frac{2}{3}\sin^{-1}\left(\cos^{3/2} x\right) + c$ 2) $\frac{1}{3}\cos^{-1}\left(\cos^{3/2} x\right) + c$

3) $-\frac{3}{2}\sin^{-1}\left(\cos^{3/2} x\right) + c$ 4) $\frac{3}{2}\cos^{-1}\left(\cos^{3/2} x\right) + c$

64. Solution of $\left(x + 2y^3\right)dy = y\,dx$ **is**

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

65. The centroid of an equilateral triangle is (0, 0) and the length of the altitude is 6. The equation of the circumcircle of the triangle is

1) $x^2 + y^2 = 6$ 2) $x^2 + y^2 = 16$ 3) $x^2 + y^2 = 9$ 4) $x^2 + y^2 = 36$

66. If O is the origin and OP, OQ are the tangents to the circle $x^2 + y^2 + 2gx + 2fy + c = 0$ **, then the circumcentre of the** ΔOPQ **is**

1) $(-g, -f)$ 2) $(-f, -g)$ 3) $(-g/2, -f/2)$ 4) $(-f/2, -g/2)$

67. A tetrahedron has vertices O(0,0,0) A(1,2,1) B(2,1,3) and C(-1,1,2) then angle between OAB and ABC will be

1) $\cos^{-1}\left(\frac{17}{31}\right)$ 2) 30° 3) 90° 4) $\cos^{-1}\left(\frac{19}{35}\right)$

68. $\lim_{x\to 0}\frac{(ab)^x - a^x - b^x + 1}{x^2}$ **is**

1) log a 2) log b 3) log a log b 4) 1

69. $\underset{x\to 0}{Lt}\, f\left(\frac{1-\cos 3x}{x^2}\right)$ **[where** $f(x)$ **is a continuous function satisfying the condition** $f\left(\frac{9}{2}\right)=\frac{2}{9}$**] is equal to**

1) 0 2) 9/2 3) 2/9 4) 1

70. **If** $f(x)=\begin{cases}\frac{\log(1+ax)-\log(1-bx)}{x}, x\neq 0\\ k, x=0\end{cases}$

and $f(x)$ **is continuous at** $x=0$**, then the value of k is**

1) a-b 2) a+b 3) loga+logb 4) ab

71. **Sand is being poured from a pipe at the rate of** $12cm^3/\sec$**. The falling sand forms a cone on the ground in such a way that the height of the cone is always one sixth of the radius of the base. The rate (in cm/sec) at which the height of the sand cone increasing when the height is 4cm**

1) $\frac{1}{24®}$ 2) $\frac{1}{48®}$ 3) $\frac{1}{36®}$ 4) $\frac{1}{12®}$

72. **The value a for which the function** $f(x)=(a+2)x^3-3ax^2+9ax-1$ **decreases for all real values of** x**, is**

1) a<-2 2) a>-2 3) a<-3 4) -3<a<-2

73. **The equation of tangent to the curve whose parametric equations are** $x=a\sqrt{\cos 2t}.\cos t$**;** $y=a\sqrt{\cos 2t}.\sin t$**; at** $t=\frac{®}{6}$ **is**

1) y=a 2) $y=\frac{a}{2\sqrt{2}}$ 3) $y=2a\sqrt{2}$ 4) $y=a\sqrt{2}$

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

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

75. **If one of the lines of** $my^2+(1-m^2)xy-mx^2=0$ **is a bisector of the angle between the lines** $xy=0$, **then m=**

1) 2 2) 0 3) -1/2 4) 1 or -1

76. **The equation** $x^2+(\text{a}+\text{«})xy+\text{a}\text{«}y^2+x+\text{«}y=0$ **represents two parallel lines if**

1) $\text{a}+\text{«}=0$ 2) $\text{a}=4\text{«}$ 3) $\text{a}=\text{«}$ 4) $\text{a}=3\text{«}$

77. **If the lines joining the origin to the points of intersection of the line** $y=kx+1$ **and** $x^2+y^2=1$ **are at right angles then k=**

1) ±3 2) ±2 3) ±1 4) ±4

78. If A(3,2,-4) B(5,4,-6) and C(9,8,-10) are three collinear points then the ratio in which C divides AB

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

79. The equation of the plane passing through the points (-1,1,1) and (1,-1,1) and perpendicular to the plane $x+2y+2z=5$

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

80. A line makes same angles α **with each of the** x **and z-axis. If the angle** β **, which it makes with y-axis, is such that** $\sin^2\beta = 3\sin^2\alpha$ **then** $\cos^2\alpha =$

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

PHYSICS

81. If young's modulus Y, Surface Tension S and time T are fundamental quantities, then the dimensional formula of density is

1) $S^2Y^3T^{-2}$ 2) $S^2Y^{-3}T^2$ 3) $S^{-2}Y^{-3}T^{-2}$ 4) $S^{-2}Y^3T^2$

82. A particle moving in a straight line with initial velocity u and uniform acceleration f, if the sum of the distances travelled in t^{th} **and** $(t+1)^{th}$ **seconds is 50cm, then its velocity after t seconds in cm/s is**

1) 100 2) 25 3) 50 4) Zero

83. A projectile has the maximum range 100m. If it is pushed up smooth inclined plane of angle 30° **with the same speed, the distance travelled by it along the inclined plane will be**

1) 200m 2) $200/\sqrt{3}$ m 3) 100m 4) $100\sqrt{3}$ m

84. Two vectors $\overline{A}\&\overline{B}$ **have precisely equal magnitudes. For the magnitude of** $\overline{A}+\overline{B}$ **to be larger than the magnitude of** $\overline{A}-\overline{B}$ **by a factor n, what must be the angle between them**

1) $Tan^{-1}(1/n)$ 2) $2Tan^{-1}(n)$ 3) $2Tan^{-1}(1/n)$ 4) $Tan^{-1}(n)$

85. A body of 3kg rests in limiting equilibrium on an inclined plane whose slope is 30°**. If the plane is raised to a slope of** 60°**, the force in kg weight along the plane required to support it is** $(g=10ms^{-2})$

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

86. An Impulse I given to a body changes its velocity from V_1 **to** V_2**. The increase in the kinetic energy of the body is given by**

1) I (V_1+V_2) 2) $\frac{I}{2}(V_1+V_2)$ 3) I (V_1-V_2) 4) $\frac{I}{2}(V_1-V_2)$

87. One third chain is hanging down from a table. Work done to bring the hanging part of the chain on the table is (Mass of chain=M and Length=L)

1) $\frac{MgL}{32}$ 2) $\frac{9MgL}{2}$ 3) $\frac{MgL}{3}$ 4) $\frac{MgL}{18}$

88. A body projected vertically up with a velocity 12m/s returns to the ground with a velocity of 10m/s. The maximum height attained by the body is $(g=10ms^{-2})$

1) 12.2m 2) 1.1m 3) 2.2 4) 6.1m

89. A body of mass 2kg moves at $2\bar{i}$ m/s and another body of mass 3kg moves at $4\bar{i}$ m/s. The kinetic energy of centre of mass is

1) 25.6J 2) 6.4J 3) 12.8J 4) 20J

90. A thin hollow sphere of mass m is completely filled with a liquid of mass m. When the sphere rolls with a velocity ¬ , kinetic energy of the system is (neglect friction)

1) $\frac{1}{2}mv^2$ 2) mv^2 3) $\frac{4}{3}mv^2$ 4) $\frac{4}{5}mv^2$

91. A body is projected vertically upwards from the surface of the earth with a velocity equal to $\frac{2}{3}$ of escape velocity of earth. If R is the radius of the earth, the maximum height attained by the body is

1) $\frac{4R}{5}$ 2) $\frac{4R}{9}$ 3) $\frac{5R}{4}$ 4) $\frac{5R}{9}$

92. Springs of spring constants K, 2K, 4K, 8K, ……2048K are connected in series. A mass Mkg is attached to the lower end of the last spring and the system is allowed to vibrate. The time period is given by

1) $2®\sqrt{\frac{M}{K}}$ 2) $2®\sqrt{\frac{M}{4K}}$ 3) $2®\sqrt{\frac{M}{2048K}}$ 4) $2®\sqrt{\frac{2M}{K}}$

93. Two wires of different materials each of length l and cross sectional area A are joined in series to form a composite wire. If their Young's moduli are Y and 3Y, the total elongation produced by applying a force F to stretch the composite wire

1) $\frac{3Fl}{4AY}$ 2) $\frac{3FA}{4Yl}$ 3) $\frac{2Fl}{3AY}$ 4) $\frac{4Fl}{3AY}$

94. A dry clean needle of diameter d and density ° when carefully placed on the surface of water remains floating. If T is the surface Tension of water, then maximum value for the diameter d of the needle for enabling it to float will be

1) $d=\sqrt{\frac{8°®}{Tg}}$ 2) $d=\sqrt{\frac{4°®}{Tg}}$ 3) $d=\sqrt{\frac{8T}{®°g}}$ 4) Data incomplete

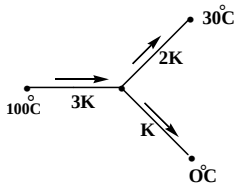
95. The ratio of coefficients of apparent expansions of the same liquid in two different vessels is 2:3. If $~_1$ and $~_2$ are the coefficient of linear expansions, then coefficient of real expansion of the liquid is

1) $9~_1-6~_2$ 2) $6~_1-9~_2$ 3) $3~_1-2~_2$ 4) $2~_1-3~_2$

96. A quill tube contains a mercury column of length 12cm. The length of air column is 16cm when it is held vertically. On inverting it with its open end downwards, the length of air column will be _____cm (atmospheric pressure=76cm of Hg)

1) 16 2) 36 3) 12 4) 22

97. Three rods of same dimensions have thermal conductivities 3K, 2K and K. They are arranged as shown in the figure below, then the temperature of the junction in steady state is



1) $50^{\circ}c$ 2) $40^{\circ}c$ 3) $60^{\circ}c$ 4) $30^{\circ}c$

98. The relation between the internal energy U and adiabatic constant ¥ is

1) $U=\frac{PV}{¥-1}$ 2) $U=\frac{PV^{¥}}{¥-1}$ 3) $U=\frac{PV}{¥}$ 4) $U=\frac{¥}{PV}$

99. Five moles of Hydrogen initially at STP is compressed adiabatically so that its temperature becomes 473 K. The increase in internal energy of the gas, in kilo joules is (R=8.3 J/mole-K, ¥ =1.4)

1) 41.50 2) 21.55 3) 20.75 4) 83

100. At a given temperature the root mean square velocities of oxygen and hydrogen molecules are in the ratio

1) 16:1 2) 1:16 3) 4:1 4) 1:4

101. A string of length *l* hangs freely from a rigid support. The time required by a transverse pulse to travel from bottom to top of the string is

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

102. A stretched sonometer wire is in tension with a tuning fork. When the length is increased by 2%, the number of beats per second is 5. Find the frequency of the fork

1) 500Hz 2) 250Hz 3) 200Hz 4) 400Hz

103. A vessel is half filled with a liquid of refractive index « . The other half of the vessel is filled with an immiscible liquid of refractive index $2«$. If the apparent depth of the vessel is 75% of the actual depth, then « =

1) 1.5 2) 2 3) 1 4) 2.5

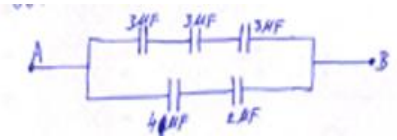
104. A ray of light passes through an equilateral prism such that angle of incidence is equal to angle of emergence and each one is equal to $\frac{2}{3}$ of angle of prism. The angle of deviation is

1) 40° 2) 20° 3) 60° 4) 30°

105. The bob of a simple pendulum is hanging vertically down from a fixed identical bob by means of a string of length 'L'. If both bobs are charged with a charge q each, time period of the pendulum is (ignore the radii of the bobs)

1) $2®\sqrt{\frac{L}{g+\left(\frac{q^2}{L^2m^2}\right)}}$ 2) $2®\sqrt{\frac{L}{g-\left(\frac{q^2}{L^2m}\right)}}$ 3) $2®\sqrt{\frac{L}{g}}$ 4) $2®\sqrt{\frac{L}{g-\left(\frac{q^2}{Lm}\right)}}$

106. In the given arrangement of capacitors, one $3\mu F$ capacitor has got $150\mu J$ of energy. Then the potential difference across $2\mu F$ capacitor is

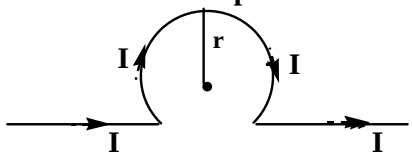


1) 40v 2) 15v 3) 20v 4) 25v

107. When a battery connected across a resistor of 16Ω, the voltage across the resistor is 12v. When the same battery is connected across a resistor of 10Ω, voltage across it is 10v. The internal resistance of the battery in ohms is

1) 10 2) 8 3) 6 4) 12

108. The magnetic field at the centre of circular loop in the circuit shown in figure is



1) $\frac{\mu_0}{4\pi}\frac{2I}{r}(\pi-1)$ 2) $\frac{\mu_0}{4\pi}\frac{2I}{r}(1+\pi)$ 3) $\frac{\mu_0}{4\pi}\frac{2I}{r}$ 4) $\frac{\mu_0}{4\pi}\frac{I}{r}(1+\pi)$

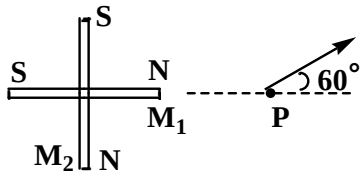
109. A circular coil of n turns is kept in a uniform magnetic field such that the plane of the coil is perpendicular to the field. Th magnetic flux associated with the coil is now ϕ. Now the coil is opened and made into another circular coil of twice the radius of the previous coil and kept in the same field such that the plane of the coil is perpendicular to the field. The magnetic flux associated with this coil now is

1) ϕ 2) $\phi/2$ 3) $\phi/4$ 4) 2ϕ

110. A coil of self inductance $\left(\frac{1}{\pi}\right)H$ is connected in series with a 300Ω resistance. A voltage of 400v at frequency 100Hz is applied to this combination. The phase difference between the voltage and current will be

1) $Tan^{-1}(4/3)$ 2) $Tan^{-1}(2/3)$ 3) $Tan^{-1}(3/4)$ 4) $Tan^{-1}(3/2)$

111. Two short bar magnets of magnetic moments M_1 and M_2 are placed one over the other as shown. The resultant magnetic induction at the point P makes an angle 60° with the axial line of M_1. Ratio of M_1 to M_2 is



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

112. Two energy levels of an electron in atom are separated by 9.9ev. The frequency of radiation emitted when the electrons goes from higher to the lower level is

1) 1.2×10^{15} Hz 2) 3.6×10^{15} Hz 3) 2.4×10^{15} Hz 4) 4.8×10^{15} Hz

113. The kinetic energies of photo electron emitted from a metal are K_1 and K_2 when irradiated with radiations of wave lengths λ_1 and λ_2 respectively. The work function of the metal is

1) $\frac{K_1\lambda_1 - K_2\lambda_2}{\lambda_2 - \lambda_1}$ 2) $\frac{K_1\lambda_2 - K_2\lambda_1}{\lambda_2 - \lambda_1}$ 3) $\frac{K_1\lambda_2 + K_2\lambda_1}{\lambda_2 + \lambda_1}$ 4) $\frac{K_1\lambda_1 + K_2\lambda_2}{\lambda_1 + \lambda_2}$

114. The height of the antenna

a) Limits the population covered by the transmission

b) Limits the ground wave propagation

c) Effectively used in line of sight communication

1) a and b are true 2) b and c are true 3) c and a are true 4) a,b,c are true

115. If A=1 and B=0, then interms of boolean algebra, the value of $\overline{A} \bullet$ A+B is

1) A 2) A+B 3) B 4) $A^2 + B$

116. In a transistor circuit, when the base current is increased by $50\mu A$, keeping the collector voltage fixed at 2v, the collector current increases by 2mA. The current gain of the transistor is

1) 40 2) 20 3) 60 4) 80

117. Interference pattern is obtained with two coherent light sources of intensity ratio . In the interference pattern, the ratio of $\frac{I_{max} - I_{min}}{I_{max} + I_{min}}$ will be

1) $\frac{\sqrt{\ }}{\ +1}$ 2) $\frac{2\sqrt{\ }}{\ +1}$ 3) $\frac{\sqrt{\ }}{(\ +1)^2}$ 4) $\left(\frac{\sqrt{\ }+1}{\sqrt{\ }-1}\right)^2$

118. The velocity of an electromagnetic wave in a medium is $2x10^8 ms^{-1}$. If the relative permeability is 1, then relative permitivity of the medium is _____ ($c_\circ$=$3x10^8 ms^{-1}$)

1) 2.25 2) 1.5 3) 4/9 4) 2/3

119. The radio active sample contains 600 radio active atoms. Its half life period is 30 minutes. The no. of radio active atoms remaining, if the decay occurs for 90 minutes is

1) 300 2) 200 3) 400 4) 75

120. If the radius of a nucleus with mass number 125 is 2 fermi, then radius of a nucleus with mass number 64 is

1) 1.2 fermi 2) 2.5 fermi 3) 0.8 fermi 4) 1.6 fermi

CHEMISTRY

121. If the wave number of the first line in the Balmer series of Li^{+2} ion is 1.35x 10^5 cm^{-1}, the wave number of the first line of the Balmer series of hydrogen atom is

1) $10000cm^{-1}$ 2) $15000cm^{-1}$ 3) $20000cm^{-1}$ 4) $25000cm^{-1}$

122. Ionic radius of Li^+ is nearly equal to

1) Be^{+2} 2) Mg^{+2} 3) Ca^{+2} 4) Al^{+3}

123.

List - I	**List – II**	**List – III**
P) $XeOF_4$	**A)** Sp^3d^2	**a) sqare pyramidal**
Q) $[PdBr_4]^{-2}$	**B)** Sp^2	**b) square planar**
R) O_3	**C)** $d\,Sp^2$	**c) angular**
S) I_3^-	**D)** Sp^3d^1	**d) linear**

The incorrect match is

1) P-A-a 2) Q-C-b 3) R-B-c 4) S-D-c

124. A mixture of 4 grams of Mg and MgO react with dil HCl to give 1.12 lit of H_2 gas at S.T.P then percentage of Mg in the given mixture is

1) 20% 2) 30% 3) 40% 4) 50%

125. At low pressure the compressibility factor is equal to

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

126. Correct statement(s) regarding H_2O_2 is/are

A) H_2O_2 is used to restore aerobic conditions to sewage

B) H_2O_2 has lower boiling point than water

C) Dielectric constant of H_2O_2 is more than H_2O

D) In $CuSO_4.5H_2O$, one H_2O molecule involves hydrogen bending

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

127. Aqueous Na_2CO_3 solution is _____ due to _____ hydrolysis

1) Acedic, Cationic 2) Alkaline, Cationic 3) Acedic, Anionic 4) Alkaline, Anionic

128. For a process ΔH_{vap} =30KJ $mole^{-1}$ and ΔS_{vap} =75J $mole^{-1}\,k^{-1}$ then the temperature of vapour at one atmosphere pressure is

1) 400K 2) 298K 3) 350K 4) 250K

129. Which is not antacid

1) $Mg(OH)_2$ 2) $NaHCO_3$ 3) $Al(OH)_3$ 4) $Zn(OH)_2$

130. Which one is the wrong statement about

1) The stability of +1 oxidation state increases Al<Ga<In<Tl
2) The boiling point order is B>Al>In>Ga>Tl
3) The melting point order is B>Al>Tl>In>Ga
4) The electro negativity order is B>Al>Ga>In>Tl

131. Which of the following gases is absorbed easily and more on activated charcoal

1) $CO_2(T_c = 304K)$ 2) $SO_2(T_c = 430K)$

3) $H_2(T_c = 23K)$ 4) all gases undergo absorption to the same extent

132. Hydrolysis of $(CH_3)_2\ SiCl_2$ followed by condensation polymerisation gives _____ polymer

1) Criss-Cross 2) Sheet like 3) Straight chain 4) Three dimensional

133. The D.O values of four water samples A, B, C and D are 10, 20, 30 and 40 respectively. Which is more polluted?

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

134. The equilibrium constant K_c for a reaction is $2x10^{13}$ at 300K calculate ΔG° at 300K is _____ J mole^{-1}

1) 7.64 x 10^{4} 2) 7.64 x 10^{-4} 3) -7.6 x 10^{-4} 4) -7.64 x 10^{4}

135. The P^{H} of solution obtained by mixing 100ml of each 5M NH_4Cl and 5M NH_4OH is 9.8 then P^{kb} of NH_4OH is

1) 7.0 2) 9.8 3) 4.2 4) 8.4

136. A sample of 0.50gm of an organic compound was treated according to Kjeldahl's method. The ammonia evolved was absorbed in 50ml of 0.5M H_2SO_4. The residual acid required 60ml of 0.5M solution of NaOH for neutralization. Find the percentage composition of nitrogen in the compound

1) 28 2) 56 3) 14 4) 48

137. $H_3C-C\equiv CH \xrightarrow{Na} A \xrightarrow{CH_3I} B$, then 'B' is

1) $H_3C-C\equiv C-CH_3$ 2) $CH_3-HC=CH-CH_3$

3) $CH_3-CH_2-CH_2-CH_3$ 4) $CH_2=CH-CH_2-CH_3$

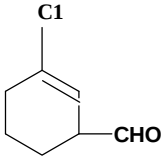
138. The reaction of benzene that damages its aromaticity is

1) $Cl_2, FeCl_3$ 2) $Alcl_3, CH_3Cl$ 3) H_2, Ni 4) fuming H_2SO_4

139. $CH_3COONa \xrightarrow{Electrolysis} M \xrightarrow[\Delta]{O_2/(CH_3COO)_2 Mn} N \xrightarrow{NaOH+CaO} O,$ 'O' in the sequence is

1) C_2H_6 2) CH_3COOH 3) C_3H_8 4) CH_4

140. The IUPAC name of the compound shown below is



1) 1-chloro cyclo hex-1-ene carbaldehyde 2) 3-chloro cyclo hex-2 ene carbaldehyde

3) 3-chloro cyclo hex-3-ene carbaldehyde 4) 1-chloro cyclo hex-2-ene carbaldehyde

141. Which aqueous solution has highest freezing point

1) $Al_2(SO_4)_3$ 2) $C_6H_{12}O_6$ 3) $K_3[Fe(CN)_6]$ 4) $MgCl_2$

142. $xA+yB\rightarrow zC$. If $\frac{-d[A]}{dt}=\frac{-0.5d[B]}{dt}=\frac{dC}{dt}$ then x, y and z are

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

143. Stabilisation energy of octahedral complex with d^7 configuration

A) 1.8 Δ^0 with three unpaired electrons **B) 1.8 Δ^0 with one unpaired electrons**

C) 0.8 Δ^0 with three unpaired electrons **D) 0.8 Δ^0 with one unpaired electrons**

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

144. The slag formed in the extraction of copper is

1) $ZnCO_3$ 2) $FeCO_3$ 3) $CaSiO_3$ 4) $FeSiO_3$

145. Incorrect statement about permanganate ion is

1) Tetrahedral 2) Paramagnetic 3) Purple in colour 4)It has three $p\pi - d\pi$ bonds

146. The metal crystals with complex structure are

1) Mn, Fe 2) Co, Ni 3) Mn, Hg 4) Co, Cu

147. The formula of brown ring and the oxidation state of Fe in brown ring formula are

1) $[Fe(H_2O)_5NO]^{+2}$ and +2 2) $[Fe(H_2O)_5NO]^{+2}$ and +1

3) $[Fe(H_2O)_5NO]^{+1}$ and +2 4) $[Fe(H_2O)_5NO]^{+1}$ and +1

148. Amphoteric oxide is

1) Mn_2O_7 2) CrO_3 3) Cr_2O_3 4) Both a and b

149. $4HCl+O_2 \xrightarrow[723K]{X} 2Cl_2+2H_2O$, the magnetic momentum of cation in 'X' is _____ Bohr magnetons

1) 1.732 2) 2.732 3) 3.7 4) 4.7

150. $XeF_4 + - \rightarrow XeF_6 + O_2$

1) $XeOF_2$ 2) $XeOF_4$ 3) OF_2 4) O_2F_2

151. In a compound atoms of element 'Y' form C.C.P. lattice and those of element 'X' occupy 2/3rd of tetrahedral voids. The formula of the compound will be

1) X_2Y_3 2) X_2Y 3) X_3Y_4 4) X_4Y_3

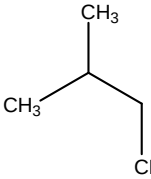
152. Aniline $\xrightarrow[H_2So_4,288k]{HNo_3}$ a mixture of ortho nitro aniline (a) para nitro aniline (b) and meta nitro aniline (c) then the % of decreasing order of formation of major product is

1) b > a > c 2) c > a > b

3) b > c > a 4) a > b > c

153. n-pentane and Iso-pentane can be distinguished by

1) Br_2 2) O_3 3) $Conc.H_2SO_4$ 4) $KMnO_4$

154.  **$\xrightarrow[h\nu]{Cl_2} C_5H_{11}Cl$ the no. of Isomeric products formed**

1) 6 2) 4 3) 2 4) 10

155. Identify the sequence of bases of m-RNA molecule synthesized on the given DNA strand – AGC GAT TAC

1) ACGCAT TAG 2) TGG CTA ATG 3) UC GC UA AUG 4) UC G CUT TUC

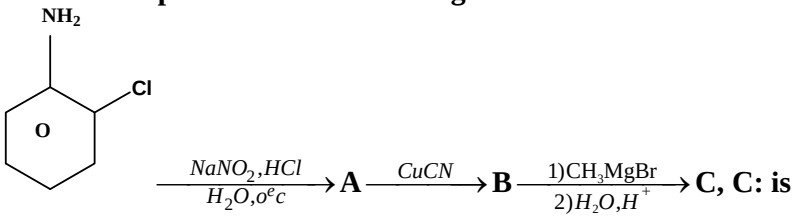
156. Identify the incorrect statement

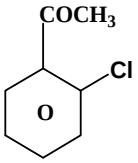
1) Backalite and urea-formaldehyde resins are elastomers
2) Polyamides like nylon 6, nylon 6, 6' are the examples of fibres
3) Polystyrene, polyvinyl and polythene are thermoplastic polymers
4) Thermo plastic polymers have intermolecular forces in between elastomers and fibres

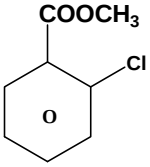
157. Limiting equivalent conductance of $AlCl_3$, Na_2SO_4 and NaCl are X, Y and Z $ohm^{-1}\ cm^2 eq^{-1}$ limiting molar conductance of $Al_2(SO_4)_3$ is ($ohm^{-1}\ cm^2\ mole^{-1}$)

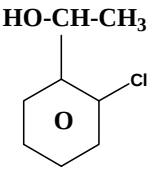
1) X+Y-Z 2) 6(X+Y-Z) 3) 2X+3Y-6Z 4) 2X+3Y-Z

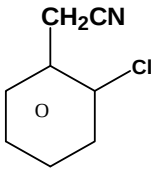
158. What is the product of the following series of reactions



1) 

2) 

3) 

4) 

159. Assertion : Penicillin – G is an antibiotic
Reason : Penicillin – G is effective against gram positive as well as gram negative bacteria

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

160. Both Geometrical and optical Isomerism are shown by

1) $[Co(NH_3)_4Cl_2]^+$ (transform) 2) $[Co(NH_3)_5Cl]^{2+}$
3) $[Co(en)_2Cl_2]^+$ 4) $[Cr(en)_3]^{+3}$

*** * * ***

KEY SHEET

EAMCET (ENGG) **Date: 00-00-2017**
Time: 3 Hours **Max. Marks: 160**

MATHEMATICS

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

PHYSICS

81) **4**	82) **2**	83) **3**	84) **3**	85) **3**	86) **2**	87) **4**	88) **4**	89) **1**	90) **3**
91) **1**	92) **4**	93) **4**	94) **3**	95) **1**	96) **4**	97) **3**	98) **1**	99) **3**	100) **4**
101) **4**	102) **2**	103) **3**	104) **2**	105) **3**	106) **3**	107) **2**	108) **1**	109) **4**	110) **2**
111) **1**	112) **3**	113) **1**	114) **4**	115) **3**	116) **1**	117) **2**	118) **1**	119) **4**	120) **4**

CHEMISTRY

121) **2**	122) **2**	123) **4**	124) **2**	125) **1**	126) **4**	127) **4**	128) **1**	129) **4**	130) **4**
131) **2**	132) **3**	133) **4**	134) **4**	135) **3**	136) **1**	137) **1**	138) **3**	139) **4**	140) **2**
141) **2**	142) **3**	143) **4**	144) **4**	145) **2**	146) **3**	147) **2**	148) **3**	149) **1**	150) **4**
151) **4**	152) **3**	153) **4**	154) **1**	155) **3**	156) **1**	157) **2**	158) **1**	159) **3**	160) **3**

HINTS & SOLUTIONS

MATHS

1. Put $\theta = \frac{\pi}{4}$

$P = \frac{\sqrt{2}}{1+\sqrt{2}} = \frac{1}{1+\frac{1}{\sqrt{2}}} =$

$\frac{1-\cos\theta+\sin\theta}{1+\sin\theta} = P$

2. $\frac{\sin A\sin B}{\cos A\cos B} = \frac{1}{2}$ by components and dividendo

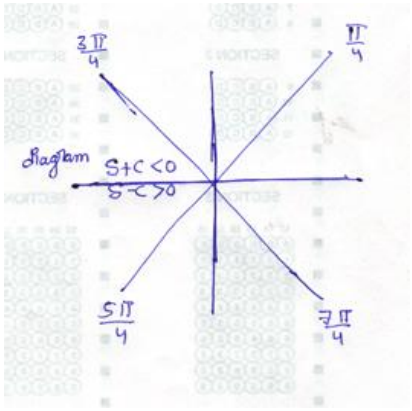
3. If A=340, $\frac{A}{2} = 170 \in \left[\frac{3\pi}{4}, \frac{5\pi}{4}\right]$

$\sqrt{1-\sin A} - \sqrt{1+\sin A}$

$\sqrt{\left(\sin\frac{A}{2} - \cos\frac{A}{2}\right)^2} - \sqrt{\left(\sin\frac{A}{2} + \cos\frac{A}{2}\right)^2}$

$\sin\frac{A}{2} - \cos\frac{A}{2} - (-\sin\frac{A}{2} - \cos\frac{A}{2})$

$2\sin\frac{A}{2}$



4. Change in $\sqrt{3}\frac{\cos 20}{\sin 20} - 4\cos 20$

$\frac{\sqrt{3}\cos 20 - 4\sin 20\cos 20}{\sin 20}$

$\frac{\sqrt{3}\cos 20 - 2\sin 40}{\sin 20}$

$\frac{\sqrt{3}\cos 20 - 2\sin(60-20)}{\sin 20}$

Simplify it answer=1

5. By concept period is $\frac{1}{k}$

6. $(2^3)^n = (8)^n = (1+7)^n$ expand it

Then $2^{3n} - 7n - 1$ is divisible by 49

7. Put x =0 and expand determinant

r =18

8. $|AdjA| = |A|^{n-1} = |A|^2$ and

$A(adjA) = |A|I \Rightarrow |A| = 4 \Rightarrow |AdjA| = 4^2 = 16$

9. $x+2y = X, x-2y = Y$

Find x, y

$x = \frac{X+Y}{2}, y = \frac{X-Y}{4}$

$xy = \frac{X^2 - Y^2}{8}$

……*…..

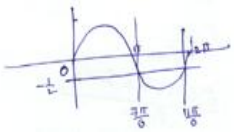
$7-x>0 \quad x-3\geq 0 \quad 7-x\geq x-3$

10. $x-7<0 \quad x-3\geq 0 \quad 10\geq 2x$

$x<7 \quad x\geq 3 \quad x\leq 5$

$x\in\{3,4,5\}$

11. $\sin x \geq -\frac{1}{2}$



$x \in \left[0, \frac{7\pi}{6}\right] \cup \left[\frac{11\pi}{6}, 2\pi\right]$

12. $10 = 3\pi + \theta, \theta \in \left(0, \frac{\pi}{2}\right)$

$\sin^{-1}(\sin(3\pi+\theta)) = \sin^{-1}(-\sin\theta)$

$= -\sin^{-1}(\sin\theta)$

$= -\theta$

$= 3\pi - 10$

13. $\sinh^{-1} p = \log_e(5+\sqrt{26})$

$\log_e(p+\sqrt{p^2+1}) = \log_e(5+\sqrt{26})$

P=5

14. $a^2+b^2+c^2 = 2a\left[c\frac{1}{2} + \frac{\sqrt{3}}{2}b\right] = 2a[c\cos 60 + b\cos 30]$

$B = 60^\circ, C = 30^\circ$

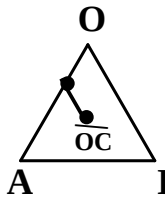
$\therefore A = 90^\circ$

Right angled Δ

15. $\tan\theta = \frac{\sqrt{3}+1}{\sqrt{3}-1}$

$\theta = 75^\circ$

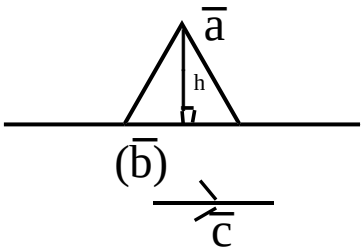
16.



$\overline{C}$ lies inside ΔOAB

17. On X Y plane vector is
=4i-3j
$\perp$ r vector is =3i+4j
Unit vector = $\pm\frac{1}{5}$(3i+4j)

18.



Area of $\Delta^{le} = \frac{1}{2}\left|(\bar{b}-\bar{a})\times\bar{c}\right|$

$\frac{1}{2}h|\overline{c}| = \frac{1}{2}\left|(\bar{a}-\bar{b})\times\bar{c}\right|$

$h = \frac{\left|(\bar{a}-\bar{b})\times\bar{c}\right|}{|\overline{c}|}$

19. $\left[\bar{x}\ \ \bar{a}\ \ \bar{b}\right] = \bar{x}.(\bar{a}\times\bar{b})$

$= \frac{\left(\bar{a}\times\bar{b}\right)^2 - \left[\bar{a}\ \ \bar{a}\times\bar{b}\ \ \bar{a}\times\bar{b}\right]}{\left(\bar{a}\times\bar{b}\right)^2}$

$= \frac{\left(\bar{a}\times\bar{b}\right)^2}{\left(\bar{a}\times\bar{b}\right)^2} = 1$

20. $a\sim^2 + b\sim + c = 0, a\ ^2 + b\ \ + c = 0$

$a\sim + b = \frac{-c}{\sim}, a\ \ + b = \frac{-c}{}$

$\frac{-c}{\sim} = x$

$\sim = \frac{-c}{x}$

Sub in $a\sim^2 + b\sim + c = 0$
$\Rightarrow acx^2 - bx + 1 = 0$

21. Roots of $ax\sqrt{x} + bx + c\sqrt{x} + d = 0$ are
$\sim^2$, ^{2},¥^{2}

22. By taking L.C.M and put $x = a$, then

$A = \frac{a^3}{(a-b)(a-c)}$

23. Case1: circle circle interfect we get two points
$4_{c_2}\ x2 = 12$
Case2: Circle and line interfect we get two points
$4_{c_1}\ x4_{c_1}\ x2 = 16x2 = 32$
Case3: Line and line interfect we get one point
$4_{c_2}\ x1 = 6$
No. of points = 12+32+6=50

24. Put one-one for each purse, remaining 7 things can be distributed by $n+r-1_{c_{r-1}}$ ways

$7+5-1_{c_{5-1}} = 11_{c_4}$

25. $9_{c_2}\ x9_{c_2} = 36x36 = 1296$

26. $(3-5x)(1-x)^{-2}$

$(3-5x)(1+2x+3x^2+....+100x^{99}+101x^{100}+...\infty)$

Coefficient x^{100} is
303-500= -197

27. $\left[(1+x)^3\right]^6 = (1+x)^{18}$
Number of terms = 19

28. $\sqrt{x-iy} = \pm\left(\sqrt{\frac{\sqrt{x^2+y^2}+x}{2}} - i\sqrt{\frac{\sqrt{x^2+y^2}-x}{2}}\right)$

29. $|z+3| \le 2$
$|z-2| = |z+3-5| \le |z+3|+5 \le 2+5 \le 7$
Maximum value of $|z-2| = 7$

30. $\sim = -w, \quad = -w^2$
$\sim^5 + \ ^5 = -(w^5 + w^{10})$
If w^3=1 then
$= -(w^2 + w)$
=1

31. Varience of Ist 20 natural numbers is
$\frac{n^2-1}{12} = \frac{399}{12} = \frac{133}{4}$

32. $n(S) = 2^n$
$n(E) = n_{c_0} + n_{c_2} + n_{c_4} + ... + = 2^{n-1}$
$p(E) = \frac{2^{n-1}}{2^n} = \frac{1}{2}$

33. n(E)=A suit can be selected by = 4_{c_1}

n(S)= $52_{c_{13}}$

34. $\frac{P\left(\overline{A}\cap B\right)}{P(B)}=\frac{P(B)-P(A\cap B)}{P(B)}$

$=\frac{\frac{5}{8}-\frac{1}{4}}{\frac{5}{8}}$

$=\frac{\frac{5-2}{8}}{\frac{5}{8}}=\frac{3}{5}$

35. Sum of infinite G.P=$\frac{a}{1-r}$

36. $p=\frac{1}{2},q=\frac{1}{2}$

$p(\mathrm{x}\geq 1)\geq 0.99$

$1-p(\mathrm{x}=0)\geq 0.99$

$1-n_{c_0}\left(\frac{1}{2}\right)^{\circ}\left(\frac{1}{2}\right)^{n}\geq 0.99$

$1-\frac{1}{2^n}\geq 0.99$

n=7

37. $\frac{e^{-\mathrm{a}}\mathrm{a}^1}{1!}=\frac{2.e^{-\mathrm{a}}\mathrm{a}^2}{2!}$

$\mathrm{a}=\mathrm{a}^2$

$\mathrm{a}=0,\ \mathrm{a}=1$

38. By using general term $T_{r+1}=n_{c_r}(x^2)^{\mathrm{n-r}}\left(\frac{a}{x}\right)^r$

$=5_{c_r}(x^2)^{5-r}\left(\frac{a}{x}\right)^r$, power of $x=1$ then we will get r

39. Sub $\sim+\ =\frac{-1}{2},\sim\ =\frac{3}{2}$

40. $\sim\ +\ ¥+¥\sim=-3,\ \sim\ ¥=1,\ \sim+\ \ +¥=-2$

$\sim^{-2}+\ \ ^{-2}+¥^{-2}=\frac{1}{\sim^2}+\frac{1}{\ ^2}+\frac{1}{¥^2}=$

$\frac{\sim^2\ \ ^2+\ \ ^2¥^2+¥^2\sim^2}{(\sim\ ¥)^2}=\frac{s_2{}^2-2s_3s_1}{s_3{}^2}$

41. $r=\sqrt{2},(x_1,y_1)=(2,0)$

$x=x_1+r\cos\theta$

$y=y_1+r\sin\theta$

42. Reflection about $y=x$ is $(1,4)$ two units along +ve direction of X-axes is $(3,4)$

Use $x=\mathrm{X}\cos(\theta)-\mathrm{Y}\sin(\theta)$,

$y=\mathrm{X}\sin(\theta)+\mathrm{Y}\cos(\theta)$

43. P = 5, ~ $=60^0$

$x\cos\sim+y\sin\sim=\mathrm{P}$

44. $\left|\frac{ax_1+by_1+c}{a\cos\sim+b\sin\sim}\right|$

45. The quadrilateral formed by the lines is a rhombus

46. Intercepts between the axes made by the given lines are $a\sqrt{2},\ ar\sqrt{2},\ ar^2\sqrt{2}$

47. By solving two equations we get

$2y^2-ry-r^2=0$

48. $AB=\sqrt{t_1{}^2+t_2{}^2}=$ where $t_1\ \&\ t_2$ are lengths of tangent

49. a(1)=(-2) (-1) $\Rightarrow$ a=2

50. $t_1t_2=2$

51. $y-x=1\ \&\ x=y^2$

$\frac{dy}{dx}=\frac{1}{y}=1\Rightarrow y=\frac{1}{2}$

$\therefore$ pt on the parabola $\left(\frac{1}{4},\frac{1}{2}\right)$

Distance $\Rightarrow\frac{\left|\frac{1}{4}-\frac{1}{2}+1\right|}{\sqrt{1+1}}=\left|\frac{1-2+4}{4\sqrt{2}}\right|=\frac{3}{4\sqrt{2}}$

52. $9(x-1)^2+4(y-1)^2=23+9+4=36$

$\frac{(x-1)^2}{4}+\frac{(y-1)^2}{9}=1$

$e=\frac{\sqrt{9-4}}{9}=\frac{\sqrt{5}}{3}$

$y-1=\pm 3\left(\frac{\sqrt{5}}{3}\right)$

53. $\frac{x}{a}\sec^{-}-\frac{y}{b}\tan^{-}=a^2-b^2$

& lx+my=1

$\frac{ax}{\sec^{-}}+\frac{by}{\tan^{-}}=a^2+b^2\ \&\ lx+my=1$

$\Rightarrow\frac{a}{l\sec^{-}}=\frac{b}{m\tan^{-}}=a^2+b^2$

$\Rightarrow\frac{a}{l}=\left(a^2+b^2\right)\sec^{-},\frac{b}{m}=\left(a^2+b^2\right)\tan^{-}$

54. $e_1 = \sqrt{\dfrac{\frac{144}{25}+\frac{81}{25}}{\frac{144}{25}}} = \dfrac{5}{4}$

Foci $(\pm 3,0) = (a,e,o)$ ae=3

$\Rightarrow e = \dfrac{3}{4}$

$b^2 = 16\left(1-\dfrac{9}{16}\right) = 7$

55. $\dfrac{a^2b^2}{a^2+b^2}$

56. Length of transverse $= \sqrt{d^2-(r_1+r_2)^2}$

57. $\dfrac{dx}{dy} + x\left(\dfrac{-2}{y^2}\right) = \dfrac{1}{y^3}$

I.F $e^{\int \frac{-2}{y^2} dy}$

58. $I = \dfrac{1}{2}\int_0^2 \dfrac{2x}{\sqrt{1+x^2}}.dx = \dfrac{1}{2}\left(2\sqrt{1+x^2}\right)_0^2 = \sqrt{5}-1$

59. $I = \int_0^{\pi} \dfrac{dx}{1+3^{\cos(\pi-x)}} = \int_0^{\pi} \dfrac{3^{\cos x}}{3^{\cos x}+1}.dx$

$2I = \int_0^{\pi} dx \Rightarrow I = \dfrac{\pi}{2}$

60. $I = \int_0^{\frac{\pi}{2}} \dfrac{\sec^2 x}{a^2+b^2\tan^2 x}dx \quad b\tan x = t,$

$b\sec^2 x.dx = dt$

$= \int_0^{\infty} \dfrac{1}{a^2+t^2}\dfrac{dt}{b} = \left[\dfrac{1}{ab}\text{Tan}^{-1}\left(\dfrac{t}{a}\right)\right]_0^{\infty} = \dfrac{\pi}{2ab}$

61. $2x - x^2 = x \Rightarrow x = 0, x = 1$

R.A$= \int_0^1 (2x-x^2-x)dx = \int_0^1 (x-x^2).dx$

$= \left[\dfrac{x^2}{2} - \dfrac{x^3}{3}\right]_0^1 = \dfrac{1}{2}-\dfrac{1}{3} = \dfrac{1}{6}$

62. R.A$= \int_0^{\frac{\pi}{4}} \cos x.dx + \int_{\frac{\pi}{4}}^{\pi/2} \sin x.dx$

$= [\sin x]_0^{\frac{\pi}{4}} - [\cos x]_{\frac{\pi}{4}}^{\frac{\pi}{2}}$

$= \left(\dfrac{1}{\sqrt{2}}-0\right) - \left(0-\dfrac{1}{\sqrt{2}}\right) = \sqrt{2}$

63. $\int \dfrac{\sqrt{\cos x}\sin x}{\sqrt{1-\left(\cos^{3/2} x\right)^2}}dx$

$\cos^{\frac{3}{2}} x = t$

$\dfrac{3}{2}\cos^{\frac{1}{2}} x(-\sin x)\ dx = dt$

$= \int \dfrac{1}{\sqrt{1-t^2}}\left(\dfrac{-2dt}{3}\right) = \dfrac{-2}{3}\sin^{-1}(\cos^{\frac{3}{2}} x) + c$

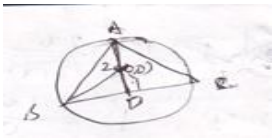
64. $\dfrac{dx}{dy} = \dfrac{x}{y+2y^2}$ or $\dfrac{dx}{dy} + x\left(\dfrac{-1}{y}\right) = 2y^2$

I.F $e^{\int -\frac{1}{y}.dy} e^{-\log|y|} = \dfrac{1}{y}$

Solution : $x.\dfrac{1}{y} = \int 2y^2.\dfrac{1}{y}.dy = 2\dfrac{y^2}{2} + c$

65. G=(0,0) $r = \dfrac{2}{3}(6) = 4$

Equation of circle is $x^2 + y^2 = 16$



66. Equation of circum circle of AGOPQ

$x^2 + y^2 + gx + fy + c = 0$

$c = \left(\dfrac{-g}{2}, \dfrac{-f}{2}\right)$

67. Normal D.R's of OAB plane are (5,-1,-3)

ABC plane are (1,-5,-3)

$\cos\theta = \dfrac{19}{35}$

68. $\lim_{x\to 0}\left(\dfrac{a^x-1}{x}\right)\lim_{x\to 0}\left(\dfrac{b^x-1}{x}\right) = \log a.\log b$

69.

$$\lim_{x\to 0} f\left(\frac{1-\cos 3x}{x^2}\right) = \lim_{x\to 0} f\left(\frac{2\sin^2(3x/2)}{x^2}\right) = f\left(\frac{9}{2}\right)$$

$\therefore f\left(\dfrac{9}{2}\right) = \dfrac{2}{9}$

70. Since $f(x)$ is continuous at $x = 0$, therefore

$\lim_{x\to 0^-} f(x) = f(0) \Rightarrow \lim_{x\to 0^+} f(x) = k$

$\Rightarrow \lim_{x\to 0} \dfrac{\log(1+ax)-\log(1-bx)}{x} = k$

$\Rightarrow a\lim_{x\to 0}\dfrac{\log(1+ax)}{ax} - (-b)\lim_{x\to 0}\dfrac{\log(1-bx)}{-bx} = k$

$\Rightarrow a+b = k$

71. Given

$h=\frac{r}{6},\frac{dv}{dt}=12cm^3/\sec,h=4,V=\frac{1}{3}\pi r^2h=12\pi h^3$

$\Rightarrow \frac{dv}{dt}=36\pi h^2\frac{dh}{dt}\Rightarrow \frac{dh}{dt}=\frac{1}{36\pi h^2}\frac{dv}{dt}$

72. $f^1(x)<0 \quad \forall x\in R$

73. $m=\left(\frac{dy}{dx}\right)_{\frac{\pi}{6}}=0$

74. Put $x^3=\sin A \quad y^3=\sin B \Rightarrow A-B=\text{constant}$

$\Rightarrow \sin^{-1}(x^3)-\sin^{-1}(y^3)=\text{ constant}$

$\Rightarrow \frac{3x^2}{\sqrt{1-x^6}}-\frac{3y^2y^1}{\sqrt{1-y^6}}=0$

75. $h=0 \& a+b=0$

$\Rightarrow 1-m^2=0\Rightarrow m=\pm 1$

76. $a^2=ab\Rightarrow \frac{(a+\alpha)^2}{4}=a\alpha\Rightarrow a=\alpha$

77. $x^2+y^2=(y-kx)^2$

$\Rightarrow \perp ler\Rightarrow 1+1=1+k^2\Rightarrow k=\pm 1$

78. $c=\left(\frac{5a+3}{a+1},\frac{4a+2}{a+1},\frac{-6a-4}{a+1}\right)=(9,8,-10)$

$a=\frac{-3}{2}$

79. $a(x+1)+b(y-1)+c(z-1)=0$ or by verification passes through (1,-1,1)

$\Rightarrow a-b=0$

$\perp ler\Rightarrow a+2b+2c=0$ solving

80. $\cos^{2}\theta+\cos^{2}\theta+\cos^{2}\gamma=1$

$\Rightarrow \cos^{2}\gamma=1-2\cos^{2}\theta$

$\Rightarrow 1-3\sin^{2}\theta=1-2\cos^{2}\theta$

$\cos^{2}\theta=3/5$

PHYSICS

81. $d\propto Y^aS^bT^c$

M $L^{-3}=\left[ML^{-1}T^{-2}\right]^a\left[MT^{-2}\right]^b\left[T\right]^c$

On solving a= -2; b= 3; c=2

82. $d_t+d_{t+1}=50\Rightarrow\left[u+\frac{f}{2}(2t-1)\right]+\left[u+\frac{f}{2}(2(t+1))-1\right]=50$

$\Rightarrow 2u+2ft=50\Rightarrow u+ft=25$

83. $R_{\max}=\frac{u^2}{g}=100\Rightarrow u^2=100g$

$u^2=2gl\sin\theta\Rightarrow 100g=2gl\sin 30$

$\Rightarrow l=100$

84.

$\left|\bar{A}+\bar{B}\right|=n\left|\bar{A}-\bar{B}\right|\Rightarrow 2A\cos\theta/2=n\,2A\sin\theta/2$

$\Rightarrow Tan\theta/2=\frac{1}{n}\Rightarrow\theta=2Tan^{-1}(1/n)$

85. F=mg $(\sin\theta-\mu\cos\theta)$

F=3g (sin60-tan30xcos60)= $\sqrt{3}gN$

86. $\Delta KE=\frac{1}{2}m(V_2^{\,2}-V_1^{\,2})$

$=\frac{1}{2}m(V_2-V_1)(V_2+V_1)=\frac{1}{2}I(V_2+V_1)$

87. $W=\frac{Mgl}{2n^2}=\frac{Mgl}{2(3)^2}=\frac{Mgl}{18}$

88. $-mgh=0-\frac{1}{2}mu^2$

$mgh=\frac{1}{2}mv^2-0$

$\therefore \frac{1}{2}m(v^2+u^2)=2mgh$

89. $\bar{V}_{CM}=\frac{m_1\bar{u}_1+m_2\bar{u}_2}{m_1+m_2}$

$KE_{CM}=\frac{1}{2}(m_1+m_2)V_{CM}^{\,2}$

90. $K.E=\frac{1}{2}mv^2\left(1+\frac{k^2}{r^2}\right)+\frac{1}{2}mv^2$

91. $h=\frac{RK^2}{1-K^2}=\frac{R\frac{4}{9}}{1-\frac{4}{9}}=\frac{4R}{5}$

92. $\frac{1}{K_{eff}}=\frac{1}{K_1}+\frac{1}{K_2}+.....+\frac{1}{K_n}$

$=\frac{1}{K}\left[\frac{1}{2^0}+\frac{1}{2^1}+.....+\frac{1}{2^{11}}\right]$

$\frac{1}{K_{eff}}=\frac{a(1-r^n)}{K(1-r)}\Rightarrow K_{ef}f\approx K/2 \& T=2\pi\sqrt{\frac{M}{K_{eff}}}$

93. $e=\frac{Fl}{A}\left[\frac{1}{Y_1}+\frac{1}{Y_2}\right]$

94. F=mg

$\Rightarrow$ 2lT= ° Alg

$\Rightarrow$ 2T= ° ®r^2g

$\Rightarrow$ d= $\sqrt{\frac{8T}{®° g}}$

95. $\frac{¥_{a1}}{¥_{a2}}=\frac{2}{3}$

$¥_r = ¥_{a1} + 3\sim_1$

$¥_r = ¥_{a2} + 3\sim_2$

96. (H+h) l_1=(H-h) l_2

97. $\left(\frac{Q}{t}\right)=\left(\frac{Q}{t}\right)_1+\left(\frac{Q}{t}\right)_2$

$\Rightarrow (100-¯)3k=(¯-30)2k+(¯-0)k$

$\Rightarrow 360=6¯$

$\Rightarrow ¯=60^\circ C$

98. $dU = nc_v dT$

$U = nTc_v = \frac{PV}{R}\frac{R}{¥-1}=\frac{PV}{¥-1}$

99. $\Delta U = n\frac{R}{¥-1}dt$

=5x $\frac{8.3}{1.4-1}$ x200=20.75

100. $C\propto\frac{1}{\sqrt{M}}$

101. $¬ = \sqrt{\frac{T}{«}}=\sqrt{\frac{(M/L)gx}{M/L}}=\sqrt{gx}$

$a=\frac{v^2}{2s}=\frac{g}{2}$ and $t=\frac{v}{a}=2\sqrt{l/g}$

102. $f\sim\frac{1}{l}\Rightarrow\frac{\Delta f}{f}=-\frac{\Delta l}{l}$

$\therefore \frac{5}{f}$ x100=2$\Rightarrow$ f=250Hz

103. $\frac{d/2}{«}+\frac{d/2}{2«}=\frac{3}{4}d$

$\Rightarrow\frac{1}{«}+\frac{1}{2«}=\frac{3}{2}\Rightarrow « = 1$

104. $i=\frac{2}{3}A=40^\circ$

$i=\frac{A+D}{2}\Rightarrow 80=60+D\Rightarrow D=20^\circ$

105. Repulsion b/w the charges doesn't contribute restoring force. Hence T doesn't changes

106. $\frac{1}{2}CV^2=150« J$

$\Rightarrow V=10V$

$V_{AB}=30V$

P.D across $2«F=30\frac{4}{4+2}=20$ V

107. $V=iR=\frac{E}{R+r}R$

$\Rightarrow E=\frac{V}{R}(R+r)\Rightarrow\frac{12}{16}(16+r)=\frac{10}{10}(10+r)$

$\Rightarrow r=8\Omega$

108. $B_1=\frac{«_\circ i}{2®r}$, $B_2=\frac{«_\circ i}{2r}$ $\therefore B=B_2-B_1$

109. $¤ = NB®r^2$

$L=N2®r\Rightarrow Nr=const$

$\therefore ¤_2=\frac{N}{2}B®(2r)^2=2¤$

110. $Tan¯=\frac{x_L}{R}=\frac{2®fL}{R}$

111. $B_1=B\cos 60,\ B_2=B\sin 60$

$\frac{B_1}{B_2}=\frac{2M_1}{M_2}=\frac{1/2}{\sqrt{3}/2}\Rightarrow\frac{M_1}{M_2}=\frac{1}{2\sqrt{3}}$

112. $¬=\frac{E_2-E_1}{h}=\frac{9.9x1.6x10^{-19}}{6.6x10^{-34}}=2.4x10^{15}Hz$

113. $\frac{hc}{a_1}=K_1+W\rightarrow(1)$ and $\frac{hc}{a_2}=K_2+W\rightarrow(2)$

$\frac{(1)}{(2)}\Rightarrow W=\frac{K_1a_1-K_2a_2}{a_2-a_1}$

114. Conceptual

115. $\bar{1}\bullet 1+0=0\bullet 1+0=0$=B

116. $=\frac{\Delta I_C}{\Delta I_B}=\frac{2x10^{-3}}{50x10^{-6}}=40$

117. $\frac{I_1}{I_2}=$

$\frac{I_{max}-I_{min}}{I_{max}+I_{min}}=\frac{4\sqrt{I_1I_2}}{2(I_1+I_2)}=\frac{2}{\sqrt{\frac{I_1}{I_2}}+\sqrt{\frac{I_2}{I_1}}}=\frac{2\sqrt{\ }}{+1}$

118. $\sqrt{«_r \in_r}=\frac{c_\circ}{c}$

$\Rightarrow \in_r=\left(\frac{c_\circ}{c}\right)^2\frac{1}{«_r}$

119. $\frac{N}{N_\circ}=\frac{1}{2^{t/T}}$

$\frac{N}{600}=\frac{1}{2^{\frac{90}{30}}}\Rightarrow N=75$

120. $R\sim A^{1/3}$

$R_2 = \left(\frac{64}{125}\right)^{1/3}$ x2=1.6 fermi

CHEMISTRY

121. $\bar{\nu} = R_H\left[\frac{1}{n_1^2} - \frac{1}{n_2^2}\right] \times Z^2$ for Balmar series

$n_1 = 2$ and first line for Balmar series $n_2 = 3$

H atom : $\bar{\nu} = 1,09,677\left[\frac{1}{2^2} - \frac{1}{3^2}\right] \times (1)^2$

$= 1,09,677 \times \left[\frac{1}{4} - \frac{1}{9}\right] = 1,09,677\left[\frac{5}{36}\right]$ = 15232 cm^{-1}

122. Li shows diagonals properties with Mg.

'So, ionic radius of Li^+ is nearly equal to Mg^{+2}

123. $XeOF_4 = \frac{8+4}{2} = 6 \Rightarrow sp^3d^2$, shape = square pyramidal

$[pdBr_4]^{-2} = dsp^2 = squre\ \ planar\ shape$

$O_3 = \frac{6+0}{2} = 3 \Rightarrow sp^2\ \ angular\ \ shape$

$I_3^- = \frac{7+2+1}{2} = 5 \Rightarrow sp^3d \quad shape = linear$

124. $\underset{(24\ gr;)}{Mg} + 2HCl \rightarrow MgCl_2 + \underset{(22.4\ lit)}{H_2} \uparrow$

22.4 lit of H_2 gas is given by 24 gr ; of Mg

1.12 lit of H_2 ……..?

$\frac{1.12 \times 24}{22.4} = 1.2\ gr;\ of\ \ Mg$

$4gm$ 100%

$1.2gm$ .....?

$\frac{1.2 \times 100}{4} = 30\%$

125. $\left(P + \frac{an^2}{v^2}\right)(v - nb) = nRT$

At low pressure, (b = negligible v – nb = v)

For 1 mole: $\left(P + \frac{a}{v^2}\right)v = RT$

$PV + \frac{a}{v} = RT$

$\frac{PV}{RT} + \frac{a}{vRT} = 1$

$Z + \frac{a}{vRT} = 1 \Rightarrow Z = 1 - \frac{a}{RTV}$

126. Conceptual

127. $Na_2CO_3 + 2H_2O \rightarrow \underset{Strong\ Base}{2NaOH} + \underset{Weak\ acid}{H_2CO_3}$

128. $\Delta S = \frac{\Delta H}{T}$

Given $\Delta H = 30\ kJ/mol\ = = 30 \times 10^3\ J/mol$

$\Delta s = 75\ J/mol.k$

129. Conceptual

130. Order of Electro negativity of group – 13 elements = B > T*l* > In > Ga > A*l*

131. Conceptual

132.

$$\begin{array}{l} H \\ / \\ OH \end{array} + Cl-Si-Cl + H-OH \xrightarrow[-2H_2O]{} HO-\underset{\displaystyle CH_3}{\overset{\displaystyle CH_3}{\overset{|}{\underset{|}{Si}}}}-OH$$

$$HO-\underset{\displaystyle CH_3}{\overset{\displaystyle CH_3}{\overset{|}{\underset{|}{Si}}}}-OH + HO-\underset{\displaystyle CH_3}{\overset{\displaystyle CH_3}{\overset{|}{\underset{|}{Si}}}}-OH \xrightarrow[-H_2O]{} HO-\underset{\displaystyle CH_3}{\overset{\displaystyle CH_3}{\overset{|}{\underset{|}{Si}}}}-O-\underset{\displaystyle CH_3}{\overset{\displaystyle CH_3}{\overset{|}{\underset{|}{Si}}}}-OH$$

This is straight chain polymer

133. D.O values of given samples :

A = 10, B = 20, C = 30, D = 40

Water pollution $\propto \dfrac{1}{D.O}$

134. Given $k_C = 2\times10^{13}$

$T = 300K$

$\Delta G^0 = -2.303RT\log k$

$\Delta G^0 = -2.303\times8.314\times300\log\left(2\times10^{13}\right)$

$= -2.303\times8.314\times300[\log 2+13] = = -7.64\times10^4$

135. Given $p^H = 9.8 \Rightarrow p^{OH} = 14 - p^H = 14 - 9.8 = 4.2$

$[NH_4Cl] = 5m$

$[NH_4OH] = 5m$

$p^{k_b} = ?$

$p^H = p^{k_b} + \log\dfrac{[salt]}{[base]}$

$4.2 = p^{kb} + \log\dfrac{5}{5}$

$p^{kb} = 4.2$

136. *Kjeldahl's method* :

$\%\ of\ \ N = \dfrac{1.4\times N\times V}{wt.of\ \ organic\ compound}$

Where $N = normality\ of\ \ acid$

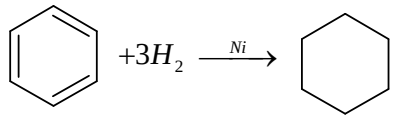
$V = vol.of\ acid\ \ in\ ml$; $neutralised\ \ by\ \ NH_3$

$N = \dfrac{1.4\times0.25\times40}{0.5} = 28$

137. $CH_3 - C\equiv C - CH + Na \rightarrow CH_3 - C\equiv C - Na\ \ (A)$

$CH_3 - C\equiv C - \boxed{Na + I} - CH_3 \rightarrow CH_3 - C\equiv C - CH_3\ \ (B)$

138.



$+3H_2 \xrightarrow{Ni}$

Benzene *Cyclo hexane*

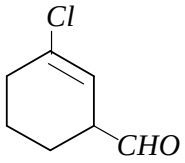
139. $CH_3COONa \xrightarrow{Electrolysis} \underset{(M)}{CH_3-CH_3}$

Ethane

$\underset{(M)}{CH_3-CH_3} \xrightarrow{O/(CH_3COO)_2Mn} \underset{(N)}{CH_3COOH}$

$CH_3COONa + NaOH \xrightarrow[-NaCO_3]{CaO} CH_4\ (O)$

140.



3 – Chloro cyclo hex-2-ene carbaldehyde

141. freezing point $\propto \frac{1}{No.of\ particles}$

142. $XA + YB \rightarrow ZC$ given $-\frac{d[A]}{dt} = \frac{-0.5d[B]}{dt} = \frac{dc}{dt}$

$-\frac{d[A]}{dt} = -\frac{1}{2}\frac{d[B]}{dt}$

$\underset{X}{(2)}\frac{d[A]}{dt} = \underset{Y}{(1)}\frac{d[B]}{dt}$

143. In the presence of strong ligand the configuration of d^7 is

$t2g^2\ \ t2g^2\ \ t2g^2\ \ eg^1$ each electron in t_{2g} contributes $+0.4\,\Delta_0$ and each electron in easy contributes $-0.6\,\Delta_0$

Stabilizing energy $= 6(+0.4) + 1(-0.6) = +2.4 - 0.6 = 1.8\,\Delta_0$

In the presence of weak ligand the configuration of d^7 is

$t_{2g}^{1+1}\ \ t_{2g}^{1+1}\ \ t_{2g}^{1}\ \ e_g^1\ \ e_g^1$

Stabilizing energy $= 5(+0.4) + 2(-0.6) = 2 - 1.2 = 0.8\,\Delta_0$

144. $FeO + SiO_2 \rightarrow FeSiO_3\ (3lag)$

145. Permangnate ion $\left[MnO_4^-\right]$

$\left[MnO_4^-\right]$ There is no compaired electrons. So, it is diamagnetic.

146. Conceptual

147. Brownring formula $\left[Fe(H_2O)_5NO\right]^{+2}$ and oxidation state of Fe = +1

148. $4HCl + O_2 \xrightarrow[723K]{X} 2Cl_2 + 2H_2O$

$4HCl + O_2 \xrightarrow[723K]{CuCl_2} 2Cl_2 + 2H_2O$

149. $X = CuCl_2$

$Cation = Cu^{+2}$

Cu^{+2} $E.C = [Ar]3d^9\ 4s^0$

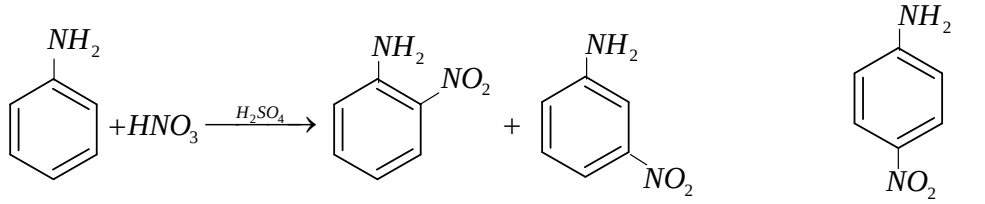
n = 1

$\mu = \sqrt{n(n+2)} = \sqrt{3} = 1.732$

150. $XeF_4 + O_2F_2 \rightarrow XeF_6 + O_2$

151.

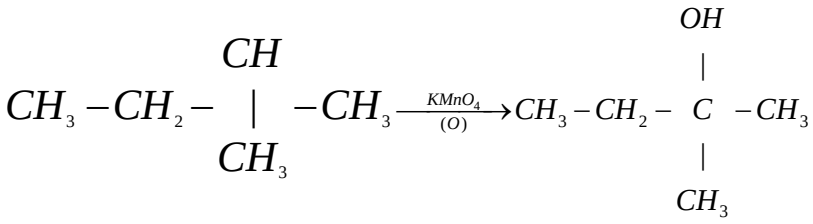
152.



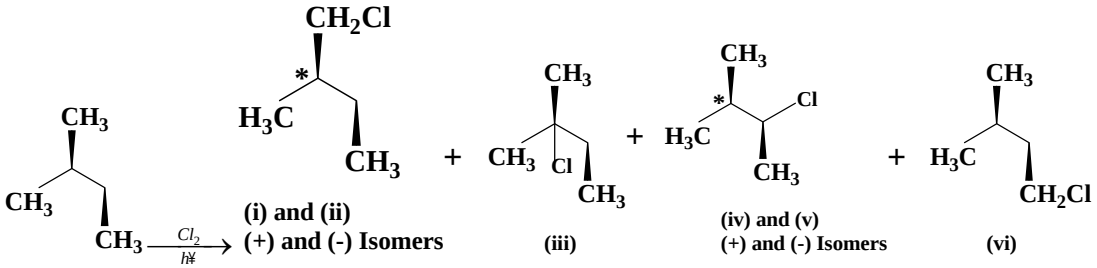
(a) 2% (c) 47% (b) 51%

$b > c > a$

153. n-pentane has no reaction with $KMnO_4$ Iso-pentane is oxidised by $KMnO_4$ into $\overset{\circ}{3}$ alchol



154.



155. In m-RNA molecule, complementary bases are $A \rightarrow U\ \ G \rightarrow C\ \ C \rightarrow G\ \ T \rightarrow A$ for sequence AGC GAT TAC the complementary bases are UCG CUA AUG

156. Conceptual

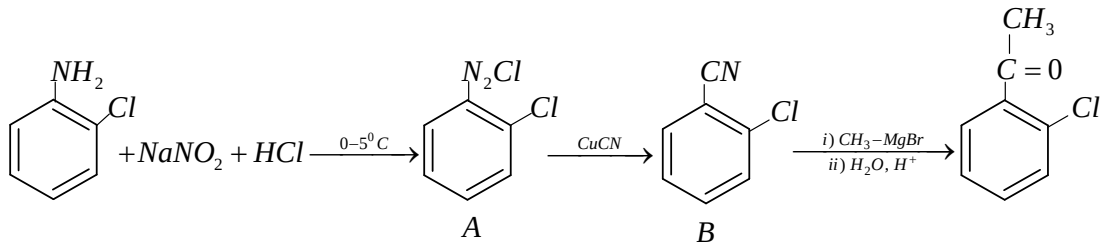
157. $\wedge^{\circ}_{eq[Al_2(SO_4)_3]} = \wedge^{\circ}_{eq(AlCl_3)} + \wedge^{\circ}_{eq(Na_2SO_4)} - \wedge^{\circ}_{eq(NaCl)}$

=X+Y-Z

Molar conductance = Equivalent conductance x Valency

$\wedge^{\circ}_{M[Al_2(SO_4)_3]} = 6(X + Y - z)$

158.



159. Conceptual

160. Conceptual

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