SEC: SR-MPC:	GTRAND TEST-04	EX. DT:
TIME: 3 Hrs.	EAPCET MODEL EXAM	Max. Marks: 160 M

MATHEMATICS

1. The domain of $\sin\log\left[\frac{\sqrt{4-x^2}}{1-x}\right]$ is

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

2. If f satisfies the relation then $f(x+y)+f(x-y)=2f(x)f(y)\forall x,y\in R$ and $f(0)\neq 0$ then $f(10)-f(-10)=$

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

3. Orthocenter of an equilateral triangle ABC is the origin O if $\overline{OA}=\bar{a},\overline{OB}=\bar{b},\overline{OC}=\bar{c}$ then $\overline{AB}+2\overline{BC}+3\overline{CA}=$

   1) $3\bar{c}$ 2) $3\bar{a}$ 3) $\bar{0}$ 4) $3\bar{b}$

4. If P and Q are two points on the curve $y=2^{x+2}$ such that $\overline{OP}.\bar{i}=-1$ and $\overline{OQ}.\bar{i}=2$ then the magnitude of $\left|\overline{OQ}-4\overline{OP}\right|$ is

   1) 10 2) 1 3) 5 4) 100

5. If $\overline{OA}=\bar{a},\overline{OB}=10\bar{a}+2\bar{b}$ and $\overline{OC}=\bar{b}$ where A and C are non collinear points. Let P denote the area of quadrilateral OABC and q denote the area of a parallelogram with $\overline{OA}$ and $\overline{OC}$ as adjacent sides then $\frac{p}{q}=$

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

6. $\bar{b}$ and $\bar{c}$ non collinear vectors, $\bar{a}$ is a vector such that $\bar{a}.(\bar{b}+\bar{c})=4$ and $\bar{a}\times(\bar{b}\times\bar{c})=(x^2-2x+6)\bar{b}+(\sin y)\bar{c}$ and $O<y\leq\pi$ then the point (x, y) is

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

7. If $A=\begin{bmatrix}\cos\theta & \sin\theta\\ -\sin\theta & \cos\theta\end{bmatrix}$ then $\underset{n\to\alpha}{Lim}\frac{1}{n}A^n$ is

   1) A null matrix 2) An identity matrix 3) $\begin{bmatrix}0 & 1\\ -1 & 0\end{bmatrix}$ 4) None

8. If $\Delta(x)=\begin{vmatrix}1 & 1 & 1\\ (e^x+e^{-x})^2 & (\pi^x+\pi^{-x})^2 & 2\\ (e^x-e^{-x}) & (\pi^x-\pi^{-x}) & -2\end{vmatrix}$ then $\Delta(x)=$

   1) x^2 2) x^2-1 3) $e^{x^2}-\pi^{x^2}$ 4) 0

9. If A and B are two square matrices such that $B=-A^{-1}BA$ then $(A+B)^2=$

   1) 0 2) A^2+B^2 3) $A^2+2AB+B^2$ 4) $A+B$

10. By eliminating a, b, c from the homogeneous equations. $x=\frac{a}{b-c}, y=\frac{b}{c-a}, z=\frac{c}{a-b}$ where a,b,c not all zero

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

11. The number of integral terms in the expansion of $\left(\sqrt{3}+\sqrt[8]{5}\right)^{256}$ is

1) 33 2) 34 3) 35 4) 32

12. If $\{x\}$ denotes the fractional part of x then $\left\{\frac{2^{2003}}{17}\right\}$ is

1) $\frac{2}{17}$ 2) $\frac{4}{17}$ 3) $\frac{8}{17}$ 4) $\frac{16}{17}$

13. $y=2x+3x^2+4x^3+----$ then x in terms of y is.

1) $\frac{1}{2}y-\frac{1.3}{2.4}y^2+\frac{1.3.5}{2.4.6}y^3-------$

2) $\frac{1}{2}y+\frac{1.3}{2.4}y^2+\frac{1.3.5}{2.4.6}y^3-------$

3) $\frac{1}{2}y-\frac{1.3}{2.4}y^2-\frac{1.3.5}{2.4.6}y^3-------$

4) $\frac{1}{2}y+\frac{1.3}{2.4}y^2-\frac{1.3.5}{2.4.6}y^3-------$

14. Sum of the series $S=1^2-2^2+3^2-4^2+----2002^2+2003^2$ is

1) 2007005 2)1005004 3)2000506 4)2007006

15. The value of a for which one root of the quadratic equation $\left(a^2-5a+3\right)x^2+\left(3a-1\right)x+2=0$ is twice as large as the other is

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

16. If x is real then the minimum value of $\frac{x^2-x+1}{x^2+x+1}$ is

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

17. $\tan A=a\ \tan B, \sin\ A=b\sin\ B\ \Rightarrow\frac{b^2-1}{a^2-1}=$

1) $\sin^2 A$ 2) $\sin^3 A$ 3) $\cos^2 A$ 4) $\cos^3 A$

18. If $A+B+C=\frac{\pi}{2}$ then $\sum\frac{\cos\left(B+C\right)}{\cos B\cos C}=$

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

19. Period of $\cos\frac{\pi x}{4}-2\cos ec\frac{\pi x}{6}+5\tan\frac{\pi x}{3}$ is

1) 12 2) 24 3) 48 4)6

20. If $32\tan^8\theta=2\cos^2\alpha-3\cos\alpha$ and $3\cos 2\theta=1$ then the general value of α is

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

21. $\log_2^x\geq 0$ then $\log_{\frac{1}{\pi}}\left\{\sin^{-1}\frac{2x}{1+x^2}+2\tan^{-1}x\right\}=$

1) $\log_{\frac{1}{\pi}}\left(4\tan^{-1}x\right)$ 2) 0 3) -1 4) -2

22. If $\cos h2x=99 then \tan h\,x$

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

23. Two sides of a triangle are given by the roots of the equation $x^2-5x+6=0$ and the angle between the sides is $\frac{\pi}{3}$ then the perimeter of the triangle is

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

24. In ΔABC $r=1, R=4, \Delta=8$ then the value of $ab+bc+ca=$

1) 18 2) 81 3) 72 4) 27

25. In $\Delta^{le}\ ABC$ if a, b and A are given then there are two triangles are formed with third side C_1 *and* C_2 such that then the value of $\left(C_1-C_2\right)^2+\left(C_1+C_2\right)^2\tan^2 A=$

1) $4a^2$ 2) $4b^2$ 3) a^2 4) b^2

26. If the roots of the equation $2x^4-5x^2+3x-4=0$ all multiplied by 2, then the transformed equation is

1) $x^4+10x^2-12x+32=0$
2) $x^4-10x^2+12x+32=0$
3) $x^4-10x^2+12x-32=0$
4) $x^4-10x^2-12x-32=0$

27. $\frac{x^2+2}{\left(x^2+1\right)\left(x^2+3\right)}=\frac{Ax+B}{x^2+1}+\frac{Cx+D}{x^2+3}$ then A+C+D is

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

28. The total number of numbers from 1000 to 9999 (both inclusive) that do not have four different digits is

1) 9^4 2) 9000 3) 4536 4) 4464

29. Six boys and girls sit along a line alternately in x ways and along a circle again alternately in y ways, then

1) $x=y$ 2) $y=12x$ 3) $x=10y$ 4) $x=12y$

30. A crew of an $8oar$ boat is to be chosen from 12 men of whom 3 can row always on the stroke side only. The number of ways in which the crew can be arranged is

1) ${}^9C_4\times{}^8C_4$ 2) ${}^{12}C_3\times{}^9C_4\times4!\times4!$

3) ${}^9C_4\times{}^8C_1\times4!\times4!$ 4) ${}^{12}C_4\times{}^8C_1\times4!\times4!$

31. A is a set containing n elements. A subset P of A is chosen. The set A is reconstructed by replacing the elements of P. A subset Q of A is again chosen. The number of ways of choosing P and Q so that $P\cap Q=\phi$ is

1) 2^n 2) 2^{2n} 3) 3^n 4) 3^{2n}

32. If the first term and common ration of a G.P are both $\frac{1}{2}\left(\sqrt{3}+i\right)$ then the absolute value of its n^{th} term is

1) 2^n 2) 3^n 3) 1 4) None

33. The product of four values of $\left(\frac{1}{2}+i\frac{\sqrt{3}}{2}\right)^{\frac{3}{4}}$ is

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

34. If p,q,r all distant cube roots of nonzero complex number z and a,b,c are complex numbers such that $ap+bq+cr\neq0$ then $-\frac{\left(aq+br+cp\right)\left(ar+bp+cq\right)}{\left(ap+bq+cr\right)^2}=$

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

35. If 5 biscuits are distributed among 3 beggars the chance that a particular beggar will get 2 biscuits is

1) $\frac{80}{243}$ 2) $\frac{30}{125}$ 3) $\frac{2}{15}$ 4) $\frac{3}{10}$

36. Three squares of a chess board are chosen at random, the probability that two are of one colour and one of another is.

1) $\frac{16}{21}$ 2) $\frac{8}{21}$ 3) $\frac{32}{12}$ 4) $\frac{7}{4}$

37. Five coins are tossed 3200 times. Using the poison distribution, The approximate probability of getting five heads 2times is

1) $\frac{1000}{e^{100}}$ 2) $\frac{2500}{e^{100}}$ 3) $\frac{5000}{e^{50}}$ 4) $\frac{5000}{e^{100}}$

38. A box congaing 6 tickets. Two of the tickets carry a price of $Rs\,5/-$ each, the other 4 the price of $Rs\,1$. If one ticket is. drawn, the mean value of the price is.

1) $\frac{14}{3}$ 2) $\frac{7}{6}$ 3) 1 4) $\frac{7}{3}$

39. If an experiment with 15 observations on x , the following results were available. $\sum x^2 = 2830, \sum x = 170$ one observation that was 20 was found to be wrong and was replaced by the correct value 30. Then the corrected variance is

1) 18.66 2) 177.33 3) 8.33 4) 78.00

40. In a moderately skewed distribution the value of mean and median are 4 and 5 respectively. The value of mode in such a situation is appropriately.

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

41. The equation $\sqrt{(x-2)^2+y^2}+\sqrt{(x+2)^2+y^2}=4$ represents

1) a pair of lines 2) a parabola 3) a line segment 4) ellipse

42. The ortho-center of the triangle formed by the pair of lines $2x^2-xy-y^2+x+2y-1=0$ and the line $x+y+1=0$ is

1) $(-1, 0)$ 2) $(0, -1)$ 3) $(-1, 1)$ 4) $(3, 5)$

43. The value of $k>0$ such that the angle between the lines $4x-y+7=0$ and $kx-5y-9=0$ is 45^0 is

1) $\frac{25}{3}$ 2) $\frac{5}{3}$ 3) 3 4) 5

44. If the axes are rotated through an angle 45^0 , and the point P has new coordinates $\left(2\sqrt{2},\sqrt{2}\right)$, then the original coordinates of P are

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

45. $A=(1,-2,3), B=(2,1,3), C(4,2,1)$ and $G=(-1,3,5)$ is the centroid of the tetrahedron $ABCD$. If $p=D_y$ and $q=D_z$ then $13p-11q=$

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

46. The point collinear with $(1,-2,-3)$ and $(2,0,0)$ among the following is

1) $(0,4,6)$ 2) $(0,4,-6)$ 3) $(0,-4,-6)$ 4) $(0,-4,6)$

47. For the plane $\pi: 2x-3y+4z+5=0,$ the points $A=(1,2,0), B=(1,2,-3)$

1) lie on the same side of $\pi=0$
2) lie on the opposite side of $\pi=0$
3) lie on the normal to $\pi=0$
4) none

48. The figure formed by the pairs of lines $3x^2+10xy+3y^2=0$ and $3x^2+10xy+3y^2-4x+4y-4=0$ is a

1) Parallelogram 2) Rhombus 3) Rectangle 4) Square

49. The distance between the straight lines $y=mx+c_1$ and $y=mx+c_2$ is $|c_1-c_2|$, when

1) $m=0$ 2) $m=1$ 3) $m=2$ 4) $m=-2$

50. The point P is equidistant from $A(1,3), B(-3,5)$ *and* $C(5,-1)$ then $PA =$

1) 5 2) $5\sqrt{5}$ 3) 25 4) $5\sqrt{10}$

51. The value of 'c' in Rolle's theorem for $f(x) = \log(x^2+2) - \log 3$ *on* $[-1,1]$ is

1) 0 2) 1
3) -1 4) Rolls theorem is not applicable

52. If $x^2 + y^2 = 25$, then $\log_5\left[Max(3x+4y)\right]$ is

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

53. A particle moves along a line by $S = \frac{1}{3}t^3 - 3t^2 + 8t + 5$ it changes its direction when

1) $t = 1, t = 2$ 2) $t = 2, t = 4$ 3) $t = 0, t = 4$ 4) none

54. The angle between the curves $2y^2 = x^3$ and $y^2 = 32x$ at $(8,16)$ is 'α' then $\tan\alpha =$

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

55. At $(2,4)$, the curves $y^2 = 8x$ and $x^2 = 4y - 12$

1) Cut orthogonally 2) Touch each other
3) Intersect at an angle $\frac{\pi}{3}$ 4) Do not intersect

56. If the relative error in the radius of a circle is 0.2 then the relative error in its area is

1) 0.2 2) 0.1 3) 0.4 4) 0.3

57. $\lim\limits_{x\to\frac{\pi}{2}} (1+3\cos x)^{\sec x} =$

1) e^2 2) e^3 3) e^{-2} 4) e^{-3}

58. If $f(x) = \begin{cases} \left(1+|\sin x|\right)^{\frac{a}{|\sin x|}}, & -\frac{\pi}{6} < x < 0 \\ b, \quad x = 0 & \text{is Continuous at } x = 0 \text{ then} \\ e^{\frac{\tan 2x}{\tan 3x}}, & 0 < x < \frac{\pi}{6} \end{cases}$

1) $a = e^{2/3}, b = 2/3$ 2) $a = 2/3, b = e^{2/3}$ 3) $a = 1/3, b = e^{1/3}$ 4) $a = e^{1/3}, b = e^{1/3}$

59. $f(x) = e^x, g(x) = \sin^{-1} x$ and $h(x) = f\left(g(x)\right)$; *then* $\frac{h'(x)}{h(x)} =$

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

60. $y = a\cos 2x + b\sin 2x$, then $y_2 + 4y =$

1) 0 2) 1 3) y_1 4) $-y_1$

61. $\int \frac{(\cos x)^{n-1}}{(\sin x)^{n+1}} dx =$

1) $\frac{-\cot^n x}{n} + c$ 2) $\frac{-\cot^n x}{n+1} + c$ 3) $\frac{\cot^n x}{n} + c$ 4) $\frac{\cot^n x}{n+1} + c$

62. $\int \frac{\sec x}{(\sec x + \tan x)^2} dx =$

1) $\frac{1}{2(\sec x + \tan x)^2} + c$ 2) $\frac{-1}{2(\sec x + \tan x)^2} + c$

3) $\frac{1}{2(\sec x + \tan x)} + c$ 4) $\frac{-1}{2(\sec x + \tan x)} + c$

63. The anti-derivative of $f(x)=1+2^x\log 2$ is $y=g(x)$ passes though $\left(-1,\frac{1}{2}\right)$ then the curve $y=g(x)$ meets the y-axis at

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

64. $\underset{x\to 0}{Lt}\ \frac{\int_0^x \sin^2 t\cos t\,dt}{x^3}$

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

65. $\int_0^{\pi}\sin^6 x dx =$

1) $\frac{5\pi}{16}$ 2) $\frac{35\pi}{128}$ 3) $\frac{5\pi}{8}$ 4) $\frac{5\pi}{18}$

66. $\lim_{n\to\infty}\left[\frac{1^k+2^k+3^k+....+n^k}{n^{k+1}}\right]=$

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

67. The area of the region bounded by $x^2=8y, x=4$ and the x-axis is

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

68. The order of the differential equation whose solution is $y=c_1e^x+c_2\sin x+c_3\cos x$ is

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

69. The substitution required to change $(3y-7x+7)dx+(7y-3x+3)dy=0$ to a homogeneous differential equation is

1) $x=X+1, y=Y$ 2) $x=X, y=Y+1$

3) $x=X+1, y=Y+1$ 4) $x=X+2, y=Y+2$

70. The solution of $\frac{dx}{dy}+\frac{x}{y}=x^2$ is

1) $\frac{1}{y}=cx-x\log x$ 2) $\frac{1}{x}=cy-y\log y$

3) $\frac{1}{x}=cx+x\log y$ 4) $\frac{1}{y}=cx-y\log x$

71. If $(-3,2)$ lies on the circle $x^2+y^2+2gx+2fy+c=0$ which is concentric with the circle $x^2+y^2+6x+8y-5=0$, then $c=$

1) 11 2) -11 3) 24 4) -24

72. The locus of the mid point of the tangent of the circle $x^2+y^2=a^2$ intercepted between the co-ordinate axes is

1) $x^4+y^4=a^4$ 2) $x^{-2}+y^{-2}=a^{-2}$ 3) $x^{-2}+y^{-2}=4a^{-2}$ 4) $x^4+y^4=4a^4$

73. If $(1,a),(b,2)$ are conjugate points with respect to the circle $x^2+y^2=25$, then $4a+2b=$.....

1) 25 2) 50 3) 100 4) 150

74. The centre of the circle touching $y-axis$ at $(0,3)$ and making an intercept 2 units on the positive $x-axis$ is

1) $(10,\sqrt{3})$ 2) $(\sqrt{3},10)$ 3) $(\sqrt{10},3)$ 4) $(3,\sqrt{10})$

75. If the circle $x^2+y^2+6x-2y+k=0$ bisects the circumference of the circle $x^2+y^2+2x-6y+15=0$ then $k=$

1) 21 2) -21 3) 23 4) -23

76. If the join of ends of the latus rectum of $x^2 = 8y$ subtends an angle θ at the vertex of the of the parabola then $\cos\theta =$

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

77. The value of k for which $(10x-5)^2 + (10y-7)^2 = k^2(5x+12y+7)^2$ represent a parabola is

1) $\frac{10}{26}$ 2) $\frac{10}{13}$ 3) $\frac{13}{10}$ 4) $\frac{26}{11}$

78. If $x = 2(\cos t - \sin t); y = 3(\cos t + \sin t)$ represents a Conic, its foci are

1) $(\pm\sqrt{10}, 0)$ 2) $(\pm\sqrt{13}, 0)$ 3) $(0, \pm\sqrt{13})$ 4) $(0, \pm\sqrt{10})$

79. $z = x + iy$ is a complex number. If the imaginary part of z^2 is 32, then locus of z is a hyperbola of eccentricity

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

80. Area of the triangle formed by the lines $x - y = 0, x + y = 0$ and any tangent to the hyperbola $x^2 - y^2 = a^2$ is

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

PHYSICS

81. The position of a particle as a function of time t is given by $x(t) = at + bt^2 - ct^3$ where a, b and c are constants when the particle attains zero acceleration, then its velocity will be

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

82. If R and H represent horizontal range and maximum height of the projectile, then the angle of projection with the horizontal is

1) $\tan^{-1}\left(\frac{H}{R}\right)$ 2) $\tan^{-1}\left(\frac{2H}{R}\right)$ 3) $\tan^{-1}\left(\frac{4H}{R}\right)$ 4) $\tan^{-1}\left(\frac{4R}{H}\right)$

83. Two springs of spring constants 1000 Nm^{-1} and 2000 Nm^{-1} are stretched with same force. They will have potential energy in the ratio of

1) 2 : 1 2) $2^2 : 1^2$ 3) 1 : 2 4) $1^2 : 2^2$

84. The moment of inertia of solid sphere of mass M and radius R about a tangent to the sphere is

1) $\frac{2}{5}MR^2$ 2) $\frac{6}{5}MR^2$ 3) $\frac{4}{5}MR^2$ 4) $\frac{7}{5}MR^2$

85. The escape speed of a body on the earth's surface is 11.2 kms^{-1}. A body is projected with thrice of this speed. The speed of the body when it escapes the gravitational pull of earth is

1) 11.2 kms^{-1} 2) $22.4\sqrt{2}$ kms^{-1} 3) $\frac{22.4}{\sqrt{2}}kms^{-1}$ 4) $22.4\sqrt{3}kms^{1}$

86. How much pressure should be applied on a litre of water if it is to be compressed by 0.1% bulk modulus of water = 2100 MPa)

1) 2100 KPa 2) 210 KPa 3) 2100 MPa 4) 210 MPa

87. Surface tension of mercury is 0.465 Nm^{-1}. The excess pressure inside a mercury drop of diameter 6mm is

1) 310 Pa 2) 410Pa 3) 510Pa 4) 610Pa

88. A rectangular body at 2000K has maximum intensity wavelength at λ_m. Its corresponding wavelength at 3000K is

1) $\frac{3}{2}\lambda_m$ 2) $\frac{2}{3}\lambda_m$ 3) $\frac{16}{81}\lambda_m$ 4) $\frac{81}{16}\lambda_m$

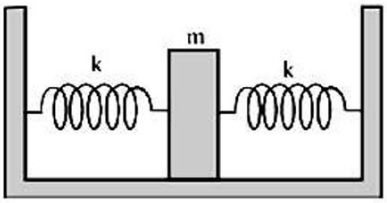
89. A refrigerator with coefficient of performance $\frac{1}{3}$ releases 200 J of heat to a hot reservoir. Then the work done on the working substance is

1) $\frac{100}{3}J$ 2) 100 J 3) $\frac{200}{3}J$ 4) $150J$

90. At what temperature is the rms velocity of hydrogen molecule is equal to that of an oxygen molecule at 47^0C

1) 10 K 2) 20 K 3) 30 K 4) 40 K

91. Two ideal springs of spring constants K each are attached to a block of mass m to fixed supports as shown. The time period of oscillation is



1) $2\pi\sqrt{\frac{m}{K}}$ 2) $2\pi\sqrt{\frac{m}{2K}}$ 3) $2\pi\sqrt{\frac{2m}{K}}$ 4) $\pi\sqrt{\frac{m}{2K}}$

92. A hollow metal sphere of radius 15cm is charged such that potential on its surface is 20 V, then the potential at the centre of sphere is

1) 0 V 2) 20 V 3) 10 V 4) 15 V

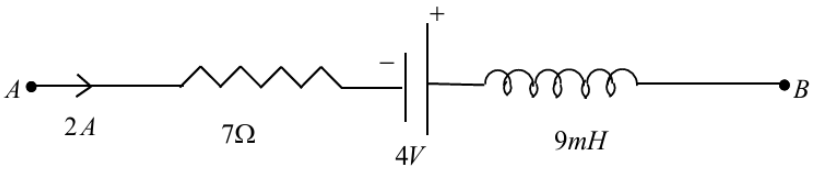
93. In a potentiometer experiment the balancing length with a cell is 560 cm. When an external resistance of 10Ω is connected in parallel to the cell then the balancing length changes by 60cm. Find the internal resistance of a cell

1) 1Ω 2) 2Ω 3) 1.2Ω 4) 2.1Ω

94. A particle of mass "m" and charge "q" is moving in a cyclotron with magnetic field B. The frequency of the circular motion of the particle is proportional to

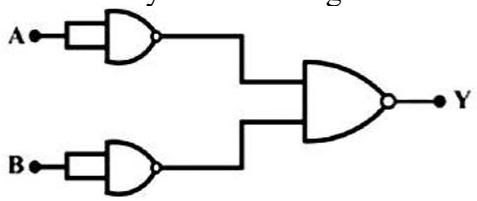
1) $\frac{qB}{m}$ 2) $\frac{2m}{qB}$ 3) $\frac{mB}{q}$ 4) $\frac{mg}{B}$

95. A branch of circuit is shown in the figure, if current is decreasing at the rate of $10^3 AS^{-1}$ then the potential difference between A and B is



1) 1 V 2) 5 V 3) 10 V 4) 2 V

96. Identify the logic operation performed by the following circuit



1) OR 2) AND 3) NOT 4) NAND

97. A cylindrical metallic wire is stretched to increase its length if the resistnce of the wire is increaed by 4% then the percentage increase in its length is

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

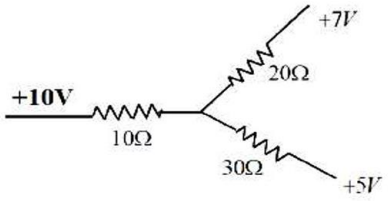
98. The magnitude of componenet of the vector $\bar{A} = 2\bar{i} + 3\bar{j}$ along the vector $\bar{B} = \left(\hat{i} + \hat{j}\right)$ is

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

99. In the relation $p=\frac{\alpha}{\beta}e^{\frac{\alpha z}{K\theta}}$ P is pressure, Z is distance, K is Boltzmann constant and 'θ' is the temperature. The dimension formula of 'β' will be

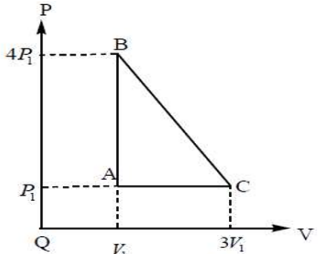
1) $M^0L^2T^0$ 2) $M^1L^2T^1$ 3) $M^1L^0T^1$ 4) $M^1L^0T^{-1}$

100. The current through 10Ω resister in the figure is approximately



1) 0.1A 2) 0.172 A 3) 0.3 A 4) 0.4 A

101. An ideal gas is taken around the cycle ABCD shown is P-V diagram. The net work done by the gas during the cycle is equal to



1) $3P_1V_1$ 2) $6P_1V_1$ 3) $12P_1V_1$ 4) P_1V_1

102. A simple pendulum is making oscillations with its bob immersed in a liquid of density n times less than the density of the bob. What is its period?

1) $2\pi\sqrt{\frac{l}{ng}}$ 2) $2\pi\sqrt{\frac{l}{\left(1-\frac{1}{n}\right)g}}$ 3) $2\pi\sqrt{\frac{ln}{g}}$ 4) $2\pi\sqrt{\frac{l}{(n-1)g}}$

103. Two identical glass $\left(\mu_g=\frac{3}{2}\right)$ equiconvex lenses of focal length f are kept in contact. The space between the two lenses is filled with water $\left(\mu_g=\frac{4}{3}\right)$. The focal length of the combination is

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

104. In Young's double slit experiment, the intensity on the screen at a point where path difference is λ is K. What will be the intensity at the point where path difference is $\frac{\lambda}{4}$?

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

105. Two identical short bar magnets, each having magnetic moment M, are placed a distance of 2d apart with axes perpendicular to each other in a horizontal plane. The magnetic induction at a point midway between them is

1) $\frac{\mu_0}{4\pi}\left(\sqrt{2}\right)\frac{M}{d^3}$ 2) $\frac{\mu_0}{4\pi}\left(\sqrt{3}\right)\frac{M}{d^3}$ 3) $\left(\frac{2\mu_0}{\pi}\right)\frac{M}{d^3}$ 4) $\frac{\mu_0}{4\pi}\left(\sqrt{5}\right)\frac{M}{d^3}$

106. When 100 volts DC is supplied across a solenoid, a current of 1.0 ampere flows in it. When 100 volt is AC applied across the same coil, the current drops to 0.5 ampere. If the frequency of ac source is 50Hz. Then the impedance and inductance of the solenoid are

1) 200Ω and 0.55 henry 2) 100Ω and 0.86 henry
3) 200Ω and 1.40 henry 4) 100Ω and 0.93 henry

107. The ratio of ionization energy of Bohr's hydrogen atom and Bohr's hydrogen like lithium atom is (Assume both atoms is ground state)

1) 1 : 1 2) 1 : 3 3) 1 : 9 4) None of these

108. A wave travelling in positive X-direction with A = 0.2 m has a velocity of 360 m/sec. If $\lambda = 60\,m$, then correct expression for the wave

1) $y = 0.2\sin\left[2\pi\left(6t + \frac{x}{60}\right)\right]$ 2) $y = 0.2\sin\left[\pi\left(6t + \frac{x}{60}\right)\right]$

3) $y = 0.2\sin\left[2\pi\left(6t - \frac{x}{60}\right)\right]$ 4) $y = 0.2\sin\left[\pi\left(6t - \frac{x}{60}\right)\right]$

109. A source and an observer move away from each other with same velocity of $10\,ms^{-1}$ with respect to ground. If the observe finds the frequency of sound coming from the source as 1980 Haz, then actual frequency of the source is (speed of sound in air = $340\,ms^{-1}$)

1) 1950 Hz 2) 2100 Hz 3) 2132 Hz 4) 2486 Hz

110. A wire of resistance 2R is stretched such that its length is doubled. Then the increase in its resistance is

1) 6R 2) 4R 3) 3R 4) 2R

111. Electro magnetic radiation of intensity 0.6 wm^{-2} is falling on a black surface. The radiation pressure on the surface is

1) $2\times10^{-9}\,Nm^{-2}$ 2) $3\times10^{-9}\,Nm^{-2}$ 3) $4\times10^{-9}\,Nm^{-2}$ 4) $6\times10^{-9}\,Nm^{-2}$

112. Radiations of wavelength 400 Nm incidents on a photo sensitive material of work function 2.2 eV the stopping potential is nearly

1) 0.1V 2) 0.4V 3) 0.5V 4) 0.9V

113. Photodiodes are mostly operates in reverse biases condition because

1) fractional change in minority carries produces higher forward current
2) fractional change in majority carries produces higher reverse current
3) fractional change in minority carries produce higher reverse current
4) fractional change in majority carries produce higher forward current

114. A water drop breaks into 64 identical droplets of each surface area $10^{-7}\,m^2$. If the surface tension of water is $0.07\,Nm^{-1}$, the increase in the surface energy in the process is

1) $336\times10^{-9}\,J$ 2) $216\times10^{-9}\,J$ 3) $432\times10^{-9}\,J$ 4) $158\times10^{-9}\,J$

115. A current 'i' is flowing through a wire of length 'L'. If it is made into a circular loop of one turn, then its magnetic moment is

1) $\frac{L^2 i}{4\pi}$ 2) $\frac{L^2}{4\pi}$ 3) $\frac{4\pi}{L^2 i}$ 4) $4\pi L^2 i$

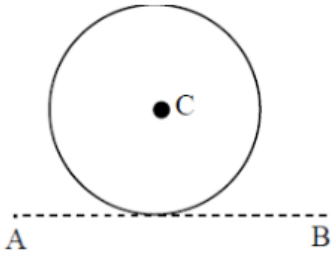
116. If the vertical component units of B of earth's magnetic field is $0.5\times10^{-4}\,J$ at a point. When aero plane of wing span 4m is moving horizontally at this place of $360\,kmh^{-1}$ then the motional emf formed across the ends of the wings is

1) 20×10^{-4} 2) 20×10^{-2} 3) 20×10^{-3} 4) 2×10^{-4}

117. A body of mass 2kg is sliding down on an inclined plane of inclination 53^0 to the horizontal. If coefficient of kinetic frication is 0.5, time taken by a body released from the top of an inclined plane to such the ground if the length of the inclined plane is $10\left(g = 10ms^{-2}\right), \left(\sin 53^0 = \frac{4}{5}\right)$

1) 2s 2) 4s 3) 8s 4) 12s

118. A thin wire of length l having linear density δ is bent into a circular loop with c as its centre, as shown in fig. the moment of inertia of the loop about the line AB is



1) $\frac{\delta l^3}{16\pi^2}$ 2) $\frac{\delta l^3}{8\pi^2}$ 3) $\frac{3\delta l^3}{8\pi^2}$ 4) $\frac{5\delta l^3}{16\pi^2}$

119. A and B are two satellites revolving around the earth in circular orbits with radii R_A and R_B. Their periods T_A and T_B are 8hr and 1 hr respectively. The ratio $\frac{R_A}{R_B}$ is equal to

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

120. A metal plate of area $10^{-3}m^2$ is placed on a liquid layer of thickness 0.8mm. the coefficient of viscosity of that liquid is 24 poise. Then the horizontal force required to move the plate with a velocity of $1cms^{-1}$

1) 0.01N 2) 0.02N 3) 0.03N 4) 0.04N

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121. The number of orbitals associated with Quantum numbers $n=5$, $ms=+1/2$ is

1) 25 2) 11 3) 15 4) 50

122. The shortest wavelength of H-atom in the Lyman series is λ_1. The longest wavelength in the balmer series of He^+ is

1) $\frac{9\lambda_1}{5}$ 2) $\frac{5\lambda_1}{9}$ 3) $\frac{27\lambda_1}{5}$ 4) $\frac{36\lambda_1}{5}$

123. The number of significant figures in 0.00340 is_____

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

124. For the reaction $Fe_2N_{(s)} + \frac{3}{2}H_{(g)^2} \square \quad 2Fe_s + NH_{(g)^3}$

1) $k_c = k_p(RT)$ 2) $k_c = k_p(RT)^{\frac{-1}{2}}$ 3) $k_c = k_p(RT)^{\frac{1}{2}}$ 4) $k_c = k_p(RT)^{\frac{3}{2}}$

125. The solubility of $Ca(OH)_2$ in water is [Given: the solubility product of $Ca(OH)_2$ in water $=5.5\times10^{-6}$]

1) 1.77×10^{-6} 2) 1.11×10^{-6} 3) 1.11×10^{-2} 4) 1.77×10^{-2}

126. The ratio of number of atoms present in a simple cubic, body centered cubic and face centered cubic structure are respectively

1) 1:2:4 2) 4:2:1 3) 8:1:6 4) 4:2:3

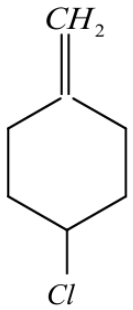
127. Freezing point of 4% aqueous solution of X is equals to freezing point of 12% aqueous solution of 'y' . If molecular weight of 'X' is A, then molecular weight of Y is_____

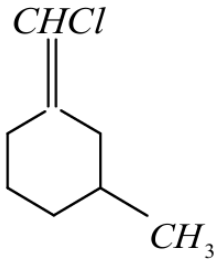
1) 2A 2) 3A 3) A 4) 4A

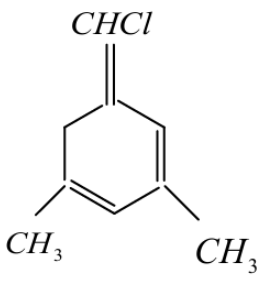
128. In Freundlich adsorption isotherm at moderate pressure the extent of adsorption (x/m) is directly proportional to p^x. The value of x is

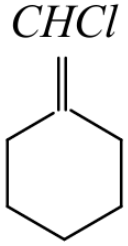
1) Zero 2) 1 3) $\frac{1}{n}$ 4) ∞

129. Among the following compounds geometrical isomerism is exhibited by

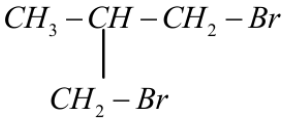
1) 

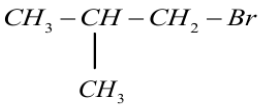
2) 

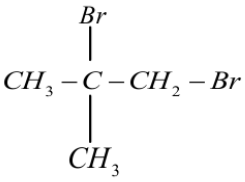
3) 

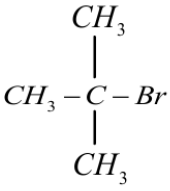
4) 

130. Excess of Isobutane on reaction with Br_2 in the presence of light at 120^0 C gives which one of the following as the major product?

1) 

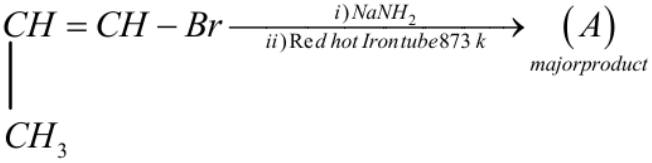
2) 

3) 

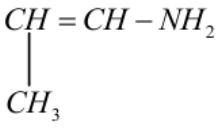
4) 

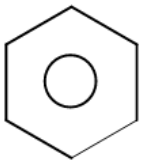
131. The stereo isomers that are formed by electrophilic addition of bromine to trans-but -2-ene is / are
1) 2 identical mesomers 2) 2 Enantiomers
3) 2 Enantiomers and 2 mesomers 4) 1 racemic and 2 Enantiomers

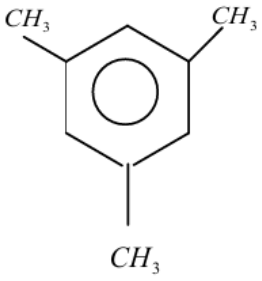
132. For the given reaction

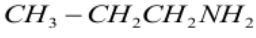


What is 'A'?

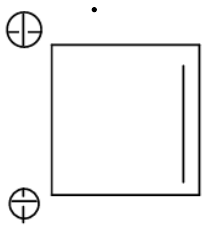
1) 

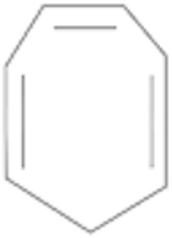
2) 

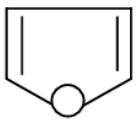
3) 

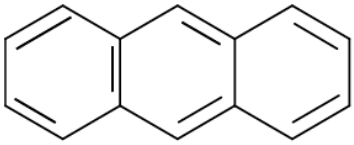
4) 

133. Which one of the following compounds is non-Aromatic?

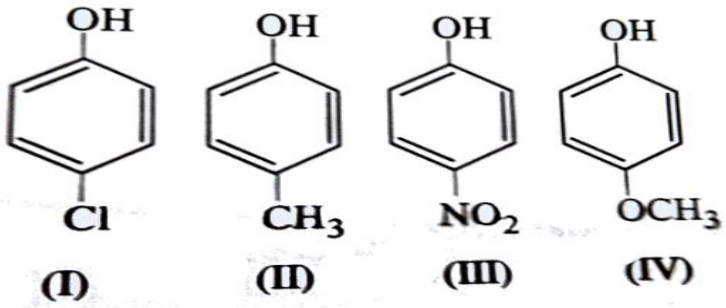
1) 

2) 

3) 

4) 

134. Arrange the following compounds in order of the decreasing acidity



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

135. $R-CN \xrightarrow[(ii)H_2O]{(i)DIBAL-H} R-Y$ consider the above reaction and identify 'Y'

1) $-CONH_2$ 2) $-CHO$ 3) $-COOH$ 4) $-CH_2NH_2$

136. Which among the following is not a polyester.

1) Glyptal 2) PHBV 3) Novolac 4) Dacron

137. Which pair of oxides is Acidic in nature?

1) CaO, SiO_2 2) B_2O_3, SiO_2 3) B_2O_3, CaO 4) N_2O, BaO

138. The total number of Isotopes of hydrogen and number of radioactive Isotopes among them respectively are

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

139. Number of paramagnetic oxides among the following given oxides is_____

$Li_2O, CaO, Na_2O_2, KO_2, MgO \text{ and } K_2O$

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

140. The hybridization of the atomic orbitals of Nitrogen in $NO_2^-, NO_2^+ \text{ and } NH_4^{\oplus}$ respectively are

1) $sp^3, sp \text{ and } sp^2$ 2) $sp^2, sp \text{ and } sp^3$ 3) $sp^3, sp^2 \text{ and } sp$ 4) $sp, sp^2 \text{ and } sp^3$

141. The set having ions which are coloured and paramagnetic both is

1) Cu^+, Zn^{+2}, Mn^{+4} 2) $Ni^{+2}, Mn^{+7}, Hg^{+2}$ 3) Cu^{+2}, Cr^{+3}, Sc^+ 4) Sc^{+3}, V^{+5}, Ti^{+4}

142. The pair that has similar atomic radii is

1) Mn and Re 2) Ti and Hf 3) Sc and Ni 4) Mo and w

143. Equal volumes of two solutions of $p^H = 2$ and $p^H = 5$ are mixed. The p^H of the resultant solution is

1) 3.5 2) 2.5 3) 4.7 4) 2.3

144. Which of the following cannot be made by using Williamson's synthesis?

1) Methoxybenzene 2) Benzyl p- nitrophenyl ether
3) Methyl tertiary butyl ether 4) Di -tert – butyl ether

145. The weight in grams of O_2 formed at Pt anode during the electrolysis of aq. K_2SO_4 solution during the passage of one coulomb of electricity is

1) $\frac{16}{96500}$ 2) $\frac{8}{96500}$ 3) $\frac{32}{96500}$ 4) $\frac{64}{96500}$

146. Molality of an aqueous solution that produces an elevation of boiling point of 1.00K at 1 atm Pressure. $\left(K_b \text{ for water} = 0.512 K \text{ kg } mol^{-1}\right)$

1) 0.512 m 2) 0.19 m 3) 1.95 m 4) 5.12 M

147. Incorrect statement about Lithium (or) its compounds is

1) Lithium cannot react with ethyne
2) Lithium bicarbonate exists in solution only
3) Lithium nitrate on heating gives Lithium nitrite and oxygen
4) Lithium chloride exists as a dihydrate

148. The total pressure of a mixture of 8g oxygen and 14g of nitrogen contained in a 11.2 lit vessel at $0^0 C$ is

1) 0.5atm 2) 1atm 3) 1.5atm 4) 2atm

149. The element having greatest difference between its first and second ionization energies, is

1) Ca 2) Sc 3) Ba 4) K

150. One mole of an ideal gas at 300K is expanded isothermally from an initial volume of one litre to 10 liters. The ΔE for this process is

1) 16.7 cal 2) 1381 cal 3) 9 lit atm 4) zero

151. Which is the correct order of stabilities of the following compounds?

1) $LiO_2 < NaO_2 < KO_2 < RbO_2 < CsO_2$ 2) $LiO_2 > NaO_2 < KO_2 < RbO_2 < CsO_2$

3) $LiO_2 < NaO_2 < KO_2 > RbO_2 < CsO_2$ 4) $LiO_2 > NaO_2 > KO_2 > RbO_2 > CsO_2$

152. There is no S-S bond in

1) $S_2O_4^{-2}$ 2) $S_2O_5^{-2}$ 3) $S_2O_3^{-2}$ 4) $S_2O_7^{-2}$

153. The crystal field stabilization energy for high spin d^4 octahedral complex is

1) $-0.6\Delta_0$ 2) $-1.8\Delta_0$ 3) $-1.6\Delta_0$ 4) $-1.2\Delta_0$

154. CH_3-CH_2-Br on treatment with $LiAlH_4$ gives ethane gas $(CH_3)_3C-Br$ on same treatment gives H_2 gas because

1) The former is SN_2 and later is E_2 reaction

2) The former is E_2 and later is SN_2 reaction

3) The former is SN_1 and later is E_2 reaction

4) The former is E_2 and later is SN_1 reaction

155. The increasing order of acidity among phenol , P-methyl phenol, m-nitro phenol and P-nitro phenol is

1) phenol <P-methyl phenol < P – nitro phenol < m – nitro phenol

2) P – methyl phenol < m – nitro phenol < phenol < P – nitro phenol

3) P – methyl phenol < phenol < m – nitro phenol < P – nitro phenol

4) m – nitro phenol < P – nitro phenol < phenol < P – methyl phenol

156. Paracetamol is an

1) Analgesic 2) Antipyretic 3) Both (1) & (2) 4) None of these

157. Which method of purification is represented by equations?

$$Ti(s)+2I_{2(s)} \xrightarrow{500K} TiI_4(g) \xrightarrow{1657K} \underset{(pure)}{Ti(s)}+2I_2$$

1)Cupellation 2) Poling 3) Van Arkel 4) Zone refining

158. The correct order of magnetic moments (spin only value in B.M) among the following is

1) $[MnCl_4]^{2-} > [CoCl_4]^{2-} > [Fe(CN)_6]^{4-}$ 2) $[Fe(CN)_6]^{4-} > [CoCl_4]^{2-} > [MnCl_4]^{2-}$

3) $[Fe(CN)_6]^{4-}\ [MnCl_4]^{2-} > [CoCl_4]^{2-}$ 4) $[FeCl_4]^{2-} > [Fe(CN)_6]^{4-} > [CoCl_4]^{2-}$

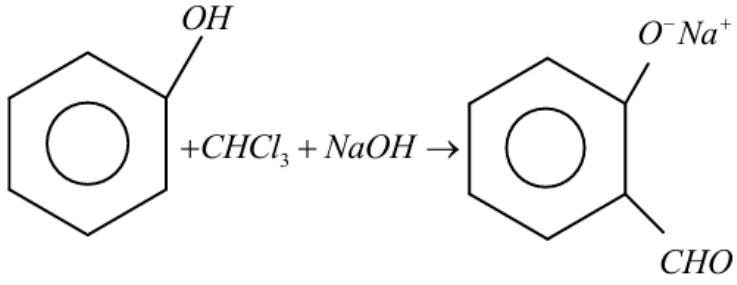
159.

Column I	**Column II**
$(A)[Ni(NH_3)_6]^{2+}$	$(p)\ SP^3$ – *hybridization*
$(B)[Co(NO_2)_6]^{3-}$	$(q)\ d^2sp^3$ – *hybridization*
$(C)[Cu(CN)_4]^{3-}$	$(r)\ dsp^2$ – *hybridization*
$(D)[Pt(NH_3)_2Cl_2]$	$(s)\ sp^3d^2$ – *hybridization*

1) A-p;B-s;C-r;D-q 2) A-q;B-p;C-s;D-r

3) A-s;B-q;C-p;D-r 4) A-r;B-s;C-q;D-p

160.



The electrophile involved in the above reaction is

1) Trichloromethyl anion $\left(\overset{-}{C}Cl_3\right)$ 2) Formyl cation $\left(\overset{\oplus}{C}HO\right)$

3) Dichloromethyl cation $\left(\overset{\oplus}{C}HCl_2\right)$ 4) Dichlorocarbene $(:CCl_2)$