K.S.R.M. COLLEGE OF ENGINEERING

(UGC-AUTONOMOUS)

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KGCET 2K23 MATHS QUESTION PAPER KEY

Note: Correct Answers Are Highlighted and OPTION marked in **RED** color, Total 320 questions from 4 sets (80 questions from each set)

1. If $\text{Im}\left(\frac{2z+1}{iz+1}\right)=-4$ then the locus of z in the complex plane is

1) A circle 2) an ellipse 3) a straight line 4) a hyperbola

2. Let α,β are the roots of $x^2-3x+5=0$ then the value of $\frac{5\alpha.\beta^{2016}+3\alpha^{2017}.\beta+\alpha.\beta^{2018}}{\alpha^{2016}+\beta^{2016}}=$

1) 5 **2) 15** 3) 40 4) 25

3. If a,b,c are different, then the value of x satisfying $\begin{vmatrix} 0 & x^2-a & x^3-b \\ x^2+a & 0 & x^2+c \\ x^4+b & x-c & 0 \end{vmatrix}=0$ is

1)a 2) b 3) 2 **4)0**

4. If for a matrix A, $|A|=6$ $adj\ A=\begin{bmatrix} 1 & -2 & 4 \\ 4 & 1 & 1 \\ -1 & P & 0 \end{bmatrix}$ then the value of P is

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

5. Highest power of 2 in 200!

1) 90 **2) 197** 3) 96 4) 97

6. If the letters of the word 'CIRCLE' are arranged as in dictionary format, then the rank of the word 'CIRCLE' is

1) 69 **2) 68** 3) 66 4) 60

7. A bag contains 30 balls of which 11 are white, 7 are yellow,7 are black and 5 are green. The probability that a ball drawn at random is either white or black or green is

1) 1/30 2) 15/28 3) 7/10 **4) 23/30**

8. If the term independent of ' x' in the expansion of $\left(\frac{x^2}{2}-\frac{1}{x}\right)^9$ is K then 2K=

1)11 **2) 21** 3) 31 4) 41

9. The number of rational terms in the expansion of $\left(\sqrt{2}+\sqrt[3]{3}\right)^{18}$ is

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

10. $16\sin(20^0)\sin(40^0)\sin(80^0) =$

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

11. For all $n \in N, 10^n + 3(4^{n+2}) + 5$ is divisible by

1) 3 2) 4 3) 5 4) 11

12. If ω is an imaginary cube root of units then $(1+\omega-\omega^2)^7 =$

1)128ω 2)-128ω 3) $128\omega^2$ **4) $-128\omega^2$**

13. The product of the values of $\left[\cos\frac{\pi}{3}+i\sin\frac{\pi}{3}\right]^{3/4}$ is

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

14. If the area of the triangle on the complex plane formed by the points Z,iz and z+iz is 50 square units then $|z|$ is

1)5 **2) 10** 3) 15 4) 20

15. The maximum value of $\frac{x}{x^2-5x+9}$ is

1) $-\frac{1}{11}$ 2) -1 3) $\frac{1}{11}$ **4)1**

16. If $a+b+c=0$ *then* $x^{a^2/bc}.x^{b^2/ca}.x^{c^2/ab} =$

1)1 2) x^2 **3) x^3** 4) x^4

17. If $\cos\theta - 4\sin\theta = 1$ *then* $\sin\theta + 4\cos\theta =$

1) ± 1 2) 0 **3) ± 4** 4) ± 3

18. If $A+B+C=0$ *then* $\sum \cot A \cot B =$

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

19. If $\sin^{10} x - \cos^{10} x = 1$ *then* $x =$

1) $n\pi$ 2) $2n\pi + \pi/2$ **3) $(2n+1)\pi/2$** 4) $n\pi/2$

20. $\text{Tan}\left[\frac{1}{2}\cos^{-1}0\right]=$

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

21. In ΔABC, if $a=4cm, b=7cm, c=9cm$ then $\text{Tan}\frac{A}{2}=$ – – – – –

1) $\frac{1}{\sqrt{20}}$ 2) $\frac{1}{\sqrt{5}}$ 3) $\frac{2}{\sqrt{20}}$ 4) $\frac{2}{3}$

22. In ΔABC, $\left(\frac{1}{r}-\frac{1}{r_1}\right)\left(\frac{1}{r}-\frac{1}{r_2}\right)\left(\frac{1}{r}-\frac{1}{r_3}\right)=$

1) $\frac{abc}{\Delta^3}$ 2)0 3) $4Rr^2$ 4) $\frac{1}{r}$

23. The ratio of circum radii of a triangle to its pedal triangle is

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

24. $\sinh(ix)=$

1) isinx 2) $\sin(ix)$ 3) $-i\sin x$ 4) $i\sin(ix)$

25. The range of $\sin^{-1}5x$ is

1) $\left[\frac{-\pi}{3},\frac{\pi}{3}\right]$ **2)** $\left[\frac{-\pi}{2},\frac{\pi}{2}\right]$ 3) $\left[\frac{-\pi}{3},\frac{\pi}{4}\right]$ 4) $\left[0,\frac{\pi}{2}\right]$

26. G.M of 4,5,20,25 is

1)100 2) 50 3)30 **4)10**

27. If $\sum d^2=20, n=5$ *then* $P=$

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

28. If $f(x+y)=f(xy)\forall, x, y\in R$ *and* $f(2023)=2023$ *then* $f(-2023)=$

1)2023 2)-2023 3) 0 4) 1

29. If $f(x)=\log\left(\frac{1+x}{1-x}\right)$ *and* $g(x)=\frac{3x+x^3}{1+3x^2}$ *then* $(gof)(x)=$

1) $f(x)$ 2) $2f(x)$ **3)** $3f(x)$ 4) $4f(x)$

30. If $\lambda(2\bar{i}-4\bar{j}+4\bar{k})$ is an unit vector then $\lambda=$

1) 6 2) -1/6 3) 1/6 **4) $\pm$ 1/6**

31. If ABCD is a parallelogram then $\overline{AC}+\overline{BD}$

1) $\overline{AB}$ 2) $2\overline{AB}$ 3) $\overline{BC}$ **4) $2\overline{BC}$**

32. If the vectors $\bar{i}+3\bar{j}+4\bar{k}$ and $\lambda\bar{i}-4\bar{j}+4\bar{k}$ orthogonal to each other then $\lambda=$

1) 5 2) -5 **3) 8** 4)-8

33. The radius of the sphere $\left(\bar{r}-2\bar{i}+3\bar{j}-\bar{k}\right).\left(\bar{r}+3\bar{i}-\bar{j}+2\bar{k}\right)=0$ is

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

34. If $\bar{a}$ is any unit vector then $\left(a\times\bar{i}\right)^2+\left(a\times\bar{j}\right)^2+\left(a\times\bar{k}\right)^2=$

1) a^{-2} **2) $2a^{-2}$** 3) $3a^{-2}$ 4) $4a^{-2}$

35. $\left(\bar{b}\times\bar{c}\right)\times\left(\bar{c}\times\bar{a}\right)=$

1) $\left[\bar{a}\,\bar{b}\,\bar{c}\right]\bar{c}$ 2) $\left[\bar{a}\,\bar{b}\,\bar{c}\right]\bar{b}$ 3) $\left[\bar{a}\,\bar{b}\,\bar{c}\right]\bar{a}$ 4) $\bar{a}\times\left(\bar{b}\times\bar{c}\right)$

36. The sum(S)= $\frac{1}{9!}+\frac{1}{3!7!}+\frac{1}{5!5!}+\frac{1}{7!3!}+\frac{1}{9!}$ is

1) $\frac{2^9}{10!}$ 2) $\frac{2^{10}}{8!}$ 3) $\frac{2^{11}}{9!}$ 4) $\frac{2^{10}}{7!}$

37. The number of ways in which $six\,'+'\,and\,\,four\,'-'$ signs can be arranged in a line such that no two $'-'$ six occur together is

1) 30 **2) 35** 3) 40 4) 45

38. If $P(A)=0.4\,and\,\,P(A\cap B)=0.15$ then $P\left(\frac{A}{A^1\cup B^1}\right)=$

1)1/17 2) 2/17 **3) 5/17** 4) 9/17

39. An unbiased cubical die is thrown 5 times. The probability that maximum number appearing on the die is 4 is

1) $7/6^5$ **2) $1023/6^5$** 3) $3781/6^5$ 4) $1781/6^5$

40. Coefficient of $x^n\,in\,\frac{x}{(x-1)^2(x-2)}$ is $C_n\,then\,\lim_{n\to\infty}\frac{C_n}{n}=$

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

41. $A(2,3), B(-1,1)$ are two points. If P is a point such that $\angle APB = 90^0$, then the locus P is

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

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

42. The equation of the line having inclination 120^0 and y-intercept -3 is

1) $x+y-5=0$ **2)** $\sqrt{3}x+y+3=0$ 3) $x+y-2=0$ 4) $x-y-5=0$

43. The equation of the straight line passing through the point (4,3) and making intercepts on the coordinate axes whose sum is -1 is

1) $\frac{x}{2}+\frac{y}{3}=-1$ *and* $\frac{x}{-2}+\frac{y}{1}=-1$

2) $\frac{x}{2}-\frac{y}{3}=1$ *and* $\frac{x}{-2}+\frac{y}{1}=1$

3) $\frac{x}{2}+\frac{y}{3}=1$ *and* $\frac{x}{2}+\frac{y}{1}=1$

4) $\frac{x}{2}-\frac{y}{3}=-1$ *and* $\frac{x}{-2}+\frac{y}{1}=-1$

44. If $A(2,-1)$ *and* $B(6,5)$ are two points the ratio in which the foot of the perpendicular from (4,1) to AB divides it is

1) 8:15 **2) 5:8** 3) -5:8 4) -8:5

45. The value of k such that $3x^2+11xy+10y^2+7x+13y+k=0$ represents a pair of straight lines is

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

46. The pairs of lines $6x^2+xy-12y^2-14x+47y-40=0, 14x^2+xy-4y^2-30x+15y=0$

1)are concurrent 2)are equally inclined 3) form a rhombus

4)are such that one bisects the angles between the other

47. The fourth vertex of the square whose consecutive vertices are (4,5,1),(2,4,-1),(3,6,-3) is

1)(-4,2,4) 2) (4,-2,-4) **3) (5,7,-1)** 4) (5,0,1)

48. The d.c's of the line joining the points(1,-2,3),(-2,4,2) are

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

4) $\left(\frac{3}{\sqrt{46}},-\frac{6}{\sqrt{46}},\frac{1}{\sqrt{46}}\right)$

49. If(2,4,-3) is the foot of the perpendicular drawn from the origin to a plane then the equation of the plane is

1) $2x+4y-3z-29=0$ 2) $2x+4y-3z-39=0$

3) $2x+4y+3z+29=0$ 4) $5x+6y-3z-29=0$

50. $\underset{x\to 0}{Lt}\dfrac{\cos^2 x-\sin^2 x-1}{\sqrt{x^2+1}-1}=$

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

51. $\underset{n\to\infty}{Lt}\dfrac{5.2^{n+1}+2.3^{n+1}}{3.2^n-7.3^n}=$

1)6/5 2) 2/7 3) -2/7 **4) -6/7**

52. Let $f(x)=\dfrac{\log(1+x+x^2)+\log(1-x+x^2)}{\sec x-\cos x}, x\neq 0$ then the value of f(0) so that f is continuous at x=0 is

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

53. If $y=\log_a x+\log_x a+\log_x x+\log_a a$ *then* $\dfrac{dy}{dx}=$

1) $\dfrac{1}{x}+x\log a$ 2) $\dfrac{\log a}{x}+\dfrac{x}{\log a}$ 3) $\dfrac{1}{x\log a}+x\log a$ **4)** $\dfrac{1}{x\log a}-\dfrac{\log a}{x(\log x)^2}$

54. $\dfrac{d}{dx}\left\{\log\left(\dfrac{1+x}{1-x}\right)^{1/4}-\dfrac{1}{2}\mathrm{Tan}^{-1}x\right\}=$

1) $\dfrac{x}{1-x^2}$ 2) $\dfrac{x}{1+x^2}$ 3) $-\dfrac{2}{1+x^2}$ **4)** $\dfrac{x^2}{1-x^2}$

55. If $x=e^t(\cos t+\sin t), y=e^t(\cos t-\sin t)$ *then* $\dfrac{dy}{dx}=$

1) tan t **2) –tan t** 3) $\tan\left(\dfrac{3t}{2}\right)$ 4) $-\cot\left(\dfrac{30}{2}\right)$

56. The equation of the tangent to the curve $2x^2-xy+3y^2=18$ *at* $(3,1)$ *is*

1) $11x+3y-36=0$ 2) $11x-3y+36=0$ 3) $3x+11y-2=0$ 4) $3x-11y+2=0$

57. The angle between the curves $xy=2$ *and* $y^2=4x$ is

1) $\mathrm{Tan}^{-1}\left(\dfrac{1}{3}\right)$ **2)** $\mathrm{Tan}^{-1}(3)$ 3) $\mathrm{Tan}^{-1}\left(\dfrac{1}{2}\right)$ 4) $\mathrm{Tan}^{-1}\left(\dfrac{2}{3}\right)$

58. $f(x)=\dfrac{x^2}{x+2}$ is increasing in

1)(-2,0) 2) (-4,-2) 3) (-4,0) **4)** $(-\infty,-4)\cup(0,\infty)$

59. If x>0,the maximum value of $\frac{\log x}{x}$ is

1) e 2) 2e 3) 1/2e **4) 1/e**

60. The centre and radius of the circle with the segment of the line x+y=1 cut of by the coordinate axes as diameter are

1) $(1,1),\sqrt{2}$ 2) $(1/2,1/2),\sqrt{2}$ **3) $(1/2,1/2),1/\sqrt{2}$** 4) $(0,0),1$

61. The length of the tangent drawn to the circle $x^2+y^2-2x+4y-11=0$ from the point (1,3) is

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

62. The equation of the circle with centre (3,-1) and which cuts off a chord of length 6 on the line $2x-5y+18=0$ is

1) $x^2+y^2-6x+2y-28=0$ 2) $x^2+y^2+4x-6y+8=0$

3) $x^2+y^2+4x-16y+18=0$ 4) $3x^2+3y^2+4x-6y+18=0$

63. The pole of the line $x-2y+22=0$ *w.r.t the circle* $x^2+y^2-5x+8y+6=0$ is

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

64. The inverse point of (1,2) w.r.t the circle $x^2+y^2-4x-6y+9=0$ is

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

65. If the circle $x^2+y^2+2x-2y+4=0$ cuts the circle $x^2+y^2+4x-2fy+2=0$ orthogonally, then f=

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

66. The angle at which the circles $x^2+y^2+8x-2y-9=0, x^2+y^2-2x+8y-7=0$ intersect is

1) $\pi/6$ 2) $\pi/4$ 3) $\pi/3$ **4) $\pi/2$**

67. The focus of the parabola $y^2-4y-8x-4=0$ is

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

68. The line $y=2x+k$ is a normal to the parabola $y^2=4x$ then k=

1) 12 **2) -12** 3) 10 4) -10

69. The eccentricity of the conic $36x^2+144y^2-36x-96y-119=0$ is

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

70. The equation $\frac{x^2}{10-a}+\frac{y^2}{4-a}=1$ represents an ellipse if

1)a<4 2) a>4 3)4<a<10 4)a>10

71. The asymptotes of the hyperbola $6x^2+13xy+6y^2-7x-8y-26=0$ are

1) $2x-3y-1=0, 3x-2y-2=0$ **2)** $2x+3y-1=0, 3x+2y-2=0$

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

72. $\int \frac{x^4+x^2+1}{x^2+1}dx=$

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

73. $\int \frac{x^4+1}{1+x^6}dx=$

1) $\mathrm{Tan}^{-1}(x)-\mathrm{Tan}^{-1}(x^3)+c$ 2) $\mathrm{Tan}^{-1}(x)-\frac{1}{3}\mathrm{Tan}^{-1}(x^3)+c$

3) $\mathrm{Tan}^{-1}(x)+\mathrm{Tan}^{-1}(x^3)+c$ **4)** $\mathrm{Tan}^{-1}(x)+\frac{1}{3}\mathrm{Tan}^{-1}(x^3)+c$

74. $\int \frac{2x+3}{(2x+1)(1-3x)}dx=$

1) $\frac{2}{5}\log|2x+1|-\frac{11}{15}\log|1-3x|+c$ 2) $\frac{2}{5}\log|2x+1|-\frac{11}{15}\log|1+3x|+c$

3) $\frac{2}{3}\log|2x-1|+\frac{11}{15}\log|1-3x|+c$ 4) $\frac{2}{5}\log|2x+1|-\frac{21}{5}\log|1+3x|+c$

75. $\int \frac{2x+3}{\sqrt{4x+3}}dx=$

1) $\frac{1}{12}(4x-3)^{3/2}+\frac{1}{4}\sqrt{4x+3}+c$ **2)** $\frac{1}{12}(4x+3)^{3/2}+\frac{3}{4}\sqrt{4x+3}+c$

3) $\frac{1}{12}(4x+3)^{3/2}-\frac{3}{4}\sqrt{4x+3}+c$ 4) $\frac{1}{12}(4x-3)^{3/2}-\frac{1}{4}\sqrt{4x+3}+c$

76. $\int_0^{\pi/2} \frac{\sec x}{\sec x+\mathrm{cosec}\,x}dx=$

1) $\pi/3$ 2) $\pi/2$ **3)** $\pi/4$ 4) $\pi/8$

77. $\int_2^3 \frac{\sqrt{x}}{\sqrt{5-x}+\sqrt{x}}dx =$

1)1/2 2)3/2 3)5/2 4)0

78. The area between the parabola $y = x^2$ and the line y=2x is

1) 1/3 2) 8/3 3) 1/ 2 **4) 4/3**

79. The solution of $\frac{dy}{dx} = e^{2x-y} + x^3 e^{-y}$ is

1) $4e^y = 2e^{2x} - x^4 + c$ 2) $4e^y = 2e^{2x} + x^4 - x^2 + c$

3) $4e^y = 2e^{2x} + x^4 + c$ 4) $4e^y = 2e^{2x} - x^4 + x^2 + c$

80. The solution of $xdy = \left[y + x\cos^2\left(\frac{y}{x}\right)\right]dx$ is

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

3) $\tan\frac{x}{y} = \log(cx)$ 4) $\cos\frac{y}{x} = \log(cx)$

81. The value of $\sin\left(\frac{5\pi}{3}\right) + \sec\left(\frac{13\pi}{3}\right)$ is

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

82. $\tan 9^0 - \tan 27^0 - \tan 63^0 + \tan 81^0 =$

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

83. $\cos 66^0 + \sin 84^0 =$

1) $\frac{1}{4}\left(\sqrt{3}+\sqrt{5}\right)$ 2) $\frac{1}{4}\sqrt{5}\left(\sqrt{3}+1\right)$ 3) $\frac{1}{4}\left(\sqrt{3}+1\right)\left(\sqrt{5}+1\right)$ **4)** $\frac{1}{4}\sqrt{3}\left(\sqrt{5}+1\right)$

84. If ${}^{2n}C_3 : {}^{n}C_3 = 12:1$, then $n =$

1) 8 2) 10 **3) 5** 4) 3

85. If $\sec x = \cosh\theta$ then find $\tanh^2\left(\frac{\theta}{2}\right) =$

1) $\sec^2\frac{x}{2}$ **2)** $\tan^2\left(\frac{x}{2}\right)$ 3) $\tanh^2\left(\frac{x}{2}\right)$ 4) $\operatorname{sech}^2\left(\frac{x}{2}\right)$

86. $\sec^2 x+5\tan x+5=$

1) $(\tan x+2)(\tan x+3)$ 2) $(\tan x+1)(\tan x+5)$

3) $(\tan x-2)(\tan x-3)$ 4) $(\sin x+2)(\sin x+5)$

87. In a triangle ABC if a,b,c are its sides and $C=60^0$. Find the value of $\frac{a}{b+c}+\frac{b}{c+a}=$

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

88. In a ΔABC, If $r_1=36,\ r_2=18$ and $r_3=12$ then $s=$

1) 6 2) 8 3) 16 **4) 36**

89. Let f be a function defined by $f(xy)=\frac{f(x)}{y}$ for all positive real numbers x and y. If $f(30)=20$ then $f(40)=$

1) 10 **2) 15** 3) 25 4) 17

90. The range of the real valued function $f(x)=\frac{x^2+x+1}{x}$ is

1) $(-\alpha 1)\cup(1\ \alpha)$ 2) $(-\alpha\ -1]\cup[1\ \alpha)$ 3) $(-\alpha\ -2]\cup[3\ \alpha)$ **4) $(-\alpha\ -1]\cup[3\ \alpha)$**

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

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

92. If the rank of the matrix $A=\begin{bmatrix}1 & 2 & 1 & -1\\ -1 & 2 & 3 & 5\\ 0 & 1 & k & k\end{bmatrix}$ is 2 and k is a real number then k is a root of following quadratic equation

1) x^2+3x+2 **2) x^2+x-2** 3) $x^2+x-6=0$ 4) $x^2-x-6=0$

93. If $\begin{bmatrix}5 & a & -7\\ b & -7 & c\\ -7 & d & -1\end{bmatrix}$ is the adjoint of the matrix $\begin{bmatrix}1 & 2 & 3\\ 2 & 3 & 1\\ 3 & 1 & 2\end{bmatrix}$ then $a+b+c+d=$

1) 8 2) 10 3) 0 4) 2

94. M and N are the mid-points of the sides BC and CD of a parallelogram ABCD respectively then $\overline{AM}+\overline{AN}=$

1) $\frac{1}{3}\overline{AC}$ 2) $\frac{2}{3}\overline{AC}$ 3) $\frac{3}{4}\overline{AC}$ **4) $\frac{3}{2}\overline{AC}$**

95. Three vectors $\bar{a}, \bar{b}, \bar{c}$ satisfy the condition $\bar{a}+\bar{b}+\bar{c}=\bar{0}$ if $|\bar{a}|=1, |\bar{b}|=3, |\bar{c}|=4$, then $\bar{a}.\bar{b}+\bar{b}.\bar{c}+\bar{c}.\bar{a}=$

1) 12 2) -12 **3) -13** 4) 13

96. If $|\bar{a}|=13, |\bar{b}|=5$ and $\bar{a}.\bar{b}=60$, then $|\bar{a}\times\bar{b}|=$

1) 15 2) 20 3) 30 **4) 25**

97. The vectors $\bar{a}=2\hat{i}+3j+6k$ and $\bar{b}$ are collinear and $|\bar{b}|=21$ then $\bar{b}=$

1) $\pm\left(2\hat{i}+3j+6k\right)$ **2) $\pm\left(6\hat{i}+9j+18k\right)$** 3) $\frac{21}{\sqrt{3}}\left(\hat{i}+j+k\right)$ 4) $\pm21\left(2\hat{i}+3j+6k\right)$

98. If $\bar{a}=\hat{i}+j+k, \bar{c}=j-k, \bar{a}\times\bar{b}=\bar{c}, \bar{a}.\bar{b}=3$ then $\bar{b}=$

1) $\frac{1}{3}\left(5\hat{i}+2j+2k\right)$ 2) $\frac{1}{3}\left(2\hat{i}+5j+2k\right)$ 3) $\frac{1}{3}\left(2\hat{i}+2j+3k\right)$ 4) $\frac{1}{3}2\hat{i}+5j+5k$

99. The set of real values of λ for which the vectors $\lambda\hat{i}-3j+5k$ and $2\lambda\hat{i}-\lambda j+k$ are perpendicular to each other is

1) $(0,1)$ 2) $\{-2\}$ 3) $\{2,-1\}$ **4) ϕ**

100. If $\frac{x+1}{(2x-1)(3x+1)}=\frac{A}{2x-1}+\frac{B}{3x+1}$ then $16A+9B=$

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

101. The number of positive real roots of the equation $3^{x+1}+3^{-x+1}=10$ is

1) 3 2) 2 **3) 1** 4) In finitely many

102. The number of real values of m so that the equation $x^3+(2m+1)x+m=0$ has equal roots is

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

103. The values of for which the equations $x^3+ax+1=0$ and $x^4+ax^2+1=0$ have a common root is

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

104. $2+\sqrt{5}$, 1 are roots of the cubic equation given by

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

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

105. $\left(\frac{1-i}{1+i}\right)^{2022}+\left(\frac{1+i}{1-i}\right)^{2021}=$

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

106. IF the complex number $z_1, z_2, 0$ are vertices of an equilateral triangle, then $z_1^2+z_2^2=$

1) $2z_1^2z_2^2$ 2) $z_1^2z_2^2$ 3) $2z_1z_2$ **4)** z_1z_2

107. If $1, \omega, \omega^2$ denote the cube root of unity then the value of $\left(1-\omega+\omega^2\right)^5+\left(1+\omega-\omega^2\right)^5$ is

1) $32\omega^2$ 2) 32ω 3) –32 **4) 32**

108. If the m^{th} term is the middle term in expansion of $\left(x^2-\frac{1}{2x}\right)^{20}$. Find coefficient of T_{m+3}

1) ${}^{20}C_{13}2^{-13}$ 2) ${}^{-20}C_{13}2^{13}$ 3) ${}^{-20}C_{13}2^{-13}$ 4) ${}^{20}C_{13}2^{13}$

109. If $x=\frac{5}{2!\,3}+\frac{5.7}{3!\,3^2}+\frac{5.7.9}{4!\,3^3}+....$ then $x^2+4x=$

1) 17 **2) 23** 3) 27 4) 39

110. A polygon has 54 diagonals. The number of sides of this polygon is

1) 12 2) 15 3) 16 4) 9

111. Find the number ways of arrangement 6 red balls and 6 black balls in a row such that no two black ball are together

1) $6!\times 6!$ 2) $7!\times 6!$ 3) $2\times 6!\times 6!$ **4)** $7\times 6!\times 6!$

112. Five digit numbers are formed by using digits 1, 2, 3, 4 and 5 without repetition. Then the probability that the randomly chosen number is divisible by 4 is

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

113. A bag contains 7 green and 5 black. 3 balls are drown at random one after the other. If the balls are not replaced, then the probability of all three balls being green is

1) $\frac{343}{1720}$ 2) $\frac{21}{36}$ 3) $\frac{12}{35}$ **4)** $\frac{7}{44}$

114. From a pack of 52 cards, 3 cards are drawn at random then, the probability that one is ace, one is queen and one is jack is

1) $\frac{19}{5525}$ 2) $\frac{21}{5525}$ 3) $\frac{17}{5525}$ **4) $\frac{16}{5525}$**

115. In a Binomial distribution $B(n, p)$. If the mean and variance are 15 and 10 respectively. Then the value of the parameter n is

1) 28 2) 16 **3) 45** 4) 25

116. For a Poisson distribution, if mean $= l$, variance $= m$ and $l + m = 8$ then $e^4\left[1 - p(x > 2)\right] =$

1) 8 **2) 13** 3) 9 4) 12

117. Calculate variance if $\sum x_i^2 = 1800$ and $\sum x_i = 960$, for 60 observations

1) 44 2) 22 3) 32 4) 6.63

118. The mean deviation of the data $3, 5, 11, 13, 17, 19, 23, 29$ about its arithmetic mean is

1) 8.5 2) 8 3) 7.2 **4) 7**

119. If $A = \begin{bmatrix} 1 & 1 & a+1 \\ 1 & a+1 & 1 \\ a+1 & 1 & 1 \end{bmatrix}$ is not an invertible matrix, then the sum of all the values of a is

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

120. $\frac{\left(\sin\frac{\pi}{8} + i\cos\frac{\pi}{8}\right)}{\left(\sin\frac{\pi}{8} - i\cos\frac{\pi}{8}\right)^8}$ is equal to

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

121. If (p, q), $(a\cos\theta, b\sin\theta)$, $(b\cos\theta, a\sin\theta)$ are vertices of a triangle where 'θ' is a parameter then the locus of the centroid of the triangle is

1) $(3x - p)^2 + (3y - q)^2 = (a + b)^2$ 2) $x^2 + y^2 = 9(a + b)^2$

3) $(3x + p)^2 + (3y + q)^2 = (a + b)^2$ 4) $x(x - a) + y(y - b) = 0$

122. The perimeter of triangle is 14 units and two of its vertices are $(-3,0),(3,0)$ then locus of the 3rd vertex is

1) $\frac{x^2}{16}+\frac{y^2}{7}=1$ 2) $\frac{x^2}{25}+\frac{y^2}{16}=1$ 3) $\frac{x^2}{7}+\frac{y^2}{16}=1$ 4) $\frac{x^2}{16}+\frac{y^2}{25}=1$

123. The intercept on the straight line $y=mx$ by the lines $y=2$ and $y=6$ is less than 5 then 'm' belongs to

1) $\left(-\frac{4}{3},\frac{4}{3}\right)$ 2) $\left(\frac{4}{3},\frac{3}{8}\right)$ **3)** $\left(-\infty,-\frac{4}{3}\right)\cup\left(\frac{4}{3},\infty\right)$ 4) $\left(\frac{4}{3},\infty\right)$

124. Two sides of a triangle are $2x-y=0$ and $x+y=3$. If its centroid is $(2,3)$ then its third side is

1) $5x-y+9=0$ 2) $5x-y-9=0$ **3)** $5x+y+9=0$ 4) $5x-y-19=0$

125. Let PS be the median of the triangle with vertices $P(2,2),Q(6,-1)$ and $R(7,3)$. The equation of the line passing through $(1,-1)$ and parallel to PS is

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

126. The equation $x^2y^2-2xy^2-3y^2-4x^2y+8xy+12y=0$ represents

1) two pairs of lines 2) a parabola 3) an ellipse 4) a hyperbola

127. If $a=\underset{n\to\infty}{Lt}\sum_{r=1}^{n}\frac{1}{(r+2)r!}$ and $b=\underset{x\to\infty}{Lt}\frac{e^{\sin x}-e^{x}}{\sin x-x}$ then [where $r!=r(r-1)(r-2).....3.2.1$]

1) $a=b$ 2) $a=2b$ **3)** $2a=b$ 4) $a+b=0$

128. The value of $\underset{x\to\frac{\pi}{4}}{Lt}\frac{4\sqrt{2}-(\cos x+\sin x)^5}{1-\sin 2x}=$

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

129. Area enclosed by the pair of lines $ax^2+2hxy+by^2+2gx+2fy+c=0$ and $ax^2+2hxy+by^2-2gx-2fy+c=0$ is

1) $\frac{|c|}{\sqrt{h^2-ab}}$ 2) $\frac{4|c|}{\sqrt{h^2-ab}}$ 3) $\frac{3|c|}{\sqrt{h^2-ab}}$ **4)** $\frac{2|c|}{\sqrt{h^2-ab}}$

130. If $f(x)$ be a continuous function for all real values of x and satisfies $x^2+x\left(f(x)-2\right)+2\sqrt{3}-3-\sqrt{3}f(x)=0 \ \forall x\in R$ then the value of $f\left(\sqrt{3}\right)$ is

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

131. If $y=\left(x^2+1\right)^{\sin x}$ then $y'(0)=$

1) $\frac{1}{2}$ 2) e^2 **3) 0** 4) $\frac{3}{2}$

132. If $f(x)=x+\tan x$ and g is the inverse of f then $g'(x)$ equals

1) $\frac{1}{1+\left[g(x)-x\right]^2}$ 2) $\frac{1}{2-\left[g(x)-x\right]^2}$ **3)** $\frac{1}{2+\left[g(x)-x\right]^2}$ 4) $\frac{1}{1-\left[g(x)-x\right]^2}$

133. If $y=\sin x+e^x$ then $\frac{d^2x}{dy^2}=$

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

134. If p and q are the lengths of the perpendiculars from the origin on the tangent and normal to the curve $x^{\frac{2}{3}}+y^{\frac{2}{3}}=a^{\frac{2}{3}}$ then $4p^2+q^2=$

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

135. The angle between the curve $2y=e^{-x/2}$ and the $y-$ axis is

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

136. If the function $f(x)=kx^3-9x^2+6x+3$ is increasing $\forall x\in R$ then $K\in$

1) $(-\infty,0)$ 2) $\left(-\infty,\frac{9}{2}\right)$ **3)** $\left(\frac{9}{2},\infty\right)$ 4) $(3,4)$

137. $f(x)=\left(1+b^2\right)x^2+2bx+1$ and $m(b)$ is the minimum value of $f(x)$. As 'b' varies then range of $m(b)$ is

1) $[0,1]$ 2) $\left(0,\frac{1}{2}\right)$ 3) $\left(\frac{1}{2},1\right)$ **4)** $(0,1]$

138. If the angle between line with d.c's $\left(\frac{-2}{\sqrt{21}},\frac{a}{\sqrt{21}},\frac{b}{\sqrt{21}}\right)$ and other line with d.c's $\left(\frac{3}{\sqrt{54}},\frac{3}{\sqrt{54}},\frac{-6}{\sqrt{54}}\right)$ is 90^0, then a pair of possible values of a' and 'b' respectively are

1) -1 , 4 2) 4, 2 **3) 4, 1** 4) -4, -2

139. The equation of the plane through the point $(4,4,0)$ and perpendicular to the plane $x+2y+2z-5=0$ and $3x+3y+2z-8=0$ is

1) $2x-3y+2z+15=0$ 2) $4x+y-3z-26=0$

3) $2x-4y+3z+8=0$ 4) $3x+5y-2z+12=0$

140. If the locus of the midpoint of the chord of the circle $x^2+y^2-2x-2y-2=0$ which makes an angle of 120^0 at the centre is $x^2+y^2-hx-ky+c=0$ then $h+k=$

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

141. Length of chord of contact of point $(4,4)$ with respect to the circle $x^2+y^2-2x-2y-7=0$ is

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

142. A circle with centre $(2,2)$ touches the coordinate axes and a straight line AB where A and B lie on positive direction of coordinate axes such that the circle lies between origin and the line AB. If O be origin then the locus of circum centre of ΔAOB will be

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

3) $xy+x+y=\sqrt{x^2+y^2}$ 4) $xy+x+y+\sqrt{x^2+y^2}=0$

143. Radical center of the circle drawn on the sides as a diameter of triangle formed by the lines $3x-4y+6=0$, $x-y+2=0$ and $4x+3y-17=0$ is

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

144. If $\left(-\frac{1}{3},-1\right)$ is a centre of similitude for the circles $x^2+y^2=1$ and $x^2+y^2-2x-6y-6=0$ then the length of common tangent of circle is

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

145. The equation of parabola whose latusrectum is 2 units, axis of line is $x+y-2=0$ and tangent at the vertex is $x-y+4=0$ is given by

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

3) $(x+y-2)^2=2\sqrt{2}(x-y+4)$ 4) $(x+y+4)^2=2\sqrt{2}(x+y-2)$

146. If a tangent to the parabola $y^2=4ax$ meets the X-axis in T and the tangent at the vertex A in P and the rectangle TAPQ is completed then locus of Q is

1) $y^2+ax=0$ 2_) $y^2-ax=0$ 3) $x^2+ay=0$ 4) $x^2-ay=0$

147. Minimum distance between the curves $y^2=4x$ and $x^2+y^2-12x+31=0$ is

1) $\sqrt{21}$ 2) $\sqrt{26}-\sqrt{5}$ **3)** $\sqrt{5}$ 4) $\sqrt{28}-\sqrt{5}$

148. The radius of the circle passing through the foci of an ellipse $9x^2+16y^2=144$ and having least radius is

1) $4\sqrt{7}$ 2) $3\sqrt{7}$ 3) $2\sqrt{7}$ **4)** $\sqrt{7}$

149. The asymptotes of the hyperbola $xy-3y-2x=0$ is

1) $xy-2x-3y+12=0$ **2)** $xy-2x-3y+6=0$

3) $xy-2x-3y-12=0$ 4) $xy-2x-3y-6=0$

150. The foci of a hyperbola coincide with the foci of the ellipse $\frac{x^2}{25}+\frac{y^2}{9}=1$, find the equation of the hyperbola if its eccentricity is 2

1) $\frac{x^2}{4}-\frac{y^2}{12}=1$ 2) $\frac{x^2}{12}-\frac{y^2}{4}=1$ 3) $\frac{x^2}{4}-\frac{y^2}{2}=1$ 4) $\frac{x^2}{2}-\frac{y^2}{4}=1$

151. $\int\frac{x^2}{\sqrt{1+x^2}\left(\sqrt{1+x^2}-1\right)}dx=$

1) $x+\sinh^{-1}x+c$ 2) $x+\sin^{-1}x+c$ 3) $x+\sinh^{-1}x+c$ 4) $x-\sinh^{-1}x+c$

152. $\int x\sqrt{4x+3}dx=$

1) $\frac{(4x+3)^{\frac{3}{2}}}{40}(4x+2)+c$ 2) $\frac{(4x+3)^{\frac{3}{2}}}{40}(4x+7)+c$

3) $\frac{(4x+3)^{\frac{3}{2}}}{40}(4x-2)+c$ 4) $\frac{(4x+3)^{\frac{3}{2}}}{4}(4x-2)+c$

153. $\int\left(\sqrt{\tan x}+\sqrt{\cot x}\right)dx=$

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

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

154. $\int_{\frac{1}{3}}^{3}\left|\log_e^x\right|dx=\frac{m}{n}\log_e^{\left(n^2/e\right)}$ then $m+n=$

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

155. Let $f\left(x\right)=\int\frac{2x}{\left(x^2+1\right)\left(x^2+3\right)}dx$, if $f\left(3\right)=\frac{1}{2}\log_e^{\left(\frac{5}{6}\right)}$ then $f\left(4\right)=$

1) $\frac{1}{2}\log_e^{\left(\frac{17}{19}\right)}$ 2) $\log_e^{\left(\frac{17}{18}\right)}$ 3) $\frac{1}{2}\log_e^{\left(\frac{19}{17}\right)}$ 4) $\log_e^{\left(\frac{19}{20}\right)}$

156. $I=\int_0^1\left(x^{21}+x^{14}+x^7\right)\left(2x^{14}+3x^7+6\right)^{\frac{1}{7}}dx=$

1) $\frac{1}{42}(11)^{\frac{8}{7}}$ **2) $\frac{1}{48}(11)^{\frac{8}{7}}$** 3) $\frac{1}{48}(11)^{\frac{7}{8}}$ 4) $\frac{1}{48}(11)^{\frac{7}{9}}$

157. Area enclosed between the curves $y=\sin 2x$, $y=\sqrt{3}\sin x$, $x=0$, and $x=\frac{\pi}{6}$ in units

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

158. The solution of $\left(1+e^{x/y}\right)dx+e^{x/y}\left(1-\frac{x}{y}\right)dy=0$ is

1) $ye^{y/x}+x=c$ 2) $ye^{x/y}+y=c$ **3) $ye^{x/y}+x=c$** 4) $ye^{x/y}+y=c$

159. The order and degree of the differential equation

$x=1+\frac{dy}{dx}+\frac{1}{2!}\left(\frac{dy}{dx}\right)^2+\frac{1}{3!}\left(\frac{dy}{dx}\right)^3+.....\infty$ is

1) 3, 1 2) 4, 2 **3) 1, 1** 4) not defined

160. If L, M are the feet of the perpendicular from $\left(2,4,5\right)$ to $xy-$ plane and $yz-$plane respectively then distance LM is

1) $9\sqrt{2}$ 2) $2\sqrt{2}$ **3) $\sqrt{29}$** 4) $\sqrt{31}$

161. If f is real valued function defined by $f(x)=\frac{x-1}{x+1}(x\neq -1)$ then $\frac{3f(x)+1}{f(x)+3}=$

1)f(x) **2) $f(2x)$** 3) $f(3x)$ 4) $f(2/x)$

162. For a function defined by $f(x)=\sqrt{(x-1)(3-x)}$

1)domain(1,3) 2) domain $(-\infty,1)\cup(3,\infty)$ 3) $range[-1,1]$ **4) $range[0,1]$**

163. If a matrix $A=[a_{ij}]_{3\times 3}$ $where\ a_{ij}=1\ if\ i\neq j$ $then\ A^3-A^2=$
$=0\ if\ i=j$

1)2I 2) 3I 3) 2A **4) 3A**

164. If $A=\begin{bmatrix}\alpha & 2\\ 2 & \alpha\end{bmatrix}$ $and\ |A^3|=125\ then\ \alpha=$

1) ± 5 2) ± 2 **3) ± 3** 4) ± 4

165. If $\begin{vmatrix}a & b & 0\\ 0 & a & b\\ b & 0 & a\end{vmatrix}=0(where\ a\neq 0, b\neq 0)$ then

1) a is one root of 1 2) b is one root of 1
3) a/b is one root of 1 **4) b/a is one root of -1**

166. Given that $A=\begin{bmatrix}1 & -1\\ 4 & -1\end{bmatrix}, B=\begin{bmatrix}1 & -1\\ 2 & 1\end{bmatrix}$ two matrices x and y such that XA=B and YB=A then $3[x+y]=$

1) 0 2) I 3) 3I **4) 6I**

167. If A function $f:R\to R$ be defined by $f(x)=\frac{x}{1+|x|}$ then f(x) is ------- function

1)One-one but not onto 2)on to but not one
3) one-one and on to 4) neigther one-one nor onto

168. Let $f:R\to R$ be function defined by $f(x)=(x+1)^2-1(x\geq -1)$. If invertable function, then set $s=\{x/\ f(x)=f^{+}(x)\}$

1) $\{0,1\}$ 2) $\{-1,0,1\}$ **3) $\{0,-1\}$** 4) $\{-1,1\}$

169. Let $A=i\begin{bmatrix} b+c & c-a & b-a \\ c-b & c+a & a-b \\ b-c & a-c & a+b \end{bmatrix}, S=\begin{bmatrix} 0 & 1 & 1 \\ 1 & 0 & 1 \\ 1 & 1 & 0 \end{bmatrix}$ Trace (SAS^{-1})

1) $a+b+c$ 2) $2(a+b+c)$ 3) $3(a+b+c)$ **4) $4(a+b+c)$**

170. If x^{2t} *occurs in* $(x+\frac{2}{x^2})^n$ then n-2t must be

1)multiple3 2) multiple 5 3) multiple of 2 4) multiple 3k+1

171. The $eq11\, e^{\sin x}-e^{-\sin x}-4=0$ has -----real root

1)infinite **2) no** 3) exactly one 4) exactly 4

172 If $ax^2+bx+6=0$ does not have two distinct real roots then least value of 3a+b is

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

173. If root of $ax^2+x+b=0$ be real lines roots $x^2-4\sqrt{ab}x+1=0$ will be

1)real 2)Irrational **3)Imaginary** 4) None

174. If α,β,γ *roots of* $x^3+x+1=0$ then EqU whose roots are $(\alpha-\beta)^2,(\beta-\gamma)^2,(\gamma-\alpha)^2$

1) $(x+1)^3+3(x+1)^2+27=0$ 2) $(x-2)^3+3(x-2)^2+27=0$

3) $(x+2)^3+3(x+2)^2+27=0$ 4) $(x-1)^3+3(x-1)^2+27=0$

175. $\frac{x+1}{x^2+px+q}=\frac{A}{x-\alpha}+\frac{B}{x-\beta}$, *where* α,β *are roots* $x^2-px+q=0$ *then* $\frac{A-B}{A+B}=$

1) $\frac{P+2}{\sqrt{p^2+4q}}$ 2) $\frac{P-2}{\sqrt{p^2+4q}}$ **3) $\frac{P+2}{\sqrt{p^2-4q}}$** 4) $\frac{P-2}{\sqrt{p^2+4q}}$

176. The number of arrangement of word triangle so that relative position of vowels and constant remains unaltered is

1)360 2) 480 3) 960 **4) 720**

177. The equation $Z\bar{z}+(2-3\bar{i})+(2+3\bar{i})\bar{z}+4=0$ represent circle of radius

1) 6 2) 4 **3) 3** 4) 2

178. $4+5\left[\frac{-1}{2}+\frac{i\sqrt{3}}{2}\right]^{334}+3\left[\frac{-1}{2}+\frac{i\sqrt{3}}{2}\right]^{365}=$

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

179. $1.1!+2.2!+3.3!+.....n.n!=$

1) $(n-1)!-1$ 2) $(n-1)!+1$ 3) $(n+1)!+1$ **4) $d(n+1)!-1$**

180. $\dfrac{\text{Tan}\,53-\tan 27}{\text{Tan}\,26}=$

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

181. If $\tan\dfrac{\alpha}{2},\tan\dfrac{\beta}{2}$ are roots of $8x^2-26x+15=0$ *then* $\cos(\alpha+\beta)=$

1)1 2) -1 **3) –627 / 725** 4) 627 / 725

182. α,β are acute angles $\cos 2\alpha=\dfrac{3\cos 2\beta-1}{3-\cos 2\beta}$ *then* $\tan\alpha=$

1) $2\tan\beta$ **2) $\sqrt{2}\tan\beta$** 3) $3\sqrt{2}\tan\alpha$ 4) $2\sqrt{2}\tan\alpha$

183. If $P_n=\sin^n\theta+\cos^n\theta$ where $n\in z^+$. The value of $6P_{10}-15P_8+10P_6+7=$

1) 2 2) 4 3) 6 **4) 8**

184. If $x=\log\left[\cot\left(\dfrac{\pi}{4}+\theta\right)\right]$ *then* $\sinh(x)=$

1) $\text{Tan}\,\theta$ 2) $\cot 2\theta$ 3) $-\text{Tan}\,2\theta$ **4) $-\cot 2\theta$**

185. In $\Delta ABC,\dfrac{r_1+r_2}{1+\cos c}=$

1) $2R$ 2) $2r_3$ 3) $2/r_3$ 4) 2r

186. In $\Delta ABC, a=(1+\sqrt{3})cm, b=2cm, \angle c=60^0$ *then*

1) $\angle B=45^0\ \angle A=75^0$

2) $\angle B=15^0\ \angle A=105^0$

3) $\angle B=30^0\ \angle A=90^0$

4) $\angle B=75^0\ \angle A=45^0$

187. In ΔABC if $\cos A+\cos B+\cos C=\dfrac{7}{4}$ *then* $\dfrac{R}{r}=$

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

188. If $\left|\bar{a}+\bar{b}\right|<\left|\bar{a}-\bar{b}\right|$ then angle between $\bar{a}$ *and* $\bar{b}$ be lies in the intervals

1) $\left(\dfrac{-\pi}{2},\dfrac{\pi}{2}\right)$ 2) $(0,\pi)$ **3) $\left(\dfrac{\pi}{2},\dfrac{3\pi}{2}\right)$** 4) $(0,2\pi)$

189. Given that $\bar{a}=6i-3j, \bar{b}=2i-6j, \bar{c}=-2i+21j$ such that $\bar{\propto}=\bar{a}+\bar{b}+\bar{c}$ vector $\bar{\propto}$ into components with respected $\bar{a}\,\&\,\bar{b}$ is given by

1) $3\bar{a}-2\bar{b}$ 2) $3\bar{b}-2\bar{a}$ **3) $2\bar{a}-3\bar{b}$** 4) $\bar{a}-2\bar{b}$

190. Let A,B,C be points with pisiton vectors $2i-j+k, i+2j+k$ *and* $3i+j+2k$ respectively. Shortest distance of B from plane OAC is _____ units

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

191. If $\bar{a},\bar{b},\bar{c}$ are three non collinear vectors then $\frac{\bar{a}.(\bar{b}\times\bar{c})}{\bar{b}.(\bar{c}\times\bar{a})}+\frac{\bar{b}.(\bar{c}\times\bar{a})}{\bar{c}.(\bar{a}\times\bar{b})}+\frac{\bar{c}.(\bar{b}\times\bar{a})}{\bar{a}.(\bar{b}\times\bar{c})}=$

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

192. If $i\times\left[(a-j)\times i\right]+j\times\left[(\bar{a}-k)\times j\right]+k\times\left[(\bar{a}-i)\times k\right]=0$ *then* $\bar{a}=$

1) $\bar{a}=\frac{1}{2}(i+j+k)$ 2) $\bar{b}=\frac{-1}{2}(i+j+k)$ 3) $i+j+k$ 4) $-(i+j+k)$

193. If $\bar{a},\bar{b},\bar{c}$ are non-coplanar vector, such that $\bar{a}\times(\bar{b}\times\bar{c})=\frac{\bar{b}\times\bar{c}}{2}$ and $\bar{b}$ *and* $\bar{c}$ are non-parallel then angle between $\bar{a}$ *and* $\bar{b}$ is

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

194. Given that $\left|\bar{a}\right|=2,\left|\bar{b}\right|=3$, then maximum value of $\left|2(\bar{a}\times\bar{b})\right|+3\left|(\bar{a}.\bar{b})\right|$ is

1) $\sqrt{13}$ 2) $2\sqrt{13}$ **3) $6\sqrt{13}$** 4) $10\sqrt{13}$

195. Natural number X is chosen at random from frict 100 naturals. The probability that $\frac{(k-2)(X-40)}{(x-30)}<0$ is

1)3/25 **2) 7/25** 3) 1/50 4) 3/50

196. If A and B are two events such that

$P(A\cup B)+P(A\cap B)=\frac{7}{8}$ *and* $P(A)=2P(B)$ *then* $P(A)=$

1)7/12 2) 7/24 3) 5/12 4) 17/24

197. If an experiment succeeds twice as often as it fails then probability in next 6 trails there will be at least 40 success

1)490/729 **2)496/729** 3)480/729 4)325/729

198. Die A has 4 red and 2 white faces whereas die B has 2 red and 4 white faces. If a coin flipped once and it shows head, the game continues by throwing die A whereas if shows tail, die B is to B used. If the Probability that die A is used is 32/33. When red turns up every time in first n throws. then value of n is

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

199. For a group of 50 male works the mean and SAD of their daily wages are 630 and 90 respectively for a group of 40 female workers these are Rs.540 and Rs. 60 respectively. The SD of these 90 workers

1)90 2) 80 3) 70 4)60

200. Five forces $\overline{AB}, \overline{AC}, \overline{AD}, \overline{AE}, \overline{AF}$ at vertex A of regular hexagon ABCDEF with centre 'O' their resultant vector

1) $6\overrightarrow{AO}$ 2) $4\overrightarrow{AO}$ 3) $2\overrightarrow{AO}$ 4) $3\overrightarrow{AO}$

201. The locus of a point which is collinear with points (a,b) and (b,a) is

1) $x+y=a+b$ 2) $x+y=a-b$ 3) $ax+by=a^2+b^2$ 4) $ax+by=a^2-b^2$

202. Two opposite vertices of square are $(1,-2)$ *and* $(-5,6)$ then other two vertices are

1) $(2,5)$ *and* $(-6,1)$ 2) $(2,-5)$ *and* $(-6,-1)$ 3) $(-2,5)$ *and* $(6,1)$ 4) $(2,5)$ *and* $(6,1)$

203. The ratio in which the line $2lx+2my+3=0$ divides the distance between parallel lines $lx+my+5=0$ *and* $lx+my-5=0$ is

1)3:7 2) 7:3 **3) 7:13** 4) 13:7

204. Equation of bisector of angle between lines $4x+3y=7$ *and* $24x+7y-31=0$ having origin is

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

205. If P and Q are two points on $4x+3y+30=0$ such that $OP=OQ=10$ where O origin then area of ΔOPQ

1)48 Sq. u 2) 38 sq. u 3) 16 sq. u 4) 32 sq.u

206. If sum of intercepts made by line on coordinate axes is always constant then it passing through

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

207. If pair of lines $\left(x^2+y^2\right)\tan 2\alpha=(x-y\tan x)^2$ are perpendicular to each other then α is

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

208. For all values of θ, the locus of the point of intersection of lines $x\cos\theta+y\sin\theta=a$ *and* $x\sin\theta-y\cos\theta=b$ is

1)an ellipse **2) Circle** 3) Parabola 4) Hyperbola

209. Number of circles having radius 5 and passing the point (-2 ,0) and (4,0) is

1) 1 **2) 2** 3) 4 4) infinite

210. The equation of circle which touches both axes and line $3x-4y+8=0$ and whose centre in Q_3 is

1) $x^2+y^2-4x-4y+4=0$ **2) $x^2+y^2+4x+4y+4=0$**

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

211. For a circle $x^2+y^2+6x-8y+9=0$ which of the following is true

1) passing through (-3 ,4) **2)touches x-axis**

3)touches y-axis 4) touches both x and y axis

212. The line $x\cos\alpha+y\sin\alpha=p$ will be a tangent to the circle $x^2+y^2-2ax\cos\alpha-2ay\sin\alpha=0$ if P=

1) 0 *or* $2a$ 2) 0 *or* a 3) a 4) $2a$

213. The value of constant term in equation of circle passing through (1,2) and (3,4) and touches the line $3x+y-3=0$ is

1)7 2) 12 3) -7 4) -12

214. The condition that circle $(x-3)^2+(y-4)^2=r^2$ lies entirely with in circle $x^2+y^2=R^2$

1) $R-r>5$ 2) $R+r\le 7$ 3) $R^2-r^2<49$ 4) $R^2-r^2<25$

215. Circles $(x+a)^2+(y+b)^2=a^2$ *and* $(x+\alpha)^2+(y+\beta)^2=\beta^2$ cuts orthogonally if

1) $a\alpha+b\beta=b^2+\alpha^2$ **2) $2(a\alpha+b\beta)=b^2+\alpha^2$**

3) $a\alpha+b\beta=a^2+\beta^2$ 4) $2(a\alpha+b\beta)=a^2+\beta^2$

216. The straight line through p(3 ,4) make angle with $\frac{\pi}{6}$ with x-axis and meets line $12x+5y+10=0$ at Q then length of PQ is

1) $\frac{132}{12\sqrt{3}+5}$ 2) $\frac{132}{5\sqrt{3}+12}$ 3) $\frac{132}{12\sqrt{3}-5}$ 4) $\frac{132}{12\sqrt{3}-12}$

217. If line $y=mx+a$ meets parabola $x^2=4ay$ in two points whose abscisa are x_1 *and* x_2 *and* $x_1+x_2=0$ then m=

1)-1 2) 1 **3) 0** 4) not defined

218. In the ellipse $25x^2+9y^2-150x-90y+225=0$

1) *foci are* $(3,1)(3,9)$ 2) $e=4/5$

3) *centre*$(5/3)$ 4)Major axis 6

219. From a point on line $y=x+c(c-perameter)$ tangents are drawn to hyperbola such that chords of contact passing through a fixed point $((x_1,y_1)$ then $\frac{x_1}{y_1}=$

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

220. A pair of perpendicular straight lines drawn through origin form isosceles triangle with $2x+3y=6$ area of triangle is

1)36/17 2) 13/5 **3)17/13** 4) 12/17

221. P is point on line segment AB where A (3, 2, -1) and (6, 2, -2). If x- coordinates of P is 5 then its y- coordinate is

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

222. $A(0,2,3)$, $B(2,-1,5)$, $C(3,0,-3)$ are vertices of ΔABC. If a,b,c are HG, GS, SH ,then ascending order of a,b,c is

1) $a<b<c$ 2) $c<b<a$ **3)** $b<a<c$ 4) $b<c<a$

223. If (a_1,b_1,c_1)*and* (a_2,b_2,c_2) are direction ratios of two lines such that $(a_1^2+b_1^2+c_1^2)(a_2^2+b_2^2+c_2^2)-(a_1a_2+b_1b_2+c_1c_2)^2=0$ then two lines are

1)Parallel 2)Perpendicular 3)include angle $\frac{\pi}{4}$ 4)include angle $\frac{\pi}{3}$

224. A plane through the line $\frac{x-1}{1}=\frac{y+1}{-2}=\frac{z-1}{1}=0$ has equation

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

225. If $L_1=\underset{x\to 0}{Lt}\left(\frac{\sin x}{x}\right)^{\frac{\sin x}{x-\sin x}}$ *and* $L_2=\underset{x\to 1}{Lt}\, x^{\frac{1}{1-x}}$ then $e\left[L_1+L_2\right]=$

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

226. If $y = \text{Tan}^{-1}\sqrt{\frac{1-x}{1+x}}$ *then* $\frac{dy}{d(\cos^{-1}x)} =$

1) 2 2) 1/2 **3) –1/2** 4) –2

227. If $x = \sin t, y = \sin kt$ *satisfy* $(1-x^2)y_2 - xy_1 + Ay = 0$ *then* $A =$

1) k^2 2) 1+k 3) k 4) 1

228. The points at which $f(x) = \max(x, x^3)$ is not differential are x=

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

229. At the point A (2,5) on the curve $y = x^3 - 2x + 1$ the gradient of curve is increasing ----- times as fast as x is

1)10 2) 5 3) 3 **4)12**

230. The values of b for which the line $y = 12x + b$ is tangent to curve $y = x^3$ are

1) ±3 2) ±4 **3) ±6** 4) ±12

231. The function $f(x) = |px - q| + r|x|$ *where* $p > 0, q > 0, r > 0$ assumes it minimum value only at one point if

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

232. The inclination of the tangent at $\theta = \frac{\pi}{3}$ on curve $x = a(\theta + \sin\theta), y = a(1 + \cos\theta)$ *is*

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

233. $\int \frac{x+2}{(x^2+3x+3)\sqrt{x+1}}dx =$

1) $\frac{1}{\sqrt{3}}\text{Tan}^{-1}\left[\frac{x}{\sqrt{3(x+1)}}\right] + c$

2) $\frac{2}{\sqrt{3}}\text{Tan}^{-1}\left[\frac{x}{\sqrt{3(x+1)}}\right] + c$

3) $\text{Tan}^{-1}\left[\frac{x}{\sqrt{3(x+1)}}\right] + c$

4) $\text{Tan}^{-1}\left[\frac{x}{3(x+1)}\right] + c$

234. $\int \frac{\sin 2x}{a^2\sin^4 x + b^2\cos^4 x}dx =$

1) $\text{Tan}^{-1}(\frac{a}{b}\tan^2 x) + c$

2) $\frac{1}{ab}\text{Tan}^{-1}(\frac{a}{b}\tan^2 x) + c$

3) $\frac{1}{ab}\text{Tan}^{-1}(\frac{a}{b}\cot^2 x) + c$

4) $\text{Tan}^{-1}(\frac{a}{b}\cot^2 x) + c$

235. $\int f(x)\sin x\cos x dx = \frac{1}{2(b^2-a^2)}\log f(x)+c$ then $f(x)=$

1) $\frac{1}{a^2\sin^2 x+b^2\cos^2 x}$ 2) $a^2\sin^2 x+b^2\cos^2 x$

3) $\frac{1}{b^2\sin^2 x+a^2\cos^2 x}$ 4) $b^2\sin^2 x+a^2\cos^2 x$

236. $\int_0^{\frac{\pi}{2}} \frac{x}{\sin x+\cos x}dx =$

1) $\pi\log\left(\sqrt{2}+1\right)$ **2)** $\frac{\pi}{2\sqrt{2}}\log\left(\sqrt{2}+1\right)$ 3) $\frac{\pi}{\sqrt{2}}\log\left(\sqrt{2}+1\right)$ 4) 0

237. If $f(x)=Ax^2+Bx$ satisfy the condition $f^1(1)=8$ and $\int_0^1 f(x)dx=\frac{8}{3}$ then

1) $A=1,B=-4$ **2)** $A=2,B=4$ 3) $A=-2,B=4$ 4) $A=-2,B=-4$

238. If $s_n=\left\{\frac{1}{1+\sqrt{n}}+\frac{1}{2+\sqrt{2n}}+\frac{1}{3+\sqrt{3n}}+.....+\frac{1}{n+\sqrt{n^2}}\right.$ then $\lim_{n\to\infty} s_n =$

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

239. The area in first quadrant bounded by curves $x^2=2y, y^2=2x$ *and* $x^2+y^2=3$ is $a+b\sin^{-1}\frac{1}{3}$ then

1) $a=\frac{\sqrt{2}}{3}, b=\frac{3}{2}$ 2) $a=\frac{3}{2}, b=\frac{\sqrt{3}}{2}$

3) $a=\frac{3}{\sqrt{2}}, b=\frac{2}{3}$ 4) $a=\frac{2}{3}, b=\frac{2}{\sqrt{3}}$

240. The solution of $y(xy+1)dx+x(1+xy+x^2y^2)dy=$

1) $2x^2y^2\log y-2xy-1=cx^2y^2$ 2) $2x^2y^2\log y+2xy-1=cx^2y^2$

3) $2xy\log x+2xy+1=cx^2y^2$ 4) $2xy\log y-2xy-1=cx^2y^2$

241. If the function $f:R-(l)\to R-(m)$ defined by $f(x)=\frac{x+3}{x-2}$ is a bijection, then $3l+2m=$

1) 10 2) 12 **3) 8** 4) 14

242. If $f(x)$ be a function defined by $f(xy)=\frac{f(x)}{y}$ for all positive real numbers x and y.

If $f(30)=20$ then $f(40)=$

1) 10 **2) 15** 3) 25 4) 17

243. If $A=\begin{bmatrix}1 & -3 & 2\\ -2 & 1 & 3\\ 3 & 2 & -1\end{bmatrix}$ then $A^2(AdjA)=$

1) 21A **2) -42A** 3) $7A^{-1}$ 4) 14(AdjA)

244. The equation whose roots are the values of the equation $\begin{vmatrix}1 & -3 & 1\\ 1 & 6 & 4\\ 1 & 3x & x^2\end{vmatrix}=0$ is

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

245. If $A=\begin{bmatrix}x & 0\\ 1 & 1\end{bmatrix}$ and $B=\begin{bmatrix}8 & 0\\ 7 & 1\end{bmatrix}$ aand $A^3=B$ then $x=$

1) -2 or 3 2) -2 3) 2 or -3 **4) 2**

246. If $A=\begin{bmatrix}\sin\alpha & -\cos\alpha\\ \cos\alpha & \sin\alpha\end{bmatrix}$ and $A+A^{-1}=I$ then $\alpha=$

1) 0 2) $\frac{\pi}{3}$ **3) $\frac{\pi}{6}$** 4) $\frac{\pi}{4}$

247. If $\cos\theta-\sin\theta=\sqrt{5}\sin\theta$ then $\cos\theta+4\sin\theta=$

1) $5\cos\theta$ 2) $\sqrt{5}\sin\theta$ 3) $5\sin\theta$ **4) $\sqrt{5}\cos\theta$**

248. In a ΔABC $\tan\frac{A}{2}\tan\frac{B}{2}+\tan\frac{B}{2}\tan\frac{C}{2}+\tan\frac{C}{2}\tan\frac{A}{2}=$

1) 0 **2) 1** 3) $\frac{1}{2}$ 4) π

249. $\sin 22\frac{1}{2}^0=$

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

250. If $\sin\theta+\operatorname{cosec}\theta=4$ then $\sin^2\theta+\operatorname{cosec}^2\theta=$

1) 12 2) 18 3) 16 **4) 14**

251. The value of $\frac{1+\tanh x}{1-\tanh x}$ is

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

252. If in a ΔABC, $a=2, b=3$ and $c=4$ then $\tan\frac{A}{2}=$

1) $\sqrt{\frac{3}{15}}$ 2) $\sqrt{\frac{4}{15}}$ 3) $\sqrt{\frac{2}{15}}$ **4) $\sqrt{\frac{1}{15}}$**

253. In a ΔABC $r_1\cot\frac{A}{2}+r_2\cot\frac{B}{2}+r_3\cot\frac{C}{2}=$

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

254. In a ΔABC, if $a=2, b=3$ and $\sin A=\frac{2}{3}$, then $\lfloor B=$

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

255. If the equation of the plane passing through the point $A(-2,1,3)$ and perpendicular to the vector $3\hat{i}+j+5k$ is $ax+by+cz+d=0$ then $\frac{a+b}{c+d}=$

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

256. If $\bar{a}$ is collinear with $\bar{b}=3\hat{i}+6j+6k$ and $\bar{a}.\bar{b}=27$ then $|\bar{a}|=$

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

257. Let $\bar{F}=2\hat{i}+2j+5k$ $A=(1,2,5)$, $B=(-1,-2,-3)$ and $\overline{BA}\times\bar{F}=4\hat{i}+6j+2\lambda k$ then $\lambda=$

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

258. If $|\bar{a}|=13, |\bar{b}|=5$ and $\bar{a}.\bar{b}=60$ then $|\bar{a}\times\bar{b}|=$

1) 15 2) 20 3) 30 **4) 25**

259. If $\frac{13x+43}{2x^2+17x+30}=\frac{A}{2x+5}+\frac{B}{x+6}$ then $A^2+B^2=$

1) $\frac{23}{3}$ 2) 52 **3) 34** 4) $\frac{18}{5}$

260. The sum of squares of roots of the equation $x^{\frac{2}{3}}+x^{\frac{1}{3}}-2=0$ is

1) 82 **2) 65** 3) 50 4) 37

261. The range of the function $f(x)=\frac{x^2+x+1}{x^2-x+1}$ is

1) $\left[\frac{1}{3}, 3\right]$ 2) $\left[\frac{1}{2}, 2\right]$ 3) $\left[-\frac{1}{2}, -\frac{1}{4}\right]$ 4) $\left[-\frac{1}{2}, 2\right]$

262. The remainder when the polynomial $2x^5-3x^4+5x^3-3x^2+7x-9$ is divisible by x^2-x-3 is

1) $-41x-3$ **2)** $41x+3$ 3) $41x-3$ 4) $-41x+3$

263. The number of real values of m so that the equation $x^2+(2m+1)x+m=0$ has equal roots is

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

264. If $(x-iy)^{\frac{1}{3}}=a-ib$ then the value of $\frac{x}{2a}+\frac{y}{2b}$ is

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

265. $\left(-1+i\sqrt{3}\right)^{60}=$

1) 2^{60} 2) 2^{59} 3) $\frac{1}{2}$ 4) $\frac{3}{2}$

266. For any complex number Z, the minimum value of $|Z|+|Z-1|$ is

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

267. If the arg Z_1 and Arg $\overline{Z_2}$ are $\frac{\pi}{3}$ and $\frac{\pi}{5}$ respectively, then the value of Arg Z_1+ArgZ_2 is

1) $\frac{11\pi}{15}$ 2) $\frac{6\pi}{15}$ **3)** $\frac{2\pi}{15}$ 4) $\frac{8\pi}{15}$

268. There are 4 oranges, 5 apples, 7 mangoes in a fruit basket. The number of ways of selecting at least one fruit from among the fruits in the basket is

1) 210 2) 240 3) 209 **4) 239**

269. The least value of n so that ${}^{(n-1)}C_3 + {}^{(n-1)}C_4 > {}^{n}C_3$

1) 11 2) 9 **3) 8** 4) 7

270. There are 10 points in a plane, out of these 6 are collinear. If N is the total number of triangles formed by joining these points, then N =

1) 120 2) 850 **3) 100** 4) 150

271. In how many ways can the letters of the word "MULTIPLE" be arranged keeping the position of the vowels fixed?

1) 60 **2) 360** 3) 600 4) 300

272. The number of rational terms in the binomial expansion of $\left(\sqrt[4]{5}+\sqrt[5]{4}\right)^{100}$ is

1) 50 2) 5 **3) 6** 4) 1

273. If $x=\frac{1}{5}+\frac{1.3}{5.10}+\frac{1.3.5}{5.10.15}+.....\infty$ then $3x^2+6x=$

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

274. If the total number of observation is 20. $\sum x_i = 1000$ and $\sum x_i^2 = 84000$ then the variance of the distribution is

1) 1500 2) 1600 **3) 1700** 4) 1800

275. The range of the data 35, 12, 21, 24, 15, 7, 16, 12, 30, 32, 13, 17 is

1) 28 2) 42 3) 17 4) 21

276. If A and B are independent events such that $P(A)=0.3$, $P(B)=x$ and $P(A\cup B)=0.44$ then $x=$

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

277. From a well shuffled pack of 52 cards, two cards are drawn at random then the probability of both the cards being kings is

1) $\frac{1}{15}$ 2) $\frac{25}{57}$ 3) $\frac{35}{256}$ **4)** $\frac{1}{221}$

278. A person P speaks truth in 75% cases and another person R in 80% cases then, the probability that they likely to contradict each other in narrating the same event is

1) $\frac{7}{20}$ 2) $\frac{7}{10}$ 3) 0.2 4) 0.3

279. In a Binomial distribution $B(n,p)$ if the mean and variance are 15 and 10 respectively then the value of the parameter n is

1) 28 2) 16 **3) 45** 4) 25

280. If 3 is the variance of poisson distribution then $P(1<x<4)$

1) $\frac{123}{8}e^{-3}$ 2) $3e^{-\sqrt{3}}$ **3) $9e^{-3}$** 4) $\left(\frac{3+\sqrt{3}}{2}\right)e^{-3}$

281. If the equation of one tangent to the circle with centre $(2,-1)$ from origin is $3x+y=0$ then the equation of the other tangent through orgin is

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

282. The centre of the circle passing through the pts $(0,0)(1,0)$ and touching the circle $x^2+y^2=9$ is

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

283. The radius of the larger circle in the first quadrant and touching the line $4x+3y-12=0$ and the coordinates axes is

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

284. If one of the diameters of the circle $x^2+y^2-2x-6y+6=0$ is a chord to the circle with center (2,1) then the radius of the circle is

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

285. If the line $y-\sqrt{3}x+3=0$ cuts the parabola $y^2=x+2$ at A and B. Then PA.PB is equal to (where $P=(\sqrt{3},0)$)

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

286. Let PSP' is a focal chord of the ellipse $4x^2+9y^2=36$ and $SP=4$, then $S'P'=$

1) $\frac{26}{5}$ 2) $\frac{36}{5}$ 3)4 4)5

287. The length of the major axis of the ellipse $(5x-10)^2+(5y+15)^2=\frac{(3x-4y+7)^2}{9}$ is

1)10 **2) $\frac{15}{4}$** 3) $\frac{20}{7}$ 4)4

288. The equation to the ellipse whose axes are of length 6 and $2\sqrt{6}$ and their equation are $x-3y+3=0$ and $3x+y-1=0$ respectively , is

1) $19x^2-9xy+6y^2+3x-68y-156=0$ 2) $15x^2-3xy+9y^2+6x-48y+151=0$

3) $21x^2-6xy+29y^2+6x-58y-151=0$ 4) $16x^2+3xy+29y^2+6x-28y+151=0$

289. The equation to the conjugate hyperbola of $xy+3x-4y+13=0$ is

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

3) $(x-4)(y+3)=25$ 4) $xy+x-4y-13=0$

290. Locus of feet of perpendicular from $(5,0)$ to the tangents of $\frac{x^2}{16}-\frac{y^2}{9}=1$

1) $x^2+y^2=4$ **2)** $x^2+y^2=16$ 3) $x^2+y^2=9$ 4) $x^2+y^2=25$

291. A hyperbola , having the transverse axis of length $2\sin\theta$, is cenfocal with the ellipse $3x^2+4y^2=12$, then its equation is

1) $x^2\cos ec^2\theta-y^2\sec^2\theta=1$ 2) $x^2\sec^2\theta-y^2\cos ec^2\theta=1$

3) $x^2\sec^2\theta-y^2\cos^2\theta=1$ 4) $x^2\cos^2\theta-y^2\sin^2\theta=1$

292. $\int\left(1+\tan^2 x+\tan^4 x+\tan^6 x\right)dx=$

1) $\tan^2 x+\frac{\tan^5 x}{5}+c$ 2) $\tan x+\frac{\tan^5 x}{5}+c$

3) $x+\frac{\tan^3 x}{3}+\frac{\tan^5 x}{5}+\frac{\tan^7 x}{7}+c$ 4) $\tan x+\frac{\tan^3 x}{3}+\frac{\tan^5 x}{5}+\frac{\tan^7 x}{7}+c$

293. If $\int 3^x.3^{3^x}.3^{3^{3^x}}dx=A.3^{3^{3^x}}+c$, then A =

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

294. If $\int e^x\left(\frac{x+2}{x+4}\right)^2dx=e^x f(x)+c$, then f(x) = -------

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

295. $\int \frac{\sin x + 8\cos x}{4\sin x + 6\cos x} dx =$

1) $x + \frac{1}{2}\log(4\sin x + 6\cos) + C$ 2) $2x + \log(2\sin x + 3\cos x) + C$

3) $x + 2\log(2\sin x + 3\cos x) + C$ 4) $\frac{1}{2}\log(4\sin x + 6\cos x) + C$

296. $\int_0^{\pi/4} \frac{(\sin x + \cos x)}{8 + \sin 2x} dx$

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

297. $\int_0^{\pi/6} \cos^4 3\theta \sin^2 6\theta \, d\theta =$

1) $\frac{5}{192}$ **2)** $\frac{5\pi}{256}$ 3) $\frac{5\pi}{192}$ 4) $\frac{\pi}{96}$

298. The integral $\int_0^{\pi} \sqrt{1 + 4\sin^2 \frac{x}{2} - 4\sin \frac{x}{2}}$ *dx equals*

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

299. If m, n are the order and degree of the differential equation $\left(\frac{d^4y}{dx^4} + \frac{d^2y}{dx^2}\right)^{3/2} = a\frac{d^3y}{dx^3}$ respectively, then 2m + n =

1) $\frac{11}{2}$ 2) 7 **3) 11** 4) $\frac{7}{2}$

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

1) sec y = 2 cos x + c **2) sec y = -2 cos x + c**

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

301. $\frac{dy}{dx} = \frac{y + x\tan\frac{y}{x}}{x} \Rightarrow \sin\frac{y}{x} =$

1) cx^2 2) cx 3) cx^3 4) cx^4

302. Integrating factor of $\left(x+2y^3\right)\frac{dy}{dx}=y^2$ is

1) $e^{(1/y)}$ 2) $e^{-(1/y)}$ **3) 1/y** 4) $-1/y$

303. If $f:R\to R$ such that $f\left(x+y\right)-kxy=f\left(x\right)+2y^2$ for all $x,y\in R$ and $f\left(1\right)=2, f\left(2\right)=8$ then $f\left(20\right)-f\left(10\right)$

1) 600 2) 300 3) 60 4) 200

304. $\underset{x\to 0}{Lt}\frac{\log_e\left(1+x\right)}{3^x-1}=$

1) $\log_e 3$ 2) 0 3) 1 **4) $\log_3 e$**

305. $\underset{x\to 2+}{Lt}\left(\frac{\left[x\right]^3}{3}-\left[\frac{x}{3}\right]^3\right)=$

1) 0 2) 64/27 **3) 8/3** 4) 3/8

306. $f\left(x\right)=\left[x^2\right]-\left[x\right]^2$ is discontinuous on $\left[\ .\right]$ denotes G. I.F

1) Z 2) $Z-\{0\}$ **3) $Z-\{1\}$** 4) $Z-\{0,1\}$

307. $x\sqrt{1+y}+y\sqrt{1+x}=0\Rightarrow\frac{dy}{dx}=$

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

308. The equation of the horizontal tangent of the graph of the function $y=e^x+e^{-x}$ is

1) $y=-2$ 2) $y=-3$ **3) $y=2$** 4) $y=3$

309. The function $x^x\left(x>0\right)$ is decreasing in

1) $\left(0,1/e\right)$ 2) $\left(0,4\right)$ 3) $\left(-4,0\right)$ 4) $\left(1/e,\infty\right)$

310. The function $f\left(x\right)=a\sin x+\frac{1}{3}\sin 3x$ has maximum value at $x=\frac{\pi}{3}$. The value of a is

1) 3 2) 1/3 **3) 2** 4) ½

311. If a vertex of a triangle is $(1,1)$ and the midpoints of two sides through this vertex are $(-1,2)$ and $(3,2)$, then the centroid of the triangle is

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

312. If $p,x_1,x_2,x_3,....$ and $q,y_1,y_2,y_3,....$ form two infinite AP's with common differences a and b respectively, then locus of $P(\alpha,\beta)$, where $\alpha=\frac{x_1+x_2+...+x_n}{n}$ and $\beta=\frac{y_1+y_2+...+y_n}{n}$ is

1) $a(x-p)=b(y-q)$ 2) $p(x-a)=q(y-b)$

3) $p(x-p)=a(y-q)$ **4)** $b(x-p)=a(y-q)$

313. The equation of the line dividing the line segment joining the points $(2,5),(6,3)$ in the ratio 3 : 4 externally and parallel to $x+2y+7=0$ is

1) $x+2y-12=0$ 2) $5x-2y-10=0$ 3) $x+2y-24=0$ 4) $3x-4y+4=0$

314. If $4a^2+9b^2-c^2+12ab=0$, then the set of lines $ax+by+c=0$ passes through the fixed point

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

315. The value of k such that the straight line $(2x+3y+5)+k(x-7y+6)=0$ is parallel to $x-$ axis is

1) 21/5 2) 1/3 3) 5/3 **4) -2**

316. If the pair of lines $2x^2+3xy+y^2=0$ makes angles θ_1 and θ_2 with $x-$axis then $\tan(\theta_1-\theta_2)=$

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

317. The Fourth vertex of the parallelogram whose consecutive vertices are $(2,4,-1),(3,6,-1),(4,5,1)$ is

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

318. $A(1,8,4)$, $B(0,11,-4)$, $C(2,3,-1)$ are three points and D is the foot of the perpendicular from A to BC then the coordinates of 'D' are

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

319. Equation of the plane passing through $(0,0,-4)$ and perpendicular to the line joining the points $(1,-2,2),(-3,1,-2)$

1) $4x-3y+4z+16=0$ 2) $4x+3y+4z+16=0$

3) $4x+2y+3z+16=0$ 4) $4x-3y-4z-16=0$

320. If $(x_1,y_1),(x_2,y_2)$ are the extremities of a focal chord of the parabola $y^2=16x$ then $4x_1x_2+y_1y_2=$

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

K.S.R.M. COLLEGE OF ENGINEERING

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KGCET 2K23 PHYSICS QUESTION PAPER KEY

Note: Correct Answers Are Highlighted and OPTION marked in **RED** color, Total 160 questions from 4 sets (40 questions from each set).

1. If 1% and 2% are the errors in the measurement of mass and density of a cube respectively, then the error in the measurement of length is

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

2. A body is projected vertically upwards with a velocity'u' from the top of a tower. time taken by it to reach the ground is 'n' times the time taken by it to reach the highest point in its path, height of the tower is

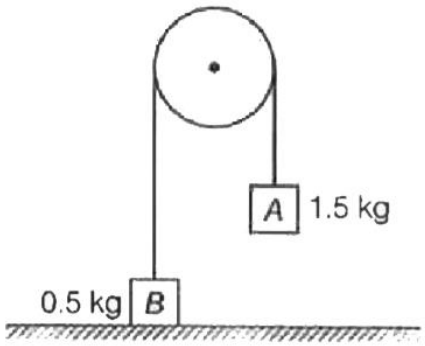
1) $\frac{nu^2(n-1)}{2g}$ 2) $\frac{nu^2(n-2)}{g}$ **3)** $\frac{nu^2(n-2)}{2g}$ 4) $\frac{u^2}{2g}(n+1)$

3. The velocity of an object moving in a straight line path is given as a function of time by $V = 6t - 3t^2$,where V is in ms^{-1} ,t is in S. The average velocity of object between t=0 and t= 2s is

1)0 2) $3ms^{-1}$ **3)** $2ms^{-1}$ 4) $4ms^{-1}$

4. Assertion(A): Range of a projectile is maximum when the angle of projection is 45^0
Reason(R): The range of a projectile depends only on the angle of projection.
1)Both are true and R is the correct explanation of A
2) Both are true that and R is not the correct explanation of A
3) A is true but R is false
4) A is false but R is true

5. Two blocks A and B of masses 1.5kg and 0.5kg respectively are connected by a massless in extensible string passing over a frictionless pulley as shown the figure. Block A is lifted until block B touches the ground and then block A is released. The initial height of block A is 80cm when block B just touches the ground. The maximum height reached by block B from the ground after the block A falls on the ground is



1) 80cm **2) 120cm** 3) 140cm 4) 160cm

6. A body of mass 2kg thrown vertically upward from the ground with a velocity of $8ms^{-1}$ reaches a maximum height of 3m. The work done by the resistance is $(g = 10ms^{-2})$

1)4J 2) 60J 3) 64J 4) 8J

7. Collision takes place between two solid sphere denoted as 1 and 2. The initial velocities of the spheres are $u_1 = 3m/s, u_2 = 1.5m/s$ and the final velocities are $v_1 = 2.5m/s, v_2 = 3.5m/s$. The coefficient of restitution between the materials of the sphere is nearly

1) 0.67 2) 0.78 3) 0.83 4) 0.96

8. A solid sphere of radius R makes a perfect rolling down on a plane which is inclined to the horizontal axis at an angle θ. If the radius of gyration is 'K' then its acceleration is

1) $\frac{g\sin\theta}{(1+\frac{k^2}{R^2})}$ 2) $\frac{2g\sin\theta}{(1+\frac{k^2}{R^2})}$ 3) $\frac{4g\sin\theta}{(1+\frac{k^2}{R^2})}$ 4) $\frac{4g\sin\theta}{(2+\frac{k^2}{R^2})}$

9. The mass of space ship is 1000kg. It is to be launched from the earth's surface out in to free space. The value of g and R(radius of earth) are $10m/s^2$ and 6400km respectively. The required energy for this work will be

1) $6.4\times10^{11}J$ 2) $6.4\times10^{8}J$ 3) $6.4\times10^{9}J$ **4)** $6.4\times10^{10}J$

10. The potential energy of a simple harmonic oscillator of mass 2kg at its mean position is 5J. If its total energy is 9J and amplitude is 1cm,then its time period is

1) $\frac{\pi}{100}S$ 2) $\frac{\pi}{50}S$ 3) $\frac{\pi}{20}S$ 4) $\frac{\pi}{10}S$

11. The area of cross section of steel wire is $0.1cm^2$ and young's modulus of steel is $2\times10^{11}Nm^{-2}$. The force required to stretch by 0.1% of its length is

1) 1000N **2) 2000N** 3) 5000N 4)4000N

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

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

13. Which of the following shown the correct relationship between the pressure 'P' and density ρ of an ideal gas at constant temperature?

1) 2) 3) 4)

14. A real gas behaves like an ideal gas if its

1) Pressure and temperature are both high
2) Pressure and temperature are both low
3) Pressure is high and temperature is low
4) Pressure is low and temperature is high

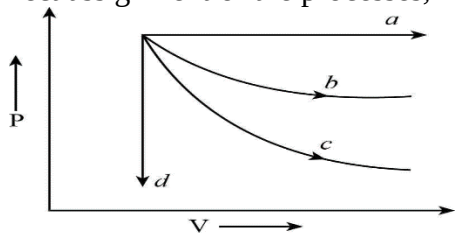
15. An ideal gas in a closed container is heated so that the final rms speed of the gas particle increases by 2 times the initial rms speed. If the initial gas temperature is 27^0C ,then the final temperature of the ideal gas is

1) 1200^0C **2) 927^0C** 3) 827^0C 4) 1473^0C

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

1) $5\times10^{-4}cm$ 2) $0.5\times10^{-4}cm$ 3) $2.5\times10^{-4}cm$ 4) $4\times10^{-4}cm$

17. The given diagram shows four process i.e isochoric, isobaric, isothermal and adiabatic. The correct assignment of the processes, in the same order is given by

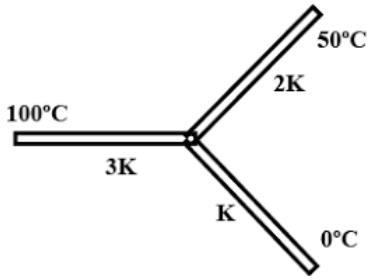


1) *d a c b* 2) *a b c d* 3) *a d b c* **4) *d a b c***

18. A diatomic ideal gas is used in Carnot's engine is working substance. During adiabatic expansion of the Cycle, if the volume of the gas increase from V to 32V, then the efficiency of the engine is

1)0.25 2) 0.5 3) 0.67 **4) 0.75**

19. Three rods of same dimensions have thermal conductivities 3K, 2K and K. They arranged as shown in the figure below. Then in the steady state the temperature of the junction 'P' is



1) $\frac{200}{3}{}^{0}C$ 2) $\frac{100}{3}{}^{0}C$ 3) $75{}^{0}C$ 4) $\frac{75}{3}{}^{0}C$

20. Six identical particles each of mass 'm' are arranged at the corners of a regular hexagon of side length 'L'. If the mass of one of the particle is doubled, the shift in the centre of mass is

1) L 2)6L/7 **3) L/7** 4) $L/\sqrt{3}$

21. Standing waves are produced in a string 16m long. If there are 9 nodes between the two fixed ends of the string and the speed of wave is 32m/s, what is the frequency of the wave?

1)5Hz **2) 10Hz** 3) 30Hz 4) 20Hz

22. The angle of deviation by a prism is $(180^0 - 2A)$. Its critical angle will be

1) $\sin^{-1}\left(\tan\frac{A}{2}\right)$ 2) $\sin^{-1}\left(\cot\frac{A}{2}\right)$ 3) $\cos^{-1}\left(\cot\frac{A}{2}\right)$ 4) $\cos^{-1}\left(\tan\frac{A}{2}\right)$

23. A thin liquid convex lens is formed in glass. Refractive index of liquid is 4/3 and that of glass is 4/3 and that of glass is 3/2 . If 'f' is the focal length of the liquid lens in air, its focal length and nature in the glass is

1)f, convex 2) f, concave 3) 2f, concave **4) 3f, concave**

24. In a young's double slit experiment, if the slit separation is twice the wave length of light used, then the maximum number of interference maxima is

1) 0 2) 3 **3) 5** 4) 7

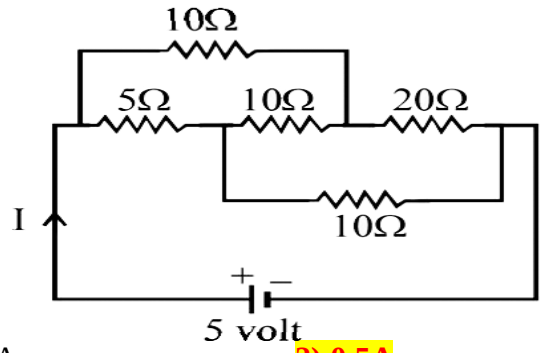
25. If charge q is placed at the centre of the line joining two equal charges Q such that the system is in equilibrium, then the value of q is

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

26. Two capacitors of capacities $1\mu F$ *and* $C\mu F$ are connected in series and the combination is charged to a potential difference of 120V. If the charge on the combination of $80\mu C$,the energy stored in the capacitor of capacity C in μJ is

1)1800 **2) 1600** 3) 14400 4) 7200

27. The current I drawn from the 5V source will be



1)0.33A **2) 0.5A** 3) 0.67A 4)0.17A

28. At a certain place, the horizontal component of earth's magnetic field is $\frac{1}{\sqrt{3}}$ times the vertical component. The angle of dip at that place is

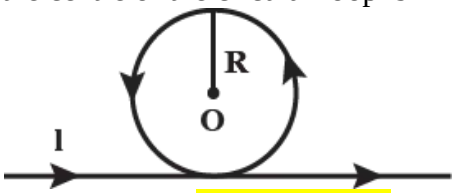
1) 30^0 2) 45^0 **3) 60^0** 4) 90^0

29. A long solenoid has 200 turns per cm and carries a current 'i'. The magnetic field at its centre is $6.28\times10^{-2}\,weber/m^2$ .Another long solenoid has 100 turns per cm and it carries a current 'i/3'. The value of the magnetic field at its centre is

1) $1.05\times10^{-4}\,weber/m^2$ **2) $1.05\times10^{-2}\,weber/m^2$**

3) $1.05\times10^{-5}\,weber/m^2$ 4) $1.05\times10^{-3}\,weber/m^2$

30. An infinitely long straight conductor is bent in to sharp as shown below. It carries a current of iA and the radius of the circular loop is R metres . Then the magnitude of magnetic induction at the centre of the circular loop is



1) $\frac{\mu_0 i}{2\pi R}$ 2) $\frac{\mu_0 \pi i}{2R}$ **3) $\frac{\mu_0 i}{2\pi R}(\pi+1)$** 4) $\frac{\mu_0 i}{2\pi R}(\pi-1)$

31. A wheel with radial metal spokes 1m in length is related in a magnetic field of $0.5\times10^{-4}T$ normal to the plane of the wheel. If the emf induced between the rim and axle is $\frac{\pi}{3000}$ V, the rotational speed of the wheel in revolution's per minute is

1)400 2) 500 3) 600 4) 700

32. A coil has inductance of 0.4 H and resistance of 8Ω. It is connected to an AC source with peak emf 4V and frequency $\frac{30}{\pi}$ Hz. The average power dissipated in the circuit is

1) 1W 2) 0.5W 3) 0.3W **4)0.1W**

33. A photon of energy 4 ev imparts all its energy to an electron that leaves a metal surface with 1.1eV of kinetic energy. The work function of the metal is

1) 2.9ev 2) 5.1ev 3) 3.64ev 4) 4.4ev

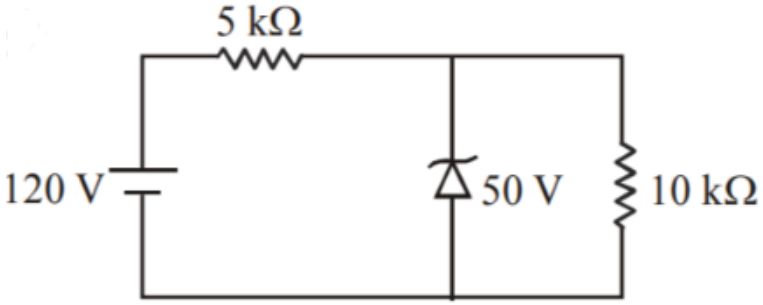
34. Hydrogen atom is in its nth energy state . If de Broglie wavelength of the electron is λ, then

1) $\lambda\alpha\frac{1}{n^2}$ 2) $\lambda\alpha\frac{1}{n}$ 3) $\lambda\alpha n^2$ **4) $\lambda\alpha n$**

35. If 13.6ev energy is required to ionise a hydrogen atom, then the required energy to remove an electron from $n=2$ is

1) 10.2ev 2) 0ev **3) 3.4ev** 4) 6.8ev

36. For the circuit shown below,the current through the zener diode is



1)9mA 2) 5mA 3) zero 4) 14mA

37. In uranium radioactive series, intial nucleus $235_{U_{92}}$ decays to final nucleus $206_{U_{82}}$. In this process the number of α-practicles and β-practicles emitted are

1) 8 and 3 2) 16 and 6 3) 16 and 3 **4) 8 and 6**

38.

List-I	List II
A. Infrared waves	P. To treat muscular
B. Radio waves	Q. for broad casting
C. X-rays	R. To detect fracture of bones
D. Ultraviolet	S. absorbed by the ozone layer of the atmosphere

Match List I with List II and select the correct opting from the choices

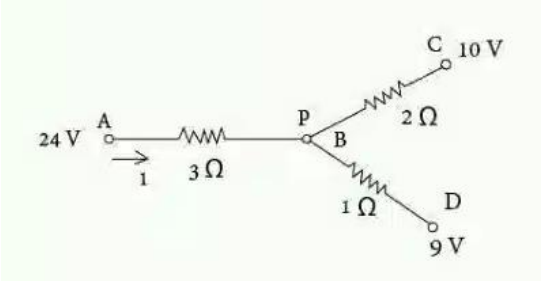
1) $A-S, B-R, C-Q, D-P$ 2) $A-P, B-Q, C-S, D-R$

3) $A-P, B-Q, C-R, D-S$ 4) $A-S, B-Q, C-R, D-P$

39. A 100 V carrier wave is made to vary between 160 V and 40V by a modulating signal. What is the modulation index?

1) 0.4 2) 0.5 **3) 0.6** 4) 0.3

40. In the circuit shown in the figure, the current 'I' is



1) 4A 2) 2A 3) 6A 4) 7A

41. The S.I unit of length is meter suppose we adopt a new unit of length which equals x meter then the area of $1m^2$ expressed in terms of new unit has a magnitude

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

42. A ball is dropped from a bridge that is 45m above the water. It falls directly into a boat which is moving with constant velocity. The boat is 12m away form the point of impact when the ball is dropped the speed of the boat is (take $g=10m/s^2$)

1) $2\,m/s$ 2) $3\ m/s$ **3) $4\,m/s$** 4) $5\,m/s$

43. A body is projected vertically up wards at time $t=0$ and is sum at a height 'H' at time t_1 and t_2 second during its to flight. The maximum height attained by it is (g = acceleration due to gravity)

1) $\frac{g(t_2-t_1)^2}{8}$ 2) $\frac{g(t_1+t_2)^2}{4}$ **3) $\frac{g(t_1+t_2)^2}{8}$** 4) $\frac{g(t_2-t_1)^2}{4}$

44. For a body in uniform circular motion, the

1) velocity is constant 2) acceleration is constant

3) angular velocity is constant 4) displacement is constant

45. Two rectangular blocks of masses 40kg and 60 kg are connected by string and kept on a friction less horizontal table. If a force of 1000N is applied on 60 kg block away from 40 kg. then the tension in string is

1) 450 N **2) 400 N** 3) 350 N 4) 500 N

46. A bullet loses 25% of its initial kinetic energy after penetrating through a distance of 2 cm in a target. The further distance it travels before coming to rest is

1) 1 cm 2) 2 cm 3) 8/3 cm **4) 6 cm**

47. A man carries a load of mass 50 kg to a height of 40 m in 25 sec. if the power of the man is 1568 ω. Then mass of the man is

1) 20 kg **2) 50 kg** 3) 100 kg 4) 75 kg

48. If 484 J of energy is spent in increasing the speed of a wheel from 60 rpm to 360 rpm. Then M. I of the wheel is

1) 1.6 kg m^2 2) 0.3 kg m^2 **3) 0.7 kg m^2** 4) 1.2 kg m^2

49. A ring and a disc of same d mass roil without slipping along a horizontal surface with same velocity. If the K.E of ring is 8J, then that of disc is

1) 2J 2) 4J **3) 6J** 4) 16J

50. A body of mass 1 kg is executing S.H.M its displacement y(incm) at time t given by $y = \left[6\sin\left(100t + \frac{\pi}{4}\right)\right]$ cm its maximum kinetic energy is

1) 1.8 J **2) 18 J** 3) 180 J 4) 0.18 J

51. If a spring of force constant K is cut into 3 equal parts then the force constant of each part will be

1) $\frac{x}{3}$ 2) K **3) $3K$** 4) $6K$

52. Two planets, A and B orbit around a star such that time period of A is 8 times the time period of B. the ratio of orbital velocities of the planets A and B is

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

53. Two point bodies of masses m and $3m$ are separated by distance d. The distance of point from m where the gravitational field intensity becomes zero is

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

54. The length of a metal wire is l_1 under tension T_1 and l_2 under tension T_2. The natural length of the wire is

1) $\frac{T_2}{T_1}(l_1 + l_2)$ **2) $\frac{l_1T_2 - l_2T_1}{T_2 - T_1}$** 3) $\frac{T_1l_1 - l_2T_2}{l_1 + l_2}$ 4) $\frac{l_1T_2 - l_2T_1}{l_2 - l_1}$

55. Which of the following works on Pascal's laws ?

1) Aneroid Barometer **2) Hydranlic lift**
3) Sprayer 4) Venturi meter

56. A soap bubble of initial radius R is to be blown up. The surface tension of the soap film is T. the surface energy needed to double the diameter of the bubble is

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

57. For perfect black body, the absorption coefficient is

1) $a=1$ 2) $a<1$ 3) $a>1$ 4) $a=0$

58. $10g$ of steam at 100^0C is mixed with $50g$ of ice at 0^0C then final temperature is

1) 20^0C 2) 50^0C **3) 40^0C** 4) 100^0C

59. A car not engine operating between temperature 600k and 300k absorbs 800J of heat from the source. The mechanical work done per cycle is

1) 400 J 2) 650 J 3) 750 J 4) 600 J

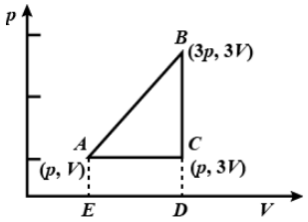
60. The ratio of the specific heats $\frac{C_p}{C_v}=\gamma$ in terms of degree of freedom (n) is given by

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

61. The average kinetic energy of H_2 molecule at 300K is E. At the same temperature the average kinetic energy of O_2 molecules is

1)E 2) $\frac{E}{4}$ 3) $\frac{E}{16}$ 4) $16E$

62. An ideal gas is taken around ABCA as shown in the below diagram. The work during a cycle is



1) $2pv$ **2) pv** 3) $\frac{1}{2pv}$ 4) zero

63. A transverse wave represented by the equation $y=2\sin(30t-40x)$ and the measurements of distances are in meters, then the velocity of propagation is

1) $15ms^{-1}$ **2) $0.75ms^{-1}$** 3) $3.75ms^{-1}$ 4) $300ms^{-1}$

64. A ray is incident from a medium of refractive index 2 into a medium of refractive index 1. The critical angle is

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

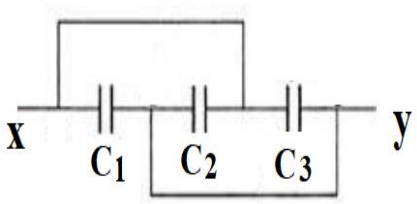
65. In young's double slit experiment of what order does the wave length of red light $(\lambda = 780nm)$ coincide with $(m+1)^{th}$ order of blue light $(\lambda = 520nm)$

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

66. Three charges $4q$, Q and q are placed at positions $0, \frac{l}{2}$ and l respectively along a straight line, if the resultant force on q is zero, then Q is equal to

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

67. The equivalent capacitance of combination shown in the fig. if $C_1 = 2\mu F$, $C_2 = 4\mu F, C_3 = 6\mu F$ is



1) $12\mu F$ 2) $4\mu F$ 3) $6\mu F$ 4) $\frac{12}{11}\mu F$

68. Am electrostatic point sprayer has a metal sphere of diameter 18 cm and at a potential of 25kv. The charge on the metal sphere is

1) 0.25 μc 2) 2.5 μc 3) 0.5 μc 4) 25 μc

69. A cell of emf 1.8v gives a current of 17A when directly connected to an ammeter of resistance 0.06Ω. Internal resistance of the cell is

1) 0.046 Ω 2) 0.066 Ω 3) 0.10 Ω 4) 10 Ω

70. Magnetic induction at the centre of circular coil is given by

1) $\frac{\mu_0 NI}{2r}$ 2) $\frac{\mu_0 NIr^2}{\left(r^2+x^2\right)^{\frac{3}{2}}}$ 3) $\frac{\mu_0 NI}{2r^2}$ 4) $\frac{\mu_0 NI}{r}$

71. A long current carrying wire produces a magnetic field of 1 T at a distance of r. the magnetic field $a)\frac{r}{2}$ $b)2r$ and c) 3r is

	a	b	c
1)	$2T$	$\frac{1}{2}T$	$\frac{1}{3}T$
2)	$3T$	$\frac{1}{3}T$	$\frac{1}{6}T$

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

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

72. The law which states that a variation in an electric field causes magnetic field is

1) Faraday's Law 2) Bio- savarat's Law

3) Modified ampere's Law 4) Lenz's Law

73. the magnetic flux of 500 μ wb perturn passing through a 200 turns cool is reversed in 20×10^{-3} seconds. The average emf induced in the coil in volt is

1) 2.5 2) 5.0 3) 7.5 **4) 10.0**

74. Match the following List- I with List – II

	List – I		List – II
A)	$\oint EdA$	I)	0
B)	$\oint BdA$	II)	$-\frac{d\phi B}{dt}$
C)	$\oint Edl$	III)	$\frac{Q}{\in_0}$
D)	$\oint Ddl$	IV)	$m_0\left(i_c+i_d\right)$

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

75. A 200v main supply is connected to a resistance of $100\,k\Omega$ the rms current is

1) 22 mA **2) 2.2 mA** 3) 220 mA 4) 10 mA

76. The ratio longest wavelength lines in the Balmer and paschem series of hydrogen spectrum is

1) $\frac{5}{36}$ **2) $\frac{7}{20}$** 3) $\frac{7}{144}$ 4) $\frac{5}{27}$

77. Light of wave length 5000 A^0 falls on a sensitive plate with photo electric work function 1.9 ev. The kinetic energy of the photo electrons emitted will be

1) 0.58ev 2) 2.48ev 3) 1.24ev 4) 1.16 ev

78. The half life of $^{209}_{84}Po$ is 103 years. The time its. Taken for 100g sample of $^{209}_{84}Po$ to decay to 3.125g is

1) 3296 years 2) $103\sqrt{2}$ years 3) 1648 years **4) 515 years**

79. In a junction transistor, the collectors current is changed by 8.9mA. if the emitter current is changed to 9.0 mA. The value of current amplification factor β is

1) 89 2) 92 3) 84 4) 96

80. A TV tower has a height 160m. its coverage range is nearly (Earth's radius $R_e = 6400km$)

1) 45255m 2) 55265m 3) 452.55km 4) 552.65m

81. A physical quantity P is related to four observables $a, b, c \text{ and } d$ as $P = \frac{\sqrt{ab}d^{\alpha}}{\sqrt{c}}(\alpha \text{ is cons tan } t)$. The Percentage errors in $a, b, c \text{ and } d$ are 0.5% in each. If the percentage error in P is 2%, then α is

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

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

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

83. A stone falls freely such that the distance covered by it in the last second of its motion is equal to the Distance covered by it in the first 5 s. It is in air for ------s

1)12 **2) 13** 3) 25 4) 26

84. The equation for the trajectory of a projectile is $y = \left(\frac{x}{\sqrt{3}} - \frac{x^2}{60}\right)m$. The velocity of projection of the projectile is (Acceleration due to gravity $= 10\ ms^{-2}$)

1) $8\ ms^{-1}$ 2) $40\ ms^{-1}$ 3) $16\ ms^{-1}$ **4)** $20\ ms^{-1}$

85. Two masses m_1 *and* m_2 are placed on a smooth horizontal surface and are connected by a string of negligible mass. A horizontal force F is applied on the mass m_2 as shown in the figure. The tension in the string is

1) $\left(\frac{m_1}{m_1 + m_2}\right)F$ 2) $\frac{m_2 F}{m_1 + m_2}$ 3) $\left(\frac{m_1}{m_2}\right)F$ 4) $\frac{m_2}{m_1}F$

86. A uniform chain has a mass m and length l. It is held on a frictionless table with one-sixth of its length hanging over the edge. The work done in just pulling the hanging part back on the table is

1) $\frac{mgl}{72}$ 2) $\frac{mgl}{36}$ 3) $\frac{mgl}{12}$ 4) $\frac{mgl}{6}$

87. The sum of moments of all the particles in a system about its centre of mass is always

1)minimum 2) Zero 3) maximum 4) infinite

88. The escape speed of an object on the surface of the earth is V. If the object is thrown out with speed 4V from the surface of the earth, the speed of the object far away from the earth is

1)3V 2) $\sqrt{15}\,V$ 3) 2.5V 4) $\sqrt{8}\,V$

89. If a pressure of $8\times10^{8}\,Nm^{-2}$ is applied to a lead block, so that its volume reduces by 20%. The bulk modulus of lead block is

1) $4\times10^{7}\,Nm^{-2}$ 2) $4\times10^{8}\,Nm^{-2}$ 3) $4\times10^{9}\,Nm^{-2}$ 4) $4\times10^{10}\,Nm^{-2}$

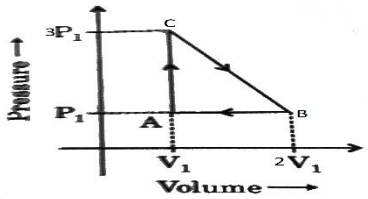
90. A rain drop of radius r is falling through air, starting from rest. The work done by all the forces on the drop, when it attains terminal velocity, is proportional to

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

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

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

92. The net work done by an ideal gas going through the cycle as shown in the P-V diagram below is



1)0 2) P_1V_1 3) $\frac{3}{2}P_1V_1$ 4) $\frac{1}{2}P_1V_1$

93. The relation between efficiency η of a heat engine and the coefficient of performance α of a refrigerator is

1) $\eta=\frac{1}{1+\alpha}$ 2) $\eta=\frac{1}{1-\alpha}$ 3) $\eta=1+\alpha$ 4) $\eta=1-\alpha$

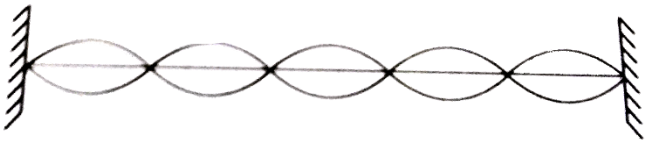
94. At what temperature an oxygen molecule has the same r.m.s velocity as the hydrogen molecule has at 20K?

1)160K **2)320K** 3) 293K 4) 347K

95. A simple pendulum of length 1m is freely suspended from the ceiling of an elevator. The time period of small oscillations as the elevator moves up with an acceleration of $2\ m/s^2$ *is* (*use* $g = 10 m/s^2$)

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

96. A string fixed at both ends vibrate in 5 loops as shown in the figure. The total number of nodes and anti nodes respectively are



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

97. An electric dipole with dipole moment P is placed with its axis at 30^0 to a uniform electric field. The work done in rotating the dipole to a position where its axis is perpendicular to the field is

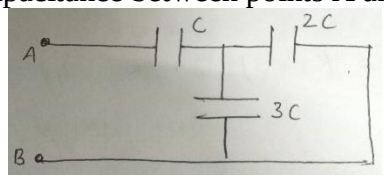
1)2PE 2) $\frac{2PE}{\sqrt{3}}$ **3)** $\frac{\sqrt{3}PE}{2}$ 4) 0

98. If a unit positive charge is taken from one point to another an equipotential surface, then

1)Work is done on the charge 2)Work is done by the charge

3)Work done is constant **4)no work is done**

99. The equivalent capacitance between points A and B is

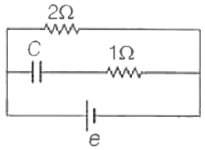


1)5/6 C 2) 6 C 3)11/5 C 4) 5/11 C

100. In a potentiometer experiment the balancing length with a cell is 560cm. 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 the cell

1) 1Ω 2) 2Ω **3)** 1.2Ω 4) 2.1Ω

101. In steady state, a capacitor of capacitance $2\mu F$ is charged to $4\mu C$, as shown in figure. If the internal resistance of the cell is 0.5Ω,then the emf of the cell is



1)4V 2) 5V **3) 2.5V** 4) 2V

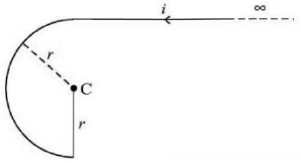
102. **Assertion(A):**When a wire of aluminium and another wire of silicon are heated from room temperature to $80^0 c$,then conductivity of aluminium increases and that of silicon decreases **Reason (R):**Aluminium has positive temperature coefficient of resistivity and silicon has negative temperature coefficient of resistivity

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

103. 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) $\frac{mq}{B}$

104. The magnetic field at the centre C of the arrangement shown in figure is



1) $\frac{\mu_0 i}{2\pi r}(1+\pi)$ **2)** $\frac{\mu_0 i}{4\pi r}(1+\pi)$ 3) $\frac{\mu_0 i}{\pi r}(1+\pi)$ 4) $\frac{\mu_0 i}{r}(1+\pi)$

105. A steel wire of length l and magnetic moment M is bent into a semi-circular arc of radius R. The new magnetic moment is

1)M 2) $\frac{2RM}{\pi l}$ **3)** $\frac{2M}{\pi}$ 4) $\frac{2\pi RM}{l}$

106. If relative permeability of iron is 5500,then its susceptibility is

1) 5500×10^{7} 2) 5500×10^{-7} 3) 5501 **4) 5499**

107. The magnitude of induced emf is directly proportional to the rate of change of magnetic flux linked with the coil. This statement is known as

1)Ohm's law 2)Lenz's law **3)Faraday's law** 4)Ampere's law

108. The impedance temperature of an L R circuit with $L = \frac{60}{\pi} mH, R = 8\Omega$ and frequency 50Hz is

1) 1.3Ω 2) 14.3Ω 3) 20Ω **4) 10Ω**

109. If the average power per unit area delivered by an electromagnetic wave is $9240 Wm^{-2}$,then the amplitude of the oscillating magnetic field in EM wave is

1) $4.4\mu T$ 2) $6.6\mu T$ **3) $8.8\mu T$** 4) $10.2\mu T$

110. What is the refractive index of the material of a double convex lens having radii of curvature of 5cm and 10cm and focal length of 20/3 cm

1)1.5 2) 2.0 3) 2.4 4) 2.6

111. A light ray travels from a medium with refractive index n_1 to another medium of refractive index n_2. If $n_1 = 2 \; and \; n_2 = \sqrt{3}$,then find the critical angle

1) 15^0 2) 30^0 3) 45^0 **4) 60^0**

112. The shape of wave front of light diverging from point source

1)Spherical 2) planar 3) cylindrical 4) Circular

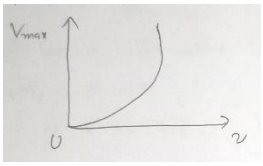
113. On using red light $(\lambda = 6600A^0)$ in young's double slit experiment, 60 fringes are observed in the field of view. If violet light $(\lambda = 4400A^0)$ is used, the number of fringes observed will be

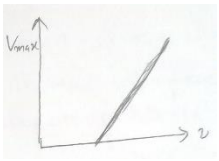
1)30 2)120 3) 60 **4)90**

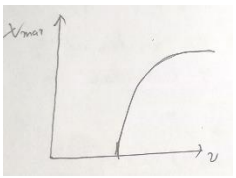
114. A particle of charge q, mass m and energy E has de-Broglie wavelength λ , for a particle of charge 2q, mass 2m and energy 2E, the de-Broglie wavelength is

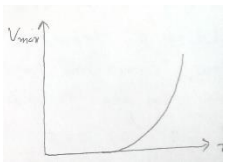
1) $\frac{\lambda}{4}$ 2) 2λ 3) 8λ **4) $\frac{\lambda}{2}$**

115. The graph between the maximum speed (V_{max})of a photoelectron and frequency of the incident radiation, in photoelectric effect is correctly represented by

1) 

2) 

3). 

4) 

116. The ratio of maximum to minimum wavelength in Balmer series of an hydrogenic atom is

1)9/5 2) 12/7 3) 9/7 4) 14/7

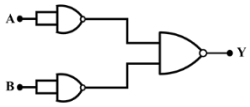
117. In the nuclear reaction, ${}^{11}_{6}c \rightarrow {}^{11}_{5}B + \beta + X$, X stands for

1)a neutron 2) an electron **3)a neutrino** 4)an anti –neutrino

118. In a junction transistor, the collector current changes by 6.8mA, if the emitter current is changed by 7mA, for such transistor, the current amplification factor is

1)30 **2) 34** 3)40 4)45

119. Identify the logic operation performed by the following circuit



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

120. The maximum amplitude of an amplitude modulated wave is 16V, while the minimum amplitude is 4V. The modulation index is

1)0.4 2) 0.5 **3) 0.6** 4) 4

121. If the velocity (v) of a body in time 't' is given by $C = AT^3 + BT^2 + CT + D$ then the dimensions of C are

1) $\left[LT^{-1}\right]$ **2)** $\left[LT^{-2}\right]$ 3) $\left[LT^{-3}\right]$ 4) $\left[LT^{-4}\right]$

122. A boy standing at the top of a tower of 20m height drops a stone. The velocity with which it hits the ground is $\left(g = 10ms^{-2}\right)$

1) $20ms^{-1}$ 2) $40ms^{-1}$ 3) $5ms^{-1}$ 4) $10ms^{-1}$

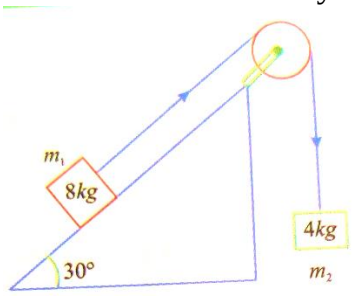
123. If $\vec{A} = 5\hat{i} - 2\hat{j} + 3\hat{k}$ and $\vec{B} = 2\hat{i} + \hat{j} + 2\hat{k}$, the component of $\vec{B}$ along $\vec{A}$ is

1) $\frac{\sqrt{14}}{38}$ 2) $\frac{28}{\sqrt{38}}$ 3) $\frac{\sqrt{28}}{38}$ **4)** $\frac{14}{\sqrt{38}}$

124. Rain drops are falling vertically downward with a velocity 4 kmph. The velocity with which they appear to fall down to a man travelling at 2 kmph horizontally is

1) $\sqrt{12}kmph$ **2)** $2\sqrt{5}\,kmph$ 3) $5\,kmph$ 4) $2\,kmph$

125. Two masses of 8 kg and 4 kg are connected by a string as shown in figure over a frictionless pulley. The acceleration of the system is



1) $4m/s^2$ 2) $2m/s^2$ **3) zero** 4) $9.8m/s^2$

126. A box of mass 4kg is placed on a rough inclined plane of inclination 60^0. Its downward motion can be prevented by applying an upward pull is F and it can be made to slide upwards by applying a force 3F. The coefficient of friction between the box and inclined plane is

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

127. A spring of spring constant $5\times10^3 N/m$ is stretched initially by 5cm from the unstitched position. Then the work required to stretch it further by another 5cm is (in Nm)

1) 6.25 2) 12.50 **3) 18.75** 4) 25

128. A simple pendulum is oscillating with an angular amplitude 90^0. If the direction of resultant acceleration of the bob is horizontal at a point where angle made by the string with vertical is

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

129. The angular displacement of a particle is given by $\theta = t^3 + 2t + 1$, where t is time in seconds. Its angular acceleration at $t = 2s$ is

1) $14\,rad\,s^{-2}$ 2) $17\,rad\,s^{-2}$ **3) $12\,rad\,s^{-2}$** 4) $9\,rad\,s^{-2}$

130. A uniform circular disc of radius R is rotating about its own axis with moment of inertia I at angular velocity ω if a denser particle of mass m is gently attached to the rim of disc than its angular velocity is

1) ω 2) $I\omega(I+mR)$ 3) $\frac{I+mR^2}{I\omega}$ **4) $\frac{I\omega}{I+mR^2}$**

131. A particle SHM has a maximum speed of $30\,cm/s$ and a maximum acceleration of $60\,cm/s^2$. The period of oscillation is

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

132. If the escape velocity on the earth is $11.2km/s$, its value for a planet having double the radius and 8 times the mass of the earth is.. (in km/s)

1) 11.2 **2) 22.4** 3) 5.6 4) 8

133. A copper wire and an aluminum wire has lengths in the ratio 3:2, diameter in the ratio 2:3 and force applied in the ratio 4:5. Then the ratio of the increase in length of the two wires is $\left(Y_{Al}=7\times10^{10}\,N/m^2, Y_{Cu}=11\times10^{10}\,N/m^2\right)$

1) 110:89 2) 180:110 **3) 189:110** 4) 80:11

134. The excess pressure inside a small air bubble of radius 0.05mm in water of surface tension 70 dyne cm^{-1} (in pascal)

1) 28.2 2) 2.8×10^2 **3) 2800** 4) 280

135. The coefficient of real expansion of a liquid is $7\times10^{-4}/^0C$. The coefficient of linear expansion of the vessel is $1\times10^{-5}/^0C$. The coefficient of apparent expansion of the liquid is

1) $82\times10^{-5}/^0C$ 2) $56\times10^{-5}/^0C$ **3) $67\times10^{-5}/^0C$** 4) $73\times10^{-5}/^0C$

136. Heat of 20 Kcal is supplied to the system and 8400 J of external work is done on the system so that its volume decreases at constant pressure. The change in internal energy is $\left(J=4200J/kcal\right)$

1) $9.24\times10^4\,J$ 2) $7.56\times10^4\,J$ 3) $8.4\times10^4\,J$ 4) $10.5\times10^4\,J$

137. The change in internal energy in joule when 20gm of gas is heated from 20^0C to 30^0C is $\left(c_v=0.18kcal/kg\,K; J=4200J/kcal\right)$

1) 72.8J **2) 151.2J** 3) 302.J 4) 450J

138. A Carnot's engine working between 27^0C and 127^0C takes up 800J of heat from the reservoir in one cycle. The work done by the engine is

1) 100 J **2) 200 J** 3) 300 J 4) 400 J

139. Four molecules of a gas are having speed 1m/sec , 4m/sec, 8m/sec and 16m/sec. The rms velocity of gas molecules is (inm/s)

1) 7.25 2) 52.56 3) 84.25 **4) 9.2**

140. A mass m attached to a spring oscillates with a period of 2s. if the mass increased by 2kg, the period increases by 1s, the initial mass m assuming that Hooke's law is obeyed is

1) 1.6 kg 2) 2.6 kg 3) 1 kg 4) 2kg

141. A standing wave set up in a medium is $y = 4\cos\left(\frac{\pi x}{3}\right)\sin 40\pi t$ where x,y are in cm and t in sec The velocity of medium particle at $x = 6cm$ at $t = 1/8$ sec is

1) $40\pi\ cm/s$ 2) $80\pi\ cm/s$ 3) $120\pi\ cm/s$ **4) $-160\pi\ cm/s$**

142. The refractive indices of glass and water are $\frac{3}{2}$ and $\frac{4}{3}$ respectively. The refractive index of glass with respect to water is

1) 2 2) $\frac{8}{9}$ **3) $\frac{9}{8}$** 4) $\frac{5}{3}$

143. In young's double slit experiment, the 10^{th} maximum of wave length λ_1 is at a distance of y_1 from the central maximum. When the wavelength of the source is changed to λ_2 .5^{th} maximum is at a distance of y_2 from its central maximum. Then $\frac{y_1}{y_2}$ is

1) $\frac{2\lambda_1}{\lambda_2}$ 2) $\frac{2\lambda_2}{\lambda_1}$ 3) $\frac{\lambda_1}{2\lambda_2}$ 4) $\frac{\lambda_2}{2\lambda_1}$

144. An infinite number if charges each of magnitude q are placed on x-axis at distances of 1,2,4,8,… meter from the origin. The intensity of the electric field at origin is

1) $\frac{q}{3\pi\varepsilon_0}$ 2) $\frac{q}{6\pi\varepsilon_0}$ 3) $\frac{q}{2\pi\varepsilon_0}$ 4) $\frac{q}{4\pi\varepsilon_0}$

145. n Capacitors of 2μ F each are connected in series a p.d of 200v is applied to the combination. The total charge on them was $1\mu C$ then n is equal to

1) 400 2) 300 3) 250 4) 25

146. A charge of 20 μC flows across a section of a conductor in 4 milli second. Calculate the current?

1) $2\mu A$ 2) $5\mu A$ 3) $3\mu A$ **4) $5\mu A$**

147. A Cell of emf 2v and internal resistance 1Ω is connected to an external resistance of 6Ω. Find current in the circuit and terminal potential difference across the cell?

1) 3A, 5V 2) $\frac{1}{2}A, \frac{1}{3}V$ **3) $\frac{1}{3}A, \frac{5}{3}V$** 4) $\frac{5}{3}A, \frac{1}{2}V$

148. Two long straight conductors carry currents 4 A and 2 A into the plane of paper. A circular path is imagined to be enclosing these currents. The value of $\int \overline{B}.\overline{dl}$ is

1) $6\mu_0$ 2) $7\mu_0$ 3) $5\mu_0$ 4) $2\mu_0$

149. A proton moving with a velocity of $2\times10^6 ms^{-1}$ describes a circle of radius R in a magnetic field. The speed of an $\alpha-$particle to describe a circle of same radius in the same magnetic field is

1) $1\times10^6 m/s$ 2) $2\times10^6 m/s$ 3) $4\times10^6 m/s$ 4) $8\times10^6 m/s$

150. A long thin magnet of moment M is bent into a semi circle. The decrease in the magnetic moment is

1) $2M/\pi$ 2) $\pi M/2$ **3) $M(\pi-2)/\pi$** 4) $M(2-\pi)/2$

151. The current decays from 5A to 2 A in 0.01s in a coil. The emf induced in a coil nearby it is 30V. the mutual inductance between the coils is

1) 1.0 H **2) 0.1 H** 3) 0.001 H 4) 10 H

152. The voltage of A.C. source varies with time according equation. $V=120\sin100\pi t\cos100\pi t$. Then the frequency of source is

1) 50Hz **2) 100Hz** 3) 150Hz 4) 200Hz

153. The de Broglie wavelength of an electron having 80 eV of energy is nearly ($1eV=1.6x10^{-19}J$, Mass of electron $=9\times10^{-31}kg$, Planck's constant $=6.6\times10^{-34}Js$) (nearly)

1) $140A^0$ 2) $0.14A^0$ 3) $14A^0$ **4) $1.4A^0$**

154. The energy necessary to remove the electron from n=10 state in hydrogen atom will be

1) 1.36 eV 2) 0.0136 eV 3) 13.6 eV **4) 0.136 eV**

155. If a full wave rectifier circuit is operating from 50Hz mains, the fundamental frequency in the ripple will be

1) 25 Hz 2) 50 Hz 3) 70.7 Hz **4) 100 Hz**

156. In the Boolean algebra, which gate is expressed as $Y = \overline{A+B}$

1) OR 2) NAND 3) AND **4) NOR**

157. How long can an electric lamp of 100w be kept glowing by fusion of 2kg of deuterium? Take the fusion reaction as.

$_1H^2 + {}_1H^2 \rightarrow {}_2^3He + n + 3.27MeV$

1) 6×10^4 years **2) 5×10^4 years** 3) 4×10^4 years 4) 3×10^4 years

158. An LC circuit contains inductance $L = 1\mu H$ and capacitance $C = 0.01\mu H$. The wavelength of electromagnetic wave generated is nearly

1) 0.5 m 2) 5 m **3) 188 m** 4) 30 m

159. In short wave communication waves of which of the following frequencies will be reflected back by the ionosphere layer, having electron density $10^{12}\ per\ m^3$

1) 2 MHz **2) 9 MHz** 3) 12 MHz 4) 18 MHz

160. When tuning forks, A and B are sounded together 5 beats per second are heard frequency of A is 250 Hz. On loading A is 250 Hz. On loading A with wax 2 beats per second are produced with B. The frequency of B is

1) 255 Hz 2) 320 Hz **3) 245 Hz** 4) 420 Hz

K.S.R.M. COLLEGE OF ENGINEERING

(UGC-AUTONOMOUS)

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KGCET 2K23 CHEMISTRY QUESTION PAPER KEY

Note: Correct Answers Are Highlighted and OPTION marked in **RED** color, Total 160 questions from 4 sets (40 questions from each set).

1. The radius of hydrogen atom in the ground state is $0.53A^0$,the radius of Li^{2+} in the similar state is

   1) $1.06\,A^0$ 2) $0.265\,A^0$ **3) $0.176\,A^0$** 4) $0.53\,A^0$

2. $K^+, Cl^-, Ca^{2+}, S^{2-}$ ions are isoelectronic. The decreasing order of their size is

   1) $S^{2-} > Cl^- > K^+ > Ca^{2+}$ 2) $Ca^{2+} > K^+ > Cl^- > S^{2-}$

   3) $K^+ > Cl^- > Ca^{2+} > S^{2-}$ 4) $Cl^- > S^{2-} > Ca^{2+} > K^+$

3. The correct order of electron affinity of the elements of oxygen family in the periodic table is

   1) $O > S > Se$ 2) $S > O > Se$ **3) $S > Se > O$** 4) $Se > O > S$

4. In which of the following species the hybrid state of the central atom is same?

   1) SO_2, SO_3 2) SO_3, SO_4^{2-} 3) SO_2, SO_3^{2-} 4) $CH_4, HCOOH$

5. Which of the following would have permanent dipole moments?

   1) SF_4 2) XeF_4 3) SiF_4 4) BF_3

6. In the formation of N_2^{1+} the electron is lost from

   1) $a\sigma - orbitals$ 2) $a\pi - orbitals$ 3) $a\overset{*}{\sigma} - orbitals$ 4) $a\overset{*}{\pi} - orbitals$

7. In the reaction $MnO_4^{1-} + SO_3 + H^+ \rightarrow Mn^{2+} + SO^{2-}{}_4$ the number of H^+ ions involved is

   1)2 **2) 6** 3) 8 4) 16

8. An alkaloid contains 17.28% of nitrogen and its molecular mass is 162. The number of nitrogen atoms present in one molecule of the alkaloid is

   1)Five 2)Four 3) three **4) two**

9. Which in incorrect about greenhouse effect?

1)It is due to high concentration of CO_2 in atmosphere

2) It is influenced by gases like CH_4, O_3 *and* $CFC's$

3)It results in lowering of the level of oceans

4) It results in warming up of the earth.

10. In vanderwaal's equation of state of the gas law the constant 'b' is measure of

1)Intermolecular repulsions 2)Intermolecular collisions per unit volumes

3)Volume occupied by the molecules 4)Intermolecular attraction

11. The molar heat capacity of water at constant pressure' is $75JK^{-1}mol^{-1}$,when 1.0KJ of heats is supplied to 100gm of water which is free to expand the increase in temperature of water is

1)1.2K **2) 2.4K** 3) 4.8K 4) 6.6K

12. At low temperature, NO_2 a reddish brown gas gets associated to form the colourless N_2O_4 as in the reaction $2NO_{2(g)}$ $N_2O_{4(g)}$.Then at equilibrium

1)There would be an increase in colour intensity

2) The mixture would become colourless

3) There would be a decrease in colour intensity

4) There would be no change in colour intensity

13. K_a for HCN in 5×10^{-10} *at* 25^0C for maintaining a constant P^H of 9, the volume of 5MKCN solution required to be added to 10ml of 2MHCN solution is?

1)4ml 2) 8ml **3) 2ml** 4) 10ml

14. The volume strength of 1.5N H_2O_2 is

1) 4.8V **2) 8.4V** 3) 3.9V 4) 8.0V

15. Lithium and Sodium are heated in dry air. Which of the following compounds will be formed?

1) $Li_2O, Li_3N, Na_2O, Na_2O_2$

2) $Li_2O, Li_3N, Na_2O, NH_3$

3) Li_2O, Na_2O

4) $Li_2O, Na_2O, NaOH$

16. $Be_2C + H_2O \rightarrow BeO + X, CaC_2 + H_2O \rightarrow Ca(OH)_2 + Y, Mg_2C_3 + H_2O \rightarrow Mg(OH)_2 + Z$,x,y,z are respectively?

1) CH_4, C_2H_2, C_3H_8

2) CH_4, C_2H_6, C_3H_8

3) CH_4, C_2H_2, C_3H_4

4) C_2H_2, C_2H_6, C_3H_4

17. When orthoboric acid is heated strongly the residue left is

1) Boron 2)Metaboric acid **3) boric anhydride** 4) borax

18. A reducing agent in

1) SnO 2) SnO_2 **3) $SnCl_2$** 4) $SnCl_4$

19. In the estimation of nitrogen by Duma's method 1.18 gms of an organic compound gave 224ml of N_2 at STP. The percentage of nitrogen in the compound is

1)20.0 2) 11.8 3) 47.5 **4) 23.7**

20. Which compound given below has Sp^3, Sp^2 *and* Sp orbitals in the ratio of 6:3:2

1) $CH_3-CH=CH-CH_2-C\equiv C-CH_3$ 2) $CH_3-CH=CH-CH_2-C\equiv CH$

3) $CH_3-CH_2-C\equiv C-CH\equiv CH_2$ 4) $CH_3-CH=CH-C\equiv CH$

21. The number of primary, secondary and tertiary amines possible with the molecular formula C_3H_9N respectively

1)1,2,2 2) 1,2,1 **3) 2,1,1** 4) 3,0,1

22. $CaC_2 \xrightarrow{H_2O} A \xrightarrow[Cu\ tube]{500^0 C} B \xrightarrow[AlCl_3]{CH_3Cl} C; C\ is$

1) Chlorobenzene **2) Toluene** 3)Acetophenone 4)hexa chlorocyclohexane

23. Henry's constant for CO_2 in water is 1.67×10^8 pascals calculate the weight of CO_2 in 500ml of water, when packed under 2.533×10^5 Pascal CO_2 pressure at 298K?

1)1.848gm 2)2.564gm 3)1.23gm 4)3.5gm

24. Vant Hoff factor of Hg_2Cl_2 in its aqueous solution will be, Hg_2Cl_2 is 80% arised

1)3.4 2) 1.8 3) 1.0 **4) 2.6**

25. A solid has a structure in which 'W' atoms are located at the cormers of the cubic lattice 'O' atoms at the centre of the edges and 'Na' atom at the centre of the cube. The formula of the compound is

1) $NaWO_2$ 2) Na_2WO_3 **3) $NaWO_3$** 4) $NaWO_4$

26. $E^0_{Zn^{2+}/Zn}$ is -0.76 volts, the emf of the following cell is $Zn/\underset{(1M)}{Zn^{2+}}//\underset{P^H=2}{HCl}/\underset{(latus)}{H_2}-Pt$

1)0.64volts 2)0.70volts 3) 0.76 volts 4) 1.52 volts

27. If a current of 1 amp flows through a metal wire for one hour. How many electrons would flow through the wire?

1) 6×10^{23} *electrons* **2) 2.24×10^{21} *electrons*** 3) 1.602×10^{-19} *electrons* 4)None

28. When excess of KI solution is added to $AgNO_3$ solution,the charge present on sol is

1)+Ve **2) –Ve** 3) both 4)Neutral

29. Select correct matching

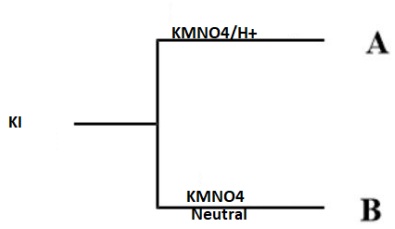
1)Pyrometallurges:Eutraction Fe 2)Electro metallurgy: Extraction of Al

3) Hydro metallurgy: Extraction of Au **4) All are correct**

30. Outer electronic configuration of the elements palladium is

1) $4d^5 5s^1$ 2) $4d^9 5s^2$ 3) $4d^{10} 5s^1$ **4)** $4d^{10} 5s^0$

31.



A and B respectively in the given reaction

1) I_2, IO_3^- 2) IO_3^-, IO_4^- 3) IO_3^-, I_2 4) I_2O_5, IO_3^-

32. Theoritically, the number of geometrical isomers expected for octahedral complex $[Mabcdef]$ is

1)0 **2) 15** 3) 12 4) 30

33. The mixed an hydride of nitrogen is

1)No **2)** NO_2 3) N_2O_3 4) N_2O_5

34. Which of the following arrangements gives the correct order of increasing basic character of the conjugate bases of the oxoacids of chlorine

1) $ClO_3^- < ClO_4^- < ClO_2^- < ClO^-$ 2) $ClO_4^- < ClO_3^- < ClO^- < ClO_2^-$

3) $ClO^- < ClO_2^- < ClO_3^- < ClO_4^-$ **4)** $ClO_4^- < ClO_3^- < ClO_2^- < ClO^-$

35. Which of the following statements is correct about D-glucose and D-Galactose compounds?

1)They are diastereomers 2)both are components of Lactose

3) They are C-4 epimers **4) All are correct**

36. Which of the alkyl halides will under go SN^1 reaction at a fastest rates?

1) $Cl-CH_2-CN$ 2) $Cl-CH_2-NO_2$ **3)** $Cl-CH_2-OMe$ 4) $Cl-CH_2-CH_3$

37. $CaOCl_2 + H_2O \rightarrow Ca(OH)_2 + X$, $X + CH_3CHO \rightarrow Y + Ca(OH)_2 \rightarrow CHCl_3$,what is 'Y'?

1) $CH_3CH(OH_2)$ 2) CH_2Cl_2 **3)** CCl_3CHO 4) CCl_3COCH_3

38. Arrange the compounds in order of decreasing reactivity for Nucleophilic addition reaction.

I) $Cl-CH_2-\overset{\overset{O}{\|}}{C}-H$ II) $H-\overset{\overset{O}{\|}}{C}-H$ III) $CH_3-\overset{\overset{O}{\|}}{C}-CH_3$

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

39. In the reaction $CH_3CN + 2[H] \xrightarrow[ethen]{HCl} X \xrightarrow[H_2O]{Boiling} Y$,the term of 'Y'

1)acetaldehyde 2)ethylamine 3)Acetone 4) dimethyl amines

40. $C_6H_5NO_2 \xrightarrow{Sn-HCl} P \xrightarrow[HCl]{NaNO_2} Q \xrightarrow[CUCN]{KCN} R \xrightarrow{H_3O^+} S$ the term 'S'

1)Benzaldehyde 2) Benzamide **3)Benzoic acid** 4) Benzene

41. The energies of an electron in first orbit of He^+ and in third orbit of Li^{2+} in J are respectively

1) $-8.72\times10^{-18}, -2.18\times10^{-18}$ 2) $-8.72\times10^{-18}, -1.96\times10^{-17}$

3) $-1.96\times10^{-17}, -2.18\times10^{-18}$ 4) $-8.72\times10^{-17}, -1.96\times10^{-17}$

42. A light of frequency $1.6\times10^{16}\,Hz$ when falls on a metal plate emits electrons that have double the kinetic energy compared to the kinetic energy of emitted electrons when frequency of $1.0\times10^{16}\,Hz$ falls on the same plate. The threshold frequency (ν_0) of the metal in Hz is

1) 1×10^{15} **2)** 4×10^{15} 3) 3×10^{15} 4) 4×10^{13}

43. Identify the set of acidic oxides.

1) Na_2O, CaO, BaO 2) ZnO, PbO, BeO

3) CO, NO, N_2O **4)** Mn_2O_7, CrO_3, V_2O_5

44. Which of the following orders are correct against the property given?

I) Dipole moment $NF_3 > NH_3 > BF_3$

II) Covalent bond length $C-O > N-O > O-H$

III) Bond order $C_2 > B_2 > He_2$

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

45. Which among the following are having diamagnetic property?

I) B_2 II) N_2 III) O_2 IV) C_2

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

46. If the kinetic energy of O_2 gas is 4.0 kJ mol^{-1}, its RMS speed in cms^{-1} is

1) 5.0×10^{2} 2) 5.0×10^{3} **3)** 5.0×10^{4} 4) 5.0×10^{-4}

47. One litre of 0.15M Na_2SO_3 aqueous solution is mixed with 500mL of 0.2 M $K_2Cr_2O_7$ aqueous solution in acid medium. What is the number of moles of $K_2Cr_2O_7$ remaining in the solution after the reaction?

1) 0.1 2) 0.0125 3) 0.025 **4) 0.05**

48. The heat required to rise the temperature of 54 g of aluminium from 40^0C to 60^0C in J is (molar heat capacity of aluminium in this temperature range is 24 J $mo1^{-1}$ K^{-1} atomic Wight of Al is 27

1) 480 2) 800 **3) 960** 4) 1280

49. The equilibrium constant at 850 K for the reaction $N_2(g)+O_2(g) \rightleftharpoons 2NO(g)$ is 0.5625. the equilibrium concentration of $NO(g)$ is $3.0\times10^{-3}M$. If the equilibrium concentration of $N_2(g)$ and $O_2(g)$ are equal, the concentrations of $N_2(g)$ in M is

1) 4.0×10^{-3} 2) 4.0×10^{-2} 3) 1.6×10^{-3} 4) 3.0×10^{-3}

50. The solubility product of a sparingly soluble salt A_2B is 3.2×10^{-11}. Its solubility in mol L^{-1} is

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

51. What is the volume (in mL)of 20 vol H_2O_2 required to completely react with 500 mL of 0.02 M acidified $KMnO_4$ solution?

1) 14.0 2) 7.0 3) 28.0 4) 42.0

52. Calcium on heating in N_2 yields an ionic compound A, which reacts with water to give $Ca(OH)_2$ and a gas B. identify A and B

1) CaN_2, NO **2)** $Ca_3N_2,\ NH_3$ 3) CaN_2, NH_3 4) $Ca_3N_2,\ NO$

53. Identify the correct statements from the following

I) Ga_2O_3 is an amphoteric oxide.

II) The dimer of aluminium chloride has three $Al-Cl-Al$ bridge bonds.

III) Boron is very hard refractory solid of high melting temperature.

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

54. Assertion (A) : $[SiF_6]^{2-}$ is formed but $[SiCl_6]^{2-}$ is not

Reason (R): Electronegativity (EN) of F is higher than EN of Cl

1) Both A and R are correct R is the 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 not correct

4) A is not correct but R is correct

55. Which one of the following methods can be used to find out the percentage composition of halogen present in an organic compound?

1) Kieldhal method 2) Duma's method

3) Lassaigne's method **4) Carius method**

56. Identify ortho and para directing groups from the following

$\underset{I}{-CHO}, \quad \underset{II}{-NHCOCH_3}, \quad \underset{III}{-OCH_3}, \quad \underset{IV}{-SO_3H}$

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

57. Which one of the following functional groups is not meta directing?

1) $-COOH$ 2) $-NO_2$ 3) $-CHO$ **4)** $-OCH_3$

58. Wurtz reaction of bromoethane gives n-butane, Sodium salt of X on heating with sodalime also results in $n-$butane, Compound X is

1) $CH_3CH_2CH_2COOH$ **2)** $CH_3(CH_2)_3COOH$

3) $CH_3(CH_2)_4COOH$ 4) CH_3CH_2COOH

59. Match the following

	List- I		**List-II**
A)	Insecticide	I)	COD
B)	$K_2Cr_2O_7$ / 50% H_2SO_4	II)	PAN
C)	Bleaching of clothes and paper	III)	Na_3AsO_3
D)	Eye irritant	IV)	BOD
		V)	H_2O_2

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

60. At $T(K)$ copper (atomic mass = 63.5 u) has fcc unit cell structure with edge length of x A. What is the approximate density of Cu in g cm^{-3} at that temperature?

1) $\frac{42.3}{x^3}$ 2) $\frac{4.23}{x^3}$ **3)** $\frac{423}{x^3}$ 4) $\frac{212}{x^3}$

61. At 300 K an ideal solution is formed by mixing 460g of toluene with 390g benzene. If the vapour pressure of pure toluene and benzene at 300 K are 32 and 40 mm respectively, the mole fraction of toluene in vapour phase is

1) 0.196 2) 0.588 3) 0.294 **4) 0.444**

62. A solution is prepared by dissolving 10 g of non-volatile solute (molar mass , 'M' g mol^{-1}) in 360 g of water. What is the molar mas in g mol^{-1} of solute if the relative lowering of vapour pressure of solution is 5×10^{-3} ?

1) 199 **2) 99.5** 3) 299 4) 149.5

63. If the E^0_{cell} of an equilibrium reaction $A(s)+2B^{2+}(aq)\rightarrow A^{2+}(aq)+2B(s)$ at 298 K is $0.59V$, the equilibrium constant K_c is

1) 1.0×10^{10} 2) 1.0×10^{2} 3) 1.0×10^{-20} **4) 1.0×10^{20}**

64. The half –life period of a first order reaction at 300 K and 400 K are 50s and 10s respectively. The activation energy of the reaction in kJ mol^{-1} is $(\log 5 = 0.70)$

1) 4.0 2) 8.0 **3) 16.10** 4) 20.10

65. Which one of the following statement is not correct?

1) A mixture of dinitrogen and dioxygen at room temperature is an example for aerosol

2) Lyophilic sols are more stable compared to lyophobic sols

3) Formation of micelles is possible only above Kraft temperature

4) An example for a soap is sodium stearate and an example for detergent is sodium lauryl sulphate

66. Identify the metal which is not common to German silver and brass.

1) *Cu* 2) *Zn* **3) *Fe*** 4) *Ni*

67. Which one of the following statements is not correct regarding phosphine?

1) It is a weak base

2) It reacts with $CuSO_4$ solution to form $CuHPO_4$

3) It is formed by the reaction of Ca_3P_2 with HCl

4) It is used in smoke screens

68. Identify the molecules which contains line pair of electrons on the sulphur atom

1) H_2SO_5 2) $H_2S_2O_8$ 3) $H_2S_2O_7$ **4) H_2SO_3**

69. $KMnO_4$ oxidises $S_2O_3^{2-}$ to $S_2O_4^{2-}$ in medium x and NO_2^- to NO_3^- in medium y, x and y are respectively

1) acidic, basic 2) acidic, acidic 3) acidic, neutral **4) neutral , acidic**

70. In lanthanide series, the elements will known to exhibit +4 oxidation state is

1) *Lu* **2) *Ce*** 3) *Pm* 4) *Nd*

71. Crystal field spitting energies for octahedral (Δ_0) and tetrahedral (Δ_1) geometries caused by the same ligands are related through the expression

1) $\Delta_0 = \Delta_t$ **2) $4\Delta_0 = 9\Delta_t$** 3) $9\Delta_0 = \Delta_t$ 4) $\Delta_0 = 2\Delta_t$

72. Assertion(A) : $S_N I$ hydrolysis of optically active 2-bromooctane results in the formation of $(\pm)-$octane -2-ol Reason (R) : The reaction proceeds through a planar carbocation which can be attacked by the nucleophile from either side

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

73. Match the following

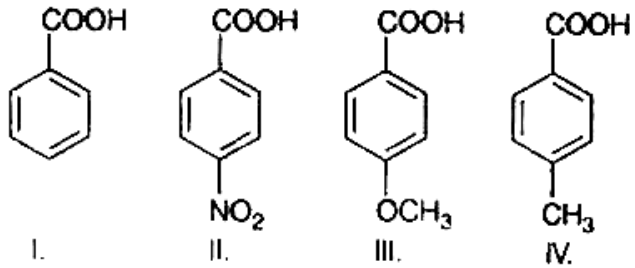
List – I		List – II
A) Lucas reagent	I)	$SnCl_2 + HCl.H_3O^+$
B) Clemmensen reagent	II)	$\left[Ag\left(NH_3\right)_2\right]^+$
C) Tollens' reagent	III)	Anhydrous $ZnCl_2 \mid conc.HCl$
D) Stephen reaction	IV)	Zn-Hg|conc. HCl
	V)	$C_6H_5SO_2Cl$

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

74. What are the products formed when an aldehyde $(RCHO)$ is reacted with Tollen's reagent?

1) $Ag,\ H_2O, RCH_2OH, NH_3$ 2) $Ag,\ H_2O, RCOO^-, H_2$
3) $Ag, H_2O, RCOO^-, NH_3$ 4) $Ag_2, H_2O, RCOO^-, NH_3$ b

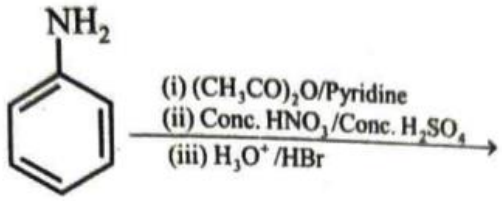
75. The increasing order of acidity of the following carboxylic acids is

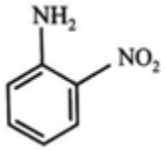


I. II. III. IV.

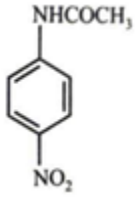
1) III < IV < II < I 2) II < III < IV < I
3) I < II < IV < III **4) III < IV < I < II**

76. The major product formed in the following reaction sequence is



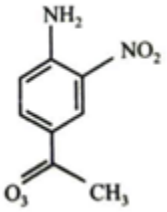


1)



2)

3)



4)

77. Which one of the following compounds undergoes Hofmann degradation reaction?

1) CH_3CN 2) $CH_3CONHCH_3$ **3) CH_3CONH_2** 4) CH_3NC

78. Find the reagent that oxidises glucose into saccharic acid?

1) Br_2, H_2O 2) HI, Δ **3) HNO_3, H_2O** 4) HCN

79. Match the following

List – I		List – II
A) Teflon	I)	$SnCl_2$
B) Anionic polymerisation	II)	C_2F_4
C) Cationic polymerisation	III)	Bakelite
D) Thermosetting polymer	IV)	Polystyrene
	V)	RLi

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

80. Which of the following are broad spectrum antibiotics?

Penicillin G	Chloram- Phenicol	Ofloxacin	Ampicillin
(I)	(II)	(III)	(IV)
1) I, II only	2) I, II, III	**3) II, III, IV**	4) I, III only

81. P-P linkage is presents in

1)Pyrophosphoric acid **2)Hypophosphoric acid**

3)Peroxy phosphoric acid 4)Metophosphoric acid

82. Column I

A. SF_6

B. SF_4

C. SF_2

D. S_2F_2

Column II

1.Angular

2. Open book

3. Octahedral

4. Pyramidal

5. distorted tetrahedral

The correct match is

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

2) $A-4, B-2, C-5, D-3$

3) $A-2, B-4, C-1, D-5$

4) $A-3, B-5, C-1, D-2$

83. The correct order of the lattice energies of the following ionic compounds is

1) $NaCl > MgBr_2 > CaO > Al_2O_3$

2) $Al_2O_3 > MgBr_2 > CaO > NaCl$

3) $MgBr_2 > Al_2O_3 > CaO > NaCl$

4) $Al_2O_3 > CaO > MgBr_2 > NaCl$

84. The pair in which two species are isostructural?

1) SiF_4 *and* SF_4

2) IO_3^{1-} *and* XeO_3

3) BH_4^{1-} *and* NH_4^{1+}

4) PF_5 *and* SF_6

85. Which of the following does not contribute towards the formation of photochemical smog?

1)NO

2) SO_2

3) O_3

4) Hydrocarbons

86. Metallic radius of Ca is 200pm covalent radius of Ca is

1) 200pm

2) 230pm

3) 280pm

4) 174pm

87. Elements X, Y, Z have atomic numbers 19,37 and 55 respectively, which of the following statement is true about them?

1) their ionization potential would increase with increasing atomic number

2) 'Y' would have an ionization potential between those of 'X' and 'Z'

3) 'Z' would have the highest ionization potential

4) 'Y' would have the highest ionization potential.

88. Which of the following radiation following has highest wave number?

1) Microwaves

2) X-rays

3) I.R-rays

4) Radio waves

89. A particle 'X' moving with a certain velocity has a debroglie wave length of $1A^0$, if particle 'Y' has a mass of 25% that of 'X' and velocity 75% that of 'X' debroglies wave length of 'Y' will be

1) $3A^0$

2) $5.33A^0$

3) $6.88A^0$

4) $48A^0$

90. The following is disinfectant under high concentration but antiseptic under low concentration

1)Phenol

2) BHT

3)BHA

4) Novestrol

91. Hydrogen gas is not liberated when the following metals added to dil. HCl

1)Mg 2) Sn **3) Ag** 4) Zn

92. The correct matching is

List –I	List II
A. NaOH	1)Germicide
B. $Na_2CO_3.10H_2O$	2) Baking powder
C. $NaHCO_3$	3) Soap
D. NaCN	4) Glass

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

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

93. Which of the following acid has same molecular weight and equivalent weight

1) H_3PO_2 2) H_3PO_3 3) H_3PO_4 4) H_2SO_4

94. In the reaction, $I_2 + 2KClO_3 \rightarrow 2KIO_3 + Cl_2$

I)Iodine is oxidised II)Chlorine is reduced

III) Iodine displaces chlorine IV) $KClO_3$ is decomposed

The corrects are

1)Only I & Iv are correct 2)Only III & IV are correct

3)I,II,III are correct 4)All are correct

95. $Na_2B_4O_7.10H_2O \xrightarrow{Conc.HCl} A \xrightarrow{160^0 C} B, Compound\ \ B\ \ is$

1) $H_2B_4O_7$ 2) B_2O_3 3) H_3BO_3 4) HBO_2

96. The carbide which gives propyne on hydrolysis

1) Al_4C_3 2) CaC_2 3) Fe_3C **4)** Mg_2C_3

97. The R.M.S velocity of an ideal gas at 300K is 12240cm/sec, then its most probable velocity in cm/sec at the same temperature is

1)10000 2) 11280 3) 1000 4) 12240

98. Given that

$$S_{(s)} + \frac{3}{2}O_{2(g)} \rightarrow SO_{3(g)} + 2x \ \ K.Cl$$

$$SO_{2(s)} + \frac{1}{2}O_{2(g)} \rightarrow SO_{3(g)} + y \ \ K.Cl$$

Which would be the enthalpy of formation SO_2 ?

1)(2x-y) 2) (2x+y) **3) (y-2x)** 4) $\frac{2x}{y}$

99. A mixture of 2 moles of N_2 *and* 8 *moles* H_2 are heated in a 2lit vessel, till equilibrium is established. At equilibrium,0.4 moles of N_2 was present. The equilibrium concentration of H_2 will be

1)2moles/lit 2) 4moles/lit **3) 1.6moles/lit** 4) 1.1 moles/lit

100. Which of the following is not a conjugates acid-base pair

1) HPO_4^{2-}, PO_4^{3-} 2) $H_2PO_4^-, HPO_4^{2-}$ 3) $H_2PO_4^-, H_3PO_4$ **4)** $H_2PO_4^-, PO_4^{3-}$

101. IUPAC name of $(CH_3)_2 - N - CH_2 - CH_2 - CH_2 - COO - C_2H_5$

1)Ethyl 4-N,N-dimethylaminopentanoate 2)1-N,N-dimethylamino-4-ethoxybutane

3)Ethyl 4-N,N-dimethylamino butanoate 4)Ethyl-3-N,N-dimethyl butanoate

102. Which of the following statements is right

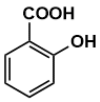
1)All carboxylic acids exhibits functional isomers as esters

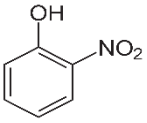
2) All alkynes exhibit chain isomerism

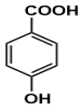
3) All ketones exhibit functional isomers as aldehyde

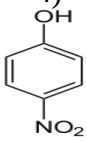
4)All ketones exhibit chain isomerism

103. The most acidic one is

1) 

2) 

3) 

4) 

104. $[A] \xleftarrow[catalyst]{H_2/Lindlers} CH_3 - C \equiv C - CH_3 \xrightarrow[liq\ NH_3]{Na\ in} [B], [A], [B]$ *respectively are*

1) Cis 2 butene,trans-2-butene 2)both trans-2-butene

3)trans-2-butene,cis-2-butene 4)both cis-2-butene

105. In which of the following reactions, the product is 1-chlorobutane?

1)1-Butene+HCl 2) 2-Butene+HCl 3) 1-Butene+HCl,ROOR

4)None

106. Which of the following acids is reactive towards esterification with ethanol?

1) HCOOH 2) $CHCl_3$ 3) $(CH_3)_2 CHCOOH$ 4) $(CH_3)_3 CCOOH$

107. In the reaction $(CH_3)_3 C - O - CH_2 - CH_3 + \underset{(1\ mole)}{HI} \rightarrow$

1) $(CH_3)_3 C - OH + CH_3 - CH_2 - I$ **2)** $(CH_3)_3 C - I + CH_3 - CH_2 - OH$

3) $(CH_3)_3 C - I + CH_3 - CH_2 - I$ 4) $(CH_3)_3 C - OH + CH_3 - CH_2 - OH$

108. $(CH_3)_2C=O \xrightarrow{Zn-Hg/Conc.HCl} X$, *here* '$X$' *is*

1) $CH_3-CH_2-CH_2-OH$ 2) $CH_3-CH(OH)-CH_3$

3) CH_3-CH_2-CHO **4)** $CH_3-CH_2-CH_3$

109. Which of the following acids on heating loses a molecule of water to form an α,β unsaturated acid?

1) $CH_3CHOHCOOH$ 2) $HOCH_2COOH$

3) $CH_3-CHOHCH_2COOH$ 4) $HOCH_2CH_2CH_2COOH$

110. $CH_3NH_2 \xrightarrow[H_2O]{HNO_2} A \xrightarrow{PI_3} B \xrightarrow{KCN} C \xrightarrow{LiAlH_4} D$, D *is*

1) $CH_3CH_2NH_2$ 2) CH_3NH_2 3) $CH_3-NH-CH_3$ 4) CH_3CN

111. An aqueous solution of ethanol has density 1.025g/ml and it is 2M. What is the molality of this solution?

1)1.79 **2) 2.14** 3) 1.95 4) None

112. Select the rate law that corresponds to the data shown for the reaction $X+Y \rightarrow Z$

Exp	$[X]$	$[Y]$	Rate
1	1.0	1.0	0.25
2	2.0	1.0	0.50
3	1.0	2.0	0.25
4	1.0	3.0	0.25

1) $rate = K[X]^1[Y]^0$ 2) $rate = K[X]^1[Y]^1$ 3) $rate = K[X]^0[Y]^0$ 4) $rate = K[X]^0[Y]^1$

113. A metal crystallises as body centred cubic lattice with the edge length of unit cell equal to 0.304nm,if the molar mass of the metal is 50.3g/mol, its density is --------- gm/cm^3

1)8.69 2) 2.14 **3) 5.96** 4) 9.26

114. 6.23×10^{19} electrons are equal to how many coulombs?

1)965columbs **2)9.65columbs** 3)96,500columbs 4)None

115. Standard reduction electrode potential of three metals A,B and C are respectively +0.05V,-3.0V and –1.2V. The reducing powers of

1) $B>C>A$ 2) $A>B>C$ 3) $C>B>A$ 4) $A>C>B$

116. 2.56 gms of sulphur in 100ml solution shows osmotic pressure of 2.463 atm at 27^0C. How many sulphur atoms are associated in colloidal sol? $(Solution\ constant = 0.0821 lit.atm.mol^{-1}.k^{-1})$

1)6 sulphur atoms **2) 8 sulphur atoms** 3) 2 sulphur atoms 4) 4 sulphur atoms

117. The chemical composition of 'slag 'formed during smelting process in the extraction of copper in

1) $Cu_2O + FeS$ **2) $FeSiO_3$** 3) $CuFeS_2$ 4) $CaSiO_3$

118. CrO_4^{2-} *and* MnO_4^- ions exhibit colour due to

1)Presence of unpaired electrons in 'd' orbitals of Cr and Mn

2) Charge transfer phenomenon

3) d-d electron transfer

4)Close packing crystal structure

119. Misch metal is

1)An alloy of Al 2)A mixture of Cr and $PbCrO_4$

3) An alloy of La & Ce 4) An alloy of Copper

120. Stable complex based on EAN Rules

i) $K_4[Fe(CN)_6]$ ii) $[Co(NH_3)_5Cl]Cl_2$ iii) $[Ni(CO)_4]$ IV) $K_2[Ni(CN)_4]$

1)i only 2) i.& ii only **3)i.,ii & iii only** 4) All

121. An open flask contains air at 27^0. To what temp it must be heated to expel one – fourth of the air?

1) 227^0C **2) 127^0C** 3) 327^0C 4) 120^0C

122. ΔU^0 of combustion of $CH_{4(g)}$ at certain temperature is -393 kJ mol^{-1}. The value of ΔH^0 is

1) zero **2) $< \Delta U^0$** 3) $> \Delta U^0$ 4) equal to ΔU^0

123. In an adiabatic process, no transfer of heat takes place between system and surroundings. Choose the correct option for free expansion of an ideal gas under adiabatic condition from the following

1) $q = 0,\ \Delta T \neq 0, W = 0$ 2) $q \neq 0,\ \Delta T = 0, W = 0$

3) $q = 0,\ \Delta T = 0, W = 0$ 4) $q = 0,\ \Delta T < 0, W \neq 0$

124. K_{a_1}, K_{a_2} and K_{a_3} are the respective ionization constants for the following reactions

$H_2S \rightleftharpoons H^+ + HS^-$

$HS^- \rightleftharpoons H^+ + S^{2-}$

$H_2S \rightleftharpoons 2H^+ + S^{2-}$

The correct relationship between K_{a_1}, K_{a_2} and K_{a_3} is

1) $K_{a_3}, = K_{a_1} \times K_{a_2}$ 2) $K_{a_3}, = K_{a_1} + K_{a_2}$ 3) $K_{a_3}, = K_{a_1} - K_{a_2}$ 4) $K_{a_3}, = K_{a_1} / K_{a_2}$

125. Which of the following options will be correct for the stage of half completion of the reaction $A \square B$?

1) $\Delta G^0 = 0$ 2) $\Delta G^0 > 0$ 3) $\Delta G^0 < 0$ 4) $\Delta G^0 = -RT \ln 2$

126. E^0 values of some redox couples are given below. On the basis of these values choose the correct option. E^0 values $Br_2 / Br^- = +1.90; Ag^+ / Ag = +0.80$

$Cu^{2+} / Cu_{(s)} = +0.34; I_{2(s)} / I^- = +0.54V$

1) Cu will reduce Br^- 2) Cu will reduce Ag

3) Cu will reduce I^- **4) Cu will reduce Br_2**

127. Which of the following reaction produces dydrogen

1) Mg+steam 2) $BaO_2 + HCl$

3) $H_2S_4O_8 + H_2O$ 4) $Na_2O_2 + 2HCl$

128. Which does not exist

1) $[SnCl_6]^{-2}$ 2) $[GeCl_6]^{-2}$ 3) $[SiF_6]^{-2}$ **4) $[CCl_6]^{-2}$**

129. What is the correct order of decreasing stability of the following cations?

$CH_3 - \overset{+}{\underset{I}{C}}H - CH_3$ $CH_3 - \overset{+}{\underset{II}{C}}H - OCH_3$

$CH_3 - \overset{+}{\underset{III}{C}}H - CH_2 - OCH_3$

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

130. Arrange the following in decreasing order of their boiling points

I) n-Butane II) 2-methylbutane III) n-Pentane IV)2, 2- Dimethylpropane

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

131. When acetylene undergoes hydrolysis in the presence of $HgSO_4 + H_2SO_4$, the product (s) formed is /are

1) $CH_3CH_2COOH + HCOOH$ **2) CH_3CHO**

3) $CH_3CH_2 - OH$ 4) $CH_3CH_2CH_2CHO$

132. Which one of the following species is planar and Non-polar with two lone pairs of electrons on the central atom

1) ClF_3 **2) XeF_5^-** 3) PCl_5 4) BrF_5

133. In the cube close packing, the unit cell has
1) 4 tetrahedral voids each of which is shared by four adjacent unit cells
2) 4 tetrahedral vodis within the unit cell
3) 8 tetrahedral voids each of which is shared by four adjacent unit cells
4) 8 tetrahedral voids within the unit cells

134. K_H values for $Ar_{(g)}$, $CO_{2(g)}$, $HCHO_{(g)}$ and $CH_{4(g)}$ are 40.39, 1.67, 1.83×10^{-5} and 0.413 respectively. Arrange these gases in the order of their increasing solubility
1) $HCHO < CH_4 < CO_2 < Ar$
2) $HCHO < CO_2 < CH_4 < Ar$
3) $Ar < CO_2 < CH_4 < HCHO$
4) $Ar < CH_4 < CO_2 < HCHO$

135. NO_2 gas is obtained by heating
1) NH_4NO_2
2) NH_4NO_3
3) $LiNO_3$
4) $NaNO_3$

136. Consider a first order gas phase decomposition reaction given below: $A_{(g)} \rightarrow B_{(g)} + C_{(g)}$. The initial pressure of the system before decomposition of A was p_1. After lapse of time 't' total pressure of the system increased by x units and becomes 'p_t'. The rate constant k for the reaction is given as _____
1) $k = \frac{2.303}{t}\log\frac{p_i}{p_i - x}$
2) $k = \frac{2.303}{t}\log\frac{p_i}{2p_i - p_t}$
3) $k = \frac{2.303}{t}\log\frac{p_i}{2p_i + p_t}$
4) $k = \frac{2.303}{t}\log\frac{p_i}{p_i + x}$

137. Which of the following electrolytes will have maximum coagulating value for AgI / Ag^+ sol?
1) Na_2S
2) Na_3PO_4
3) Na_2SO_4
4) $NaCl$

138. The colour of the coordination compounds depends on the crystal field splitting. What will be the correct order of absorption of wavelength of light in the visible region, for the complexes,
$\left[Co(NH_3)\right]^{3+}, \left[Co(CN)_6\right]^{3-}, \left[Co(H_2O)_6\right]^{3+}$?
1) $\left[Co(CN)_6\right]^{3-} > \left[Co(NH_3)_6\right]^{3+} > \left[Co(H_2O)_6\right]^{3+}$
2) $\left[Co(NH_3)_6\right]^{3+} > \left[Co(H_2O)_6\right]^{3+} > \left[Co(CN)_6\right]^{3-}$
3) $\left[Co(H_2O)_6\right]^{3+} > \left[Co(NH_3)_6\right]^{3+} > \left[Co(CN)_6\right]^{3-}$
4) $\left[Co(NH_3)_6\right]^{3+} > \left[Co(CN)_6\right]^{3-} > \left[Co(H_2O)_6\right]^{3+}$

139. The CFSE for octahedral $[CoCl_6]^{4-}$ is 18, 000 J. the CFSE for tetrahedral $[CoCl_4]^{2-}$ will be

1) 18,000 J 2) 16,000 J **3) 8,000 J** 4) 20,000 J

140. Which alkyl halide exhibits racemization is $S_N1$reaction?

1) $(CH_3)_3CCl$ 2) $CH_3CH_2CH_2Cl$ 3) CH_3CH_2Cl **4) $C_6H_5CH(CH_3)Cl$**

141. Which of the following is most acidic?

1) Benzyl alcohol 2) Cyclohexanol 3) Phenol **4) m-Chlorophenol**

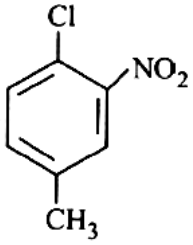
142. Compounds (A) and (C) in the following reactions are

$$CH_3CHO \xrightarrow[(ii)H_2O]{(i)CH_3MgBr} (A) \xrightarrow{H_2SO_4.\Delta} (B) \xrightarrow{Hydroboration\ oxidation} (C)$$

1) Identical **2) Positional isomers** 3) Functional isomers 4) Optical isomers

143. The gas evolved when methylamine reacts with nitrous acid is _____

1) NH_3 **2) N_2** 3) H_2 4) C_2H_6

144. The IUPAC name for 

is

1) 1-chloro -2-nitro-4-methylbenzene **2) 1-chloro-4-methyl-2-nitrobenzene**
3) 2-chloro-1-nitro-5-methylbenzene 4) m-nitro-p-chlorotoluene

145. The charge on a cation 'M' is +2 and anion 'A' is -3. The compound formed has the formula of

1) MA_2 **2) M_3A_2** 3) M_2A_3 4) M_2A

146. Which of the following has the minimum bond length?

1) O_2^+ 2) O_2^- 3) O_2^{2-} 4) O_2

147. As the P-character of hybrid orbital increase, the bond angle

1) Increases **2) Decreases** 3) Does not change 4) Becomes zero

148. The reason for small radius of 'Ga' compared to 'Al' is

1) Poor screening effect of 'd' orbitals
2) Decrease in Nuclear charge
3) Presence of higher orbitals
4) Higher atomic number

149. A: Graphite acts as lubricant due to layer like structure
B: The distance between two layers in graphite is 1.42 A^0.
C: Silica does not react with HCl, HBr and Hl
The correct answer is
1) A and C are true 2) A and B are true 3) Only A is true 4) All are true

150. NH_3 is polar, where as CO_2 is not. It is because
1) The electro negativity of N is greater than that of O
2) NH_3 involves hydrogen bonding whereas CO_2 is a discrete molecule
3) NH_3 is liner and CO_2 is angular
4) NH_3 (asymmetric) is pyramidal and CO_2 (symmetric) is linear

151. Dipole moment is shown by
1) cis-1, 2-dichloroethene 2) trans-1, 2-dichloroethene
3) trans-2, 3-dichloro-2-pentene **4) both 1 & 3**

152. The carbide which gives methane on boling with water
1) CaC_2 2) Mg_2C_3 **3) Al_4C_3** 4) Cu_2C_2

153. Match List – I and List – II and pick out correct matching codes from the given choices:

List – I Compound	List – II Structure
A. ClF_3	1. Square planar
B. PCl_5	2. Tetrahedral
C. IF_5	3. Trigonal bipyramidal
D. CCl_4	4. Square pyramidal
E. XeF_4	5. T – Shaped

	A	B	C	D	E
1)	5	4	3	2	1
2)	**5**	**3**	**4**	**2**	**1**
3)	5	3	4	1	2
4)	4	3	5	2	1

154. A magnetic moment of 1.73 BM will be shown by one among the following
1) $\left[Cu\left(NH_3\right)_4\right]^{2+}$ 2) $\left[Ni\left(CN\right)_4\right]^{2-}$ 3) $TiCl_4$ 4) $\left[CoCl_6\right]^{4-}$

155. Which of the following Pairs of solution is not an acidic buffer
1) $HClO_4$, $NaClO_4$ 2) CH_3COOH and CH_3COONa
3) H_2CO_3 and Na_2CO_3 4) H_3PO_4 and Na_3PO_4

156. The number of atoms per cell in a simple cubic, face – centered cubic, body – centered cubic are respectively

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

157. The correct order of basic nature of hydrides Group -15 elements is

1) $NH_3 > AsH_3 > SbH_3 > BiH_3 > PH_3$

2) $NH_3 > PH_3 > AsH_3 > SbH_3 > BiH_3$

3) $BiH_3 > SbH_3 > AsH_3 > PH_3 > NH_3$

4) $PH_3 > BiH_3 > SbH_3 > NH_3$

158. The ratio of the radii of first three Bohr orbits is

1) 1 : 5 : 3 2) 1 : 2 : 3 **3) 1 : 4 : 9** 4) 1 : 8 : 27

159. Correct set of four quantum number for the valence electron of Rubidium (Z= 37) is

1) 5, 01 0, +1/2 2) 5, 1, 0, +1/2 3) 5, 1, 1, +1/2 4) 6, 0, 0, +1/2

160. K_f for water is 1.86K kg mol^{-1}. If your automobile radiator holds 1.0 kg of water, how many grams of ethylene glycol $(C_2H_6O_2)$ must you add to get the freezing point of the solution lowered to -2.8^{0}C

1) 72 g **2) 93 g** 3) 39 g 4) 27 g