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24-Jan-2026_Shift-I_JEE Main-2026_Session-I(Jan)

MATHEMATICS **Max Marks: 100**

SECTION-I
(SINGLE CORRECT ANSWER TYPE)

This section contains **20 Multiple Choice Questions.** Each question has 4 options (1), (2), (3) and (4) for its answer, out of which ONLY ONE option can be correct.

Marking scheme: +4 for correct answer, 0 if not attempted and –1 in all other cases.

1. Let $S=\left\{Z\in C:\left|\frac{Z-6i}{Z-2i}\right|=1 \text{ and } \left|\frac{z-8+2i}{z+2i}\right|=\frac{3}{5}\right\}$ then $\sum_{Z\in S}|Z|^2$ is equal to

1) 385 2) 413 3) 398 4) 423

Key: 1

Sol: $\left|\frac{Z-6i}{Z-2i}\right|=1\Rightarrow y=4$

$25|z-8+2i|^2=9|z+2i|^2$

$\Rightarrow x^2+y^2-25x+4y+104=0$

Points are $(17,4),(8,4)$

2. If the function $f(x)=\frac{e^x\left(e^{\tan x-x}-1\right)+\log_e(\sec x+\tan x)-x}{\tan x-x}$ is continues at $x=0$ then the value of $f(0)$ is equal to

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

Key: 1

Sol: $f(0)=\lim_{x\to0} e^x\frac{\left(e^{\tan x-x}-1\right)}{\tan x-x}+\lim_{x\to0}\frac{\log(\sec x+\tan x)-x}{\tan x-x}$

$\lim_{x\to0} e^x\frac{\left[e^{\tan x-x}-1\right]}{\tan x-x}-1\lim_{x\to0}\frac{\log(\sec x+\tan x)-x}{\tan x-x}$

$e^{(0)}(1)+\lim_{x\to0}\frac{\frac{1}{\sec x+\tan x}.(\sec x\tan x+\sec^2 x)-1}{\sec^2 x-1}$ LHospital rule

$=1+\lim_{x\to0}\frac{\sec x-1}{(\sec x-1)(\sec x)+1)}=1+\frac{1}{2}=\frac{3}{2}$

3. Let a circle of radius 4 pass through the origin O. The Points $A\left(-\sqrt{3}a,0\right)$ and $B\left(0,-\sqrt{2}b\right)$ where a and b are real parameters $ab\neq 0$ .Then the locus of the centroid ΔOAB is circle of radius

1) $\frac{7}{3}$ 2) $\frac{11}{3}$ 3) $\frac{8}{3}$ 4) $\frac{5}{3}$

Key: 3

Sol: $R=4\Rightarrow R^2=16\Rightarrow 2b^2+3a^2=64$

$b=\frac{-3x}{\sqrt{2}},a=\frac{-3y}{\sqrt{3}}$

$2b^2+3a^2=64$

$\Rightarrow x^2+y^2=\left(\frac{8}{3}\right)^2$

$\therefore r=\frac{8}{3}$

4. Consider an A.P :a_1,a_2, a_3 ……,$a_n; a_1>0$ If $a_2-a_1=\frac{-3}{4},a_n=\frac{1}{4}a_1$ and $\sum_{i=1}^{n}a_i=\frac{525}{2}$ then $\sum_{i=1}^{17}a_i$ is equal to

1) 476 2) 136 3) 952 4) 238

Key: 4

Sol: $a_2-a_1=-\frac{3}{4}\Rightarrow a_1+d-a_1=-\frac{3}{4}\Rightarrow d=-\frac{3}{4}$

$a_n=\frac{1}{4}a_1\Rightarrow a_1+(n-1).\left(-\frac{3}{4}\right)=\frac{1}{4}a_1$

$\Rightarrow 4a_1 3n+3=a_1\Rightarrow 3a_1-3n+3=0\ \Rightarrow a_1-n+1=0$

$\sum_{i=l}^{n}a_i=\frac{525}{2}\Rightarrow\frac{n}{2}\left[2a_1+(n-1).\left(-\frac{3}{4}\right)\right]=\frac{525}{2}\Rightarrow\frac{n}{2}\left[a_1+a_n\right]=\frac{525}{2}$

$8na_1-3n^2+3n=525\Rightarrow\frac{n}{2}\left[a_1+\frac{a_1}{4}\right]=\frac{525}{2}$

$\Rightarrow a_n n=420$

$\Rightarrow a_1\left[a_1+1\right]=420=20\times 21$

$\Rightarrow a_1=20$

$\sum_{i=1}^{17}ai=\frac{17}{2}\left[a_1+a_n\right]=\frac{17}{2}\left[40+16\left(-\frac{3}{4}\right)\right]=238$

$$=\frac{17}{2}\left[\frac{5a_1}{4}\right]=\frac{17}{2}\times\frac{5}{4}\times 20$$

5. Let $\alpha,\beta\in R$ such that the function $f(x)=\begin{cases}2\alpha\left(x^2-2\right)+2\beta x & ,x<1\\ (\alpha+3)x+\alpha-\beta & x\geq 1\end{cases}$ be differentiable at all $x\in R$

then $34(\alpha+\beta)=$

1) 24 2) 84 3) 48 4) 36

Key: 3

Sol: $f(x)=\begin{cases}2x\left(x^2-2\right)+2\beta x, & x<1\\ (\alpha+3)x+\alpha-\beta, & x\geq 1\end{cases}$

$f\left(1^-\right)=f\left(1^+\right)=2\alpha(-1)+2\beta(1)=(\alpha+3)+\alpha-\beta\Rightarrow 4\alpha-3\beta+3=0 \quad \rightarrow(1)$

$f'(x)=\begin{cases}2\alpha(2x)+2\beta & x<1\\ (\alpha+3) & x\geq 1\end{cases}$

$f^1\left(1^-\right)=f^1\left(1^+\right)\Rightarrow 4\alpha+2\beta=\alpha+3\Rightarrow 3\alpha+2\beta-3=0\rightarrow(2)$

Solving $(1),(2)$ we get $\alpha=3m \quad \beta=\frac{21}{17}$

$\therefore 34(\alpha+\beta)=48$

$-2\alpha+2\beta\alpha=2\alpha$

$4\alpha-2\alpha\beta=0 \qquad \Rightarrow 2\alpha(2-\beta)=0$

$\beta=2$

$4\alpha=\alpha+\beta$

$3\alpha=\beta\Rightarrow\alpha=\frac{2}{3}$

$34\left[\frac{2}{3}+2\right]$

$34\left[\frac{2+6}{3}\right]$

6. Let $f(t)=\int\left(\frac{(1-\sin(\log_e t)}{1-\cos(\log_e t)}\right)dt, t>1.$ if.$f\left(e^{\pi/2}\right)=-e^{\pi/2}$ and $f\left(e^{\pi/4}\right)=\alpha e^{\pi/4}$ then α equals

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

Key: 3

Sol: Let $\cos t=x\Rightarrow t=e^x\Rightarrow dt=e^x dx$

$$\text{G.I} = \int \frac{1-\sin x}{2\sin^2\frac{x}{2}} e^x\,dx \quad = \frac{1}{2}\int\left(\cos ec^2\frac{x}{2} - 2\cot\frac{x}{2}\right)e^x\,dx = \frac{1}{2}e^x\left(-2\cot\frac{x}{2}\right)+c \Rightarrow -t\cot\left(\frac{\log t}{2}\right)+c$$

$$f\left(e^{-\pi/2}\right) = -e^{\pi/2} \qquad \Rightarrow c = 0$$

$$\therefore d\left(e^{\pi/4}\right) = -e^{-\pi/4}\left(\sqrt{2}+1\right)$$

$$\therefore \alpha = -\left(\sqrt{2}+1\right)$$

7. Let $S = \frac{1}{25!} + \frac{1}{3!23!} + \frac{1}{5!21!} + \ldots..$ Up to 13 terms. If $13S = \frac{2^k}{n!}, k \in N$ then n + k is equal to

1) 49 2) 51 3) 52 4) 50

Key: 1

Sol: $S = \frac{1}{26!}\left[\frac{26!}{25!1!} + \frac{26!}{5!23!} + \ldots.. + 13\,\text{terms}\right] = \frac{1}{26!}\left[{}^{26}c_1 + {}^{26}c_3 + \ldots.. + {}^{26}c_{25}\right] = \frac{2^{25}}{26!}$

$$\therefore 135 = \frac{2^{25}}{26!}\times 13 = \frac{2^{25}}{2\times 13\times 25!}\times 13 = \frac{2^{24}}{25!} \therefore n+k = 49$$

8. The number of real solutions of a the equation $x|x+3| + |x-1| - 2 = 0$ is

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

Key: 1

Sol: $x|x+3| + |x-1| - 2 = 0$

$$x \le -3 \Rightarrow x(x+3) + 1 - x - 2 = 0 \Rightarrow x^2 + 4x + 1 = 0$$

$$x = \frac{-4 \pm \sqrt{16-4}}{2} \qquad -3 < x \le 1 \Rightarrow x^2 + 3x + 1 - x - 2 = 0$$

$$x^2 + 2x - 1 = 0 \qquad x = \frac{-2 + \sqrt{4+4}}{2}$$

$$x > 1 \quad x^2 + 3x + x - 1 - 2 = 0$$

$$x^2 + 4x - 3 = 0 \qquad x = \frac{-4 \pm \sqrt{16+12}}{2} = \frac{-4 \pm 2\sqrt{7}}{2}$$

9. Let the lines $L_1 : \bar{r} = \hat{i} + 2\hat{j} + 3\hat{k} + \lambda\left(2\hat{i} + 3\hat{j} + 4\hat{k}\right), \lambda \in R,$ *and* $L_2 : \bar{r} = \left(4\hat{i} + \hat{j}\right) + \mu(5i + 2j + k)\ \mu \in R$ intersect at the point R. Let P and Q be the points lying on the lines L_1 and L_2 respectively such that $|PR| = \sqrt{29}$ *and* $|PQ| = \sqrt{\frac{47}{3}}$ and $|PQ| = \sqrt{\frac{47}{3}}$ if the Point P lies in the 1st octant then 27 $(QR)^2$ is equal to

1) 340 2) 348 3) 360 4) 320

Key: 3

Sol: Finding point $R(-1,-1,-1)$

$P(2\lambda+1,3\lambda+2,4\lambda+3)Q(5\mu+4,2\mu+1,\mu)$

$|PQ|=\sqrt{\frac{47}{3}}\Rightarrow(5\mu+3)^2+(2\mu-1)^2+(\mu-3)^2=\frac{47}{3}\Rightarrow\mu=\frac{1}{3}$

$PQ=\sqrt{29}\Rightarrow(2\lambda+2)^2+(3\lambda+3)^2+(4\lambda+4)^2=29$

$\therefore Q=\left(\frac{7}{3},\frac{1}{3},-\frac{1}{3}\right)$

$\therefore(QR)^2=\frac{120}{9}\Rightarrow 27(QR)^2=27\times\frac{120}{9}=360$

10. From a lot containing 10 defective and 90 and defective bulbs, 8 bulbs are selected one by one with replacement then the probability of getting at least 7 defective bulbs is

1) $\frac{7}{10^7}$ 2) $\frac{81}{10^8}$ 3) $\frac{73}{10^8}$ 4) $\frac{67}{10^8}$

Key: 3

Sol: required probability

$=P(X=7)+P(X=8)=P(7\text{defective},1\text{fair})+P(8\text{defective})$

$=\frac{10^7 x\,90x\,8+10^8}{100^8}=\frac{10^8[72+1]}{(100)^8}$

11. Let A(1,0) B (2,-1) and $C=\left(\frac{7}{3},\frac{4}{3}\right)$ be three points. If the equation of bisector of the angle ABC is $\alpha x+\beta y=5$ then the value of $\alpha^2+\beta^2$ is

1) 8 2) 5 3) 10 4) 13

Key: 3

Sol: $AD:DC=BA:BC=\sqrt{1+1}:\sqrt{\frac{1}{9}+\frac{49}{9}}$ =3:5

$D=\frac{3\left(\frac{7}{3},\frac{4}{3}\right)+5(1,0)}{3+5}=\left(\frac{12}{8},\frac{4}{8}\right)=\left(\frac{3}{2},\frac{1}{2}\right)$

Equation of BD is 3x+y-5=0 $\alpha^2+\beta^2=10$

12. The value of $\frac{\sqrt{3}\,\text{cosec}\,20^\circ-\sec 20^\circ}{\cos 20^\circ\cos 40^\circ\cos 60^\circ\cos 80^\circ}$ is equal to

1) 16 2) 12 3) 64 4) 32

Key: 3

Sol: $\dfrac{2\left(\dfrac{\sqrt{3}}{2}\cos 20^\circ - \dfrac{1}{2}\sec 20^\circ\right)}{\dfrac{1}{2}\times\dfrac{1}{4}\times\dfrac{1}{2}} = 64$

13. If the Domain of the function $f(x) = \log_{(10x^2-17x+7)}(18x^2-11x+1)$ is $(-\infty,a)\cup(b,c)\cup(d,\infty)-\{e\}$ then $90(a+b+c+d+e)$ equals

1) 307 2) 177 3) 316 4) 170

Key: 3

Sol: $|8x^2-11x+1>0|10x^2-17x+7>0,\neq 1$

$x\in\left(-\infty,\dfrac{1}{9}\right)\cup\left(\dfrac{1}{2},\infty\right)\ x\in\left(-\infty,\dfrac{7}{10}\right)\cup(1,\infty)\ x\neq\dfrac{6}{5},\dfrac{1}{2}$

$\therefore x\,E\left(-\infty,\dfrac{1}{9}\right)\cup\left(\dfrac{1}{2},\dfrac{7}{10}\right)\cup(1,\infty)-\left\{\dfrac{6}{5}\right\}\qquad a+b+c+d+e=3/6$

14. The mean and variance of data of 10 observations are 10 and 2 respectively. If an observation α in this data is replaced by β, then the mean and variance become 10.1 and 1.99 respectively then $\alpha+\beta$ equals

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

Key: 3

Sol: Let be data $x_1, x_2, \ldots\ldots\ldots\ldots x_a, \alpha$

$\sum_{i=1}^{9} x_i = 100-\alpha$

$\sum x_i 2 = 1020-\alpha^2$

$100-\alpha+\beta = 101\ \alpha-\beta+1$

$\dfrac{\sum_{i=1}^{9} xi^{\,2}+\beta^2}{10} - (101)^2 = 1.99$

$\beta^2.\alpha^2 = 20 \Rightarrow \alpha=\dfrac{19}{2},\beta=\dfrac{21}{2}$

$\alpha+\beta=20$

15. If $\cot x = \dfrac{5}{12}$ for some $x\in\left(\pi,\dfrac{3\pi}{2}\right)$ then $\sin 7x\left(\cos\dfrac{13x}{2}+\sin\dfrac{13x}{2}\right)+\cos 7x\left(\cos\dfrac{13x}{2}-\sin\dfrac{13x}{2}\right)$ is equal to

1) $\dfrac{1}{\sqrt{13}}$ 2) $\dfrac{4}{\sqrt{26}}$ 3) $\dfrac{5}{\sqrt{13}}$ 4) $\dfrac{6}{\sqrt{26}}$

Key: 1

Sol: $\sin 7x\left(\cos\frac{13x}{2}+\frac{13x}{2}\right)+\cos\left(\cos\frac{13x}{2}-\sin\frac{13x}{2}\right)$

$\sin\left(7x-\frac{13x}{2}\right)+\cos\left(7x-\frac{13x}{2}\right)=\sin\frac{x}{2}+\cos\frac{x}{2}=\pm\sqrt{\frac{1-\cos x}{2}}\pm\sqrt{\frac{1+\cos x}{2}}$

$=\pm\sqrt{\frac{1+\frac{5}{13}}{2}}\pm\sqrt{\frac{1-\frac{5}{13}}{2}}\quad=\sqrt{\frac{18}{2xB}}-\sqrt{\frac{8}{2\times13}}\qquad=\frac{3}{\sqrt{13}}-\frac{1}{\sqrt{13}}=\frac{1}{\sqrt{13}}$

$x\in\left(\pi,\frac{3\pi}{2}\right)$

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

16. Let each of the two ellipses $E_1:\frac{x^2}{a^2}+\frac{y^2}{b^2}=1(a>b)$ and $E_2:\frac{x^2}{A^2}+\frac{y^2}{B^2}=1(A<B)$ have eccentricity $\frac{4}{5}$. Let the Length of the latusrecta of E_1 and E_2 be $_1$, $_2$ respectively such that $2\ ^2_1=9\ _2$. If the distance between foci of E_1 is 8. Then the difference between foci of E_2 is

1) $\frac{8}{5}$ 2) $\frac{16}{5}$ 3) $\frac{32}{5}$ 4) 18

Key: 3

Sol: $2ae=8, e=\frac{4}{5}\Rightarrow\boxed{a=5}$

$b^2=a^2-a^2 2=9$

$2\ ^2,=9\ _2\Rightarrow 2\left(\frac{18}{5}\right)^2=9\frac{2A^2}{B}$

$A^2=B^2\left(1-e^2\right)$

$\Rightarrow B=4$

$\therefore$ Required $=2Be=2.4.\frac{4}{5}=\frac{32}{5}$

17. Let R be relation defined on the set $\{1,2,3,4\}\times\{1,2,3,4\}$ by $R=\{((a,b)(c,d)):2a+3b=3c+4d\}$ then the number of elements in R is

1) 6 2) 15 3) 12 4) 13

Key: 3

Sol: (a b) $\rightarrow$(c, d)

$(1,1) \rightarrow$ No values

$(1,2) \rightarrow$ No values

$(1,3) \rightarrow (1,2)$

$(1,4) \rightarrow (2,2)$

$(2,1) \rightarrow (1,1)$

$(2,2) \rightarrow (2,1)$

$(2,3) \rightarrow (3,1)$

$(2,4) \rightarrow (4,1)$

$(3,1) \rightarrow$ No values

$(3,2) \rightarrow$ No values

$(3,3) \rightarrow (1,3)$

$(3,4) \rightarrow (2,3)$

$(4,1) \rightarrow (1,2)$

$(4,2) \rightarrow (2,2)$

$(4,3) \rightarrow (3,2)$

$(4,4) \rightarrow (2,2)$

Number of elements = 12

18. Let 729, 81, 9, 1…….be a sequence and P_n denote the product of the first n terms of the sequence. If $2\sum_{n=1}^{40}(P_n)^{\frac{1}{n}} = \frac{3^{\alpha}-1}{3^{\beta}}$ and gcd of $(\alpha,\beta)=1$ then $\alpha+\beta$ is equal to

1) 79 2) 73 3) 76 4) 75

Key: 2

Sol: $P_n = 3^{6+4+2+.....+}(-24+8) = 3^{n(7-4)} \Rightarrow P_n^{1/4} = 3^{7-n}$

$$\sum_{n=1}^{40}(P_n)^{1/4} = 3^6 + 3^5 + ...40(-\infty+n) = 3^6\left[\frac{1-\left(\frac{1}{3}\right)^{40}}{1-\frac{1}{3}}\right] = \frac{3^{40}-1}{2.3^{33}}$$

$\therefore \alpha = 4^{o}.\beta = 33$

19. Let A_1 the bounded area enclosed by the curves $y=x^2+2, x+y=8$ and y-axis that lies in the first quadrant. Let A_2 be bonded area enclosed by the curves $y=x^2+2, y^2=x, x=2$ and y-axis that lies in the first quadrant then A_1-A_2 is equal to

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

Key: 1

Sol: $y=x^2+2$

$8-x=x^2+2$

$\Rightarrow x^2+x-6=0 \quad \Rightarrow (x-2)(x+3)=0 \quad \Rightarrow x=2, x=-3$

$A_1=\int_0^2\left[(8-x)\left(x^2+2\right)\right]dx$

$=\int_0^2\left(6-x-x^2\right)dx=\left[6x-\frac{x^2}{2}-\frac{x^3}{3}\right]_0^2=\left[\left(12-2-\frac{8}{3}\right)-0\right]=\frac{22}{3}$

$A_2\int_0^2\left(x^2+2-\sqrt{x}\right) \quad =\left[\frac{x^3}{3}+2x-\frac{x^{\frac{3}{2}}}{\frac{3}{2}}\right]^2 \quad =\left[\left(\frac{8}{3}+4-\frac{2}{3}2\sqrt{2}\right)-0\right]=\frac{20}{3}-\frac{2}{3}2\sqrt{2}$

20. Let $\bar{a}=2\hat{i}+\hat{j}-2\hat{k}$, $\bar{b}=\hat{i}+\hat{j}$ and $\bar{c}=\bar{a}\times\bar{b}$. Let $\bar{d}$ be a vector such that $\left|\bar{d}-\bar{a}\right|=\sqrt{11}, \left|\bar{c}\times\bar{d}\right|=3$ and angle between $\bar{c}$ and $\bar{d}$ is $\frac{\pi}{4}$. Then $\bar{a}.\bar{d}$ is equal to

1) 11 2) 0 3) 1 4) 3

Key: 2

Sol: $\varepsilon=\begin{vmatrix}\hat{i} & \hat{j} & \hat{k}\\ 2 & 1 & -2\\ 1 & 1 & 0\end{vmatrix}=\hat{i}(2)-\hat{j}(2)+\hat{k}(1)$

$\left|\bar{c}\times\bar{d}\right|=3\Rightarrow\left|\bar{c}\right|\left|\bar{d}\right|\sin\left(\bar{c},\bar{d}\right)=3\Rightarrow 3\left|\bar{d}\right|\frac{1}{\sqrt{2}}=3$

$\left|d\right|=\sqrt{2}$

$\left|\bar{d}-\bar{a}\right|=\sqrt{11}\Rightarrow\bar{d}^2+\bar{a}^2-2\bar{a}.\bar{d}=11\Rightarrow\bar{d}^2+9-2\bar{a}.\bar{d}=11\Rightarrow\bar{a}.\bar{d}=0$

SECTION-II
(NUMERICAL VALUE TYPE

This section contains **5Numerical Value Type Questions.** The Answer should be within **0 to 9999.** If the Answer is in **Decimal** then round off to the **Nearest Integer** value (Example i,e. If answer is above **10** and less than **10.5** round off is **10** andIf answer is from **10.5** and less than **11** round off is **11).**

Marking scheme: +4 for correct answer, 0 if not attempt and -1 in all other cases.

21. The number of numbers greater than 5000, less than 9000 and divisible by 3, that can be formed using the digits 0, 1, 2, 5, 9, if the repetition of the digits is allowed is___

Key: 42

Sol: conceptual

22. Let a differentiable function f satisfy the equation $\int_0^{36} f\left(\frac{tx}{36}\right)dt = 4\alpha f(x)$.

If $y = f(x)$ is a standard parabola passing through the points $(2,1)$ and $(-4,\beta)$ then β^{α} is equal to_____

Key: 64

Sol: $\int_0^{36} f\left(\frac{tx}{36}\right)dt.\frac{tx}{36} = y\ dt = \frac{36}{x}dy$

$\therefore \int_0^{x} \frac{f(y)36\,dy}{x} = 4\alpha + f(x)$

$\int_0^{x} f(y)dy = \frac{\alpha.x.f(x)}{9} \Rightarrow f(x) = \frac{\alpha}{9}(f + xfi)$

$\frac{f^1(x)}{f(x)} = \left(\frac{9}{\alpha} - 1\right)\frac{1}{x} \Rightarrow f(x) = c\ x^{\left(\frac{9}{\alpha}-1\right)}(2,1)$

$\alpha = 3, c = \frac{1}{4}\left[\therefore \frac{9}{\alpha} - 1 = 2\right]$

$y = \frac{x^2}{4}\hat{i}(-4,\beta)$ parabola $\Rightarrow \beta = 4$

$\beta^{\alpha} = 64$

23. The number of 3×2 matrices A. which can be formed using the elements of the set $\{-2,-1,0,1,2\}$ such that the sum of all the diagonal elements of A^TA is 5, is _____

Key: 312

Sol: $A = \begin{bmatrix} a & b \\ c & d \\ e & f \end{bmatrix}$ sum of diaconal elements of A^TA is 5 $\Rightarrow a^2 + b^2 + c^2 + d^2 + e^2 + f^2 = 5$

by verification the number of matrices is 312

24. Let $(2\alpha,\alpha)$ be the largest interval in which the function $f(t) = \frac{|t+1|}{t^2}, t < 0$ is strictly decreasing. Then the local maximum value of the function $g(x) = 2\log_e(x-2) + ax^2 + 4x - \alpha, x > 2$, is_____

Key: 4

Sol: $\left(\frac{t+1}{t^2}\right)$ is decreasing in $(-2,-1)$

$\boxed{\alpha = -1}$

$g(x) = \log(x-2) - x^2 + 4x + 1$

$g^1(x) = -\dfrac{(x-3)(x-1)}{x-2}$

$g(x)$ has maximum at $x = 3 \Rightarrow g(3) = 4$

25. Let a line L passing through the point P $(1,1,1)$ be perpendicular to the lines $\dfrac{x-4}{4} = \dfrac{y-1}{1} = \dfrac{z-1}{1}$ and $\dfrac{x-17}{1} = \dfrac{y-71}{1} = \dfrac{z}{0}$. Let the line L intersect the $yz-$plane at the point Q. Another line parallel to L and passing through the point $S(1,0,-1)$ intersects the yz-plane at point R. Then the square of the area of the parallelogram PQRS is equal to_____

Key: 6

Sol: $\bar{a} \times \bar{b} = -\hat{i} + \hat{j} + 3\hat{k}$

$1: \dfrac{x-1}{-1} = \dfrac{y-1}{1} = \dfrac{z-1}{3} = \lambda$

$(0,2,4)$, Area $= \left|\overline{PQ} \times \overline{PS}\right| = \sqrt{6}$

PHYSICS **Max Marks: 100**

SECTION-I
(SINGLE CORRECT ANSWER TYPE)

This section contains **20 Multiple Choice Questions.** Each question has 4 options (1), (2), (3) and (4) for its answer, out of which ONLY ONE option can be correct.

Marking scheme: +4 for correct answer, 0 if not attempted and –1 in all other cases.

26. Density of water 4°c and 20°c are $1000kg/m^3$ and $998kg/m^3$ respectively the increase in internal energy of 4kg of water when it is heated from 4°c to 20°c is ____J.

(specific heat capacity of water=4.2J/kg and 1 atmospheric pressure $=10^5\,Pa$)

1) 268799.2 2) 315826.2 3) 258700.8 4) 234699.2

Key: 1

Sol: $Q = msdt = 4\times4200\times16 = 268800$

$W = pdv = p[v_2 - v_1]$

$$= P\left[\frac{m}{\rho_2} - \frac{m}{\rho_1}\right]$$

$$= 10^5\left[\frac{4}{998} - \frac{4}{1000}\right]$$

$$= \frac{10^5\times4\times2}{998\times1000}$$

$$= 0.8016$$

$\Delta u = dQ - dw$

$= 268800 - 0.8016$

$268799.19J$

27. In a microscope of tube length 10cm, two convex len's are arranged with focal length of 2cm and 5cm Total magnification obtained with this system for normal advistament is $(5)^k$ the value of K is

1) 4 2)5 3) 2 4) 3.5

Key: 3

Sol: $f_o = 2cm,\ f_e = 5cm\ ,L = 10cm$

Magnification $m = m_o\ me = \frac{L}{f_o}\left(\frac{D}{fe}\right)$

$\therefore m = \frac{10}{2}\left(\frac{25}{2}\right)$ $= 5\ (5)$

$\therefore \boxed{K = 2}$

28. Two electrons are moving in orbits of two hydrogen like atoms with speed $3\times10^5\,m/s$ and $2.5\times10^5\,m/s$ respectively. If the radii of these orbits are nearly same then, the possible order of energy states are ___respectively

1) 9 and 8 2) 10 and 12 3) 8 and 10 4) 6 and 5

Key: 4

Sol: $E\alpha\frac{z^2}{n^2}\&\,V\alpha\frac{z}{n}$

For hydrogen like atom $E\alpha\frac{1}{n^2}\&\,V\alpha\frac{1}{n}$

$$\Rightarrow E\alpha V^2\Rightarrow\frac{E_1}{E_2}=\left(\frac{V_1}{V_2}\right)^2=\left(\frac{3\times10^5}{2.5\times10^5}\right)^2\Rightarrow\frac{E_1}{E_2}=\left(\frac{6}{5}\right)^2=\frac{36}{25}$$

But $\frac{E_1}{E_2}=\left(\frac{n_2}{n_1}\right)^2=\left(\frac{6}{5}\right)^2$

$\therefore$ Possible states are 6 & 5

29. There are three co-centric conducing spherical shell A,B and C radii a, b and c respectively $(c<b<a)$ and they are charged with charge $q_1,\ q_2\ and\ q_3$ respectively. The potentials of the spheres A, B and C respectively, are:

1) $\frac{1}{4\pi\varepsilon_o}\left[\frac{q_1+q_2+q_3}{a}\right],\frac{1}{4\pi\varepsilon_0}\left[\frac{q_1+q_2}{b}+\frac{q_3}{c}\right],\frac{1}{4\pi\varepsilon_0}\left[\frac{q_1}{a}+\frac{q_2}{b}+\frac{q_3}{c}\right]$

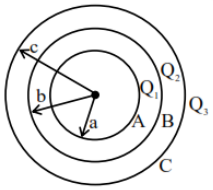
2) $\frac{1}{4\pi\varepsilon_o}\left[\frac{q_1}{a}+\frac{q_2}{b}+\frac{q_3}{c}\right],\frac{1}{4\pi\varepsilon_0}\left[\frac{q_1+q_2+q_3}{b}\right],\frac{1}{4\pi\varepsilon_0}\left[\frac{q_1+q_2+q_3}{c}\right]$

3) $\frac{1}{4\pi\varepsilon_0}\left[\frac{q_1+q_2+q_3}{a}\right],\frac{1}{4\pi\varepsilon_0}\left[\frac{q_1+q_2+q_3}{b}\right]\frac{1}{4\pi\varepsilon_0}\left[\frac{q_1+q_2+q_3}{c}\right]$

4) $\frac{1}{4\pi\varepsilon_o}\left[\frac{q_1}{a}+\frac{q_2}{b}+\frac{q_3}{c}\right],\frac{1}{4\pi\varepsilon_0}\left[\frac{q_1+q_2}{b}+\frac{q_3}{c}\right],\frac{1}{4\pi\varepsilon_0}\left[\frac{q_1+q_2+q_3}{c}\right]$

Key: 4

Sol:



$$v_A=\frac{1}{4\pi c_0}\left[\frac{q_1}{a}+\frac{q_2}{b}+\frac{q_3}{c}\right]$$

$$v_B=\frac{1}{4\pi c_0}\left[\frac{q_1+q_2}{b}+\frac{q_3}{c}\right]\qquad v_c=\frac{1}{4\pi c_0}\left[\frac{q_1+q_2+q_3}{c}\right]$$

30. An unpolarised light is incident at an interface of two dielectric media having refractive indices of 2 and $2\sqrt{3}$ respectively to satisfy the condition that reflected and refracted rays are perpendicular to each other, the angle of incidence is ___

1) 30^O 2) 60^O 3) 45^O 4) 10^O

Key: 2

Sol: From Brewster law

$$\text{Tan}\theta_P = \frac{\mu_2}{\mu_1} = \frac{2\sqrt{3}}{2} = \sqrt{3}$$

$$\boxed{\theta_P = 60^o}$$

31. Match the list -1 with list-II

	List-I		**List-II**
(A)	Magnetic induction	(I)	$M\,L\,T^{-2}\,A^{-2}$
(B)	Magnetic flues	(II)	$M\,L^2\,T^{-2}\,A^{-2}$
(C)	Magnetic permeability	(III)	$M\,L^o\,T^{-2}\,A^{-1}$
(D)	Self induction	(IV)	$M\,L^2\,T^{-2}\,A^{-1}$

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

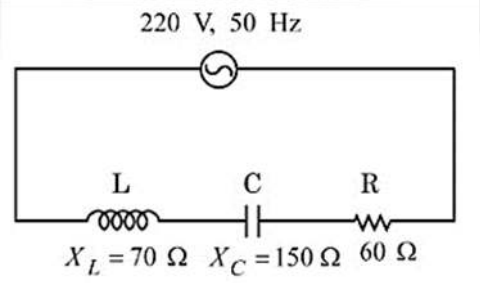
3) $A-IV, B-III, C-I, D-II$ 4) $A-III, B-IV, C-I, D-II$

Key: 4

Sol: $B = F/m = \left[mL^o\,T^{-2}A^{-1}\right], \phi = BA = \left[mL^2\,T^{-2}A^{-1}\right]$

$$\mu_o = \frac{Fr^2}{m_1 m_2} = \left[mLT^{-2}A^{-2}\right] \; L = \frac{U}{i2} = \left[mL^2T^2A^{-2}\right]$$

32. For a series LCR circuit connected with 220V 50 Hz a.c source as shown in the figure The power factory is $\frac{\alpha}{10}$ the valve of α is __



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

Key: 3

Sol: $\text{Cos}\phi = \frac{R}{Z} = \frac{R}{\sqrt{(x_c - x_c)^2 + R^2}} = \frac{60}{\sqrt{(150-70)^2 + (60)^2}}$

$\text{Cos}\phi = \frac{60}{100} = \frac{\alpha}{10}$

$\boxed{\alpha = 6}$

33. Match the list -1 with list-II

	List-I		**List-II**
A)	Ratio wave	I)	Is produced by magnetron value
B)	Micro wave	II)	Due to change in vibrational modes of atoms
C)	Infrared – wave	III)	Due to inner shell electron moving from higher energy level to lower energy level
D)	X-ray	Iv)	Due to rapid acceleration of chares

Choose the correct answer from the options given below:

1) $A \to IV, B \to I, C \to II, D \to III$ 2) $A \to II, B \to IV, C \to III, D \to I$

3) $A \to IV, B \to II, C \to I, D \to III$ 4) $A \to IV, B \to III, C \to I, D \to II$

Key: 1

Sol: Radio waves are produced by acceleration of charges, micro waves are produced by magnetron value IR waves are produced by vibration modern of atoms, x rays are produced by electrons moving from high to low

34. A cylindrical block of mass M and area of cross section A is floating in a liquid of density ρ and with x-axis vertical when depressed a little an released the block starts oscillating the period of oscillation is ____

1) $2\pi\sqrt{\frac{A}{Mg}}$ 2) $2\pi\sqrt{\frac{M}{\rho Ag}}$ 3) $\pi\sqrt{\frac{A}{Mg}}$ 4) $\pi\sqrt{\frac{2M}{Ag}}$

Key: 2

Sol: In equilibrium

When it is depressed

$F_{net} = W_{app} - F_B(x+y)$

$\Rightarrow ma = Wapp - F_{Bx} - F_{By} \Rightarrow ma = -V_{in} e\ g$

$\Rightarrow ma = -(Ay)e - g \quad \Rightarrow a = -\frac{(Aeg)}{M} y$

Compare with

$a = -w^2 y$

$\therefore w^2 = \frac{Aeg}{M} \qquad \Rightarrow w = \sqrt{\frac{Aeg}{M}}$

$T = \frac{2\pi}{\omega} \qquad \Rightarrow \boxed{T = 2\pi\sqrt{\frac{M}{Aeg}}}$

35. Given below are two statements:

Statement –I :- For all elements, grater then mass of the nucleus, greater is the binding energy per nucleon

Statement –II :-For all elements, nuclei with less binding energy per nucleon transforms to nuclei with grater bonding energy per nucleon

In the light of the above statements, choose the correct answer from the option given below

1) Statement –I is true but Statement –II are false
2) Both Statement –I and Statement –II are false
3) Both Statement –I and Statement –II are true
4) Statement –I is false but Statement –II is true

Key: 4

Sol: Statement-I is false because the binding energy per nucleon generally increases with mass number upto 56 and then it gradually decreases for heavier nuclei

Statement-II is true because less BE/A. nuclei transform into nuclei with greater BE/A

36. The electro static potential in a charged spherical region of radius r varies as $V= ar^3+b$. where a and b are constants. The total charge in the sphere of unit radius is $\alpha \times \pi a \varepsilon_0$. The value of α is _____.

(permittivity of vacuum is ε_0)

1) -8 2) -9 3) -12 4) -6

Key: 3

Sol: We know $E=-\frac{dv}{dr} \Rightarrow E=-a\left(3r^2\right)+0 \quad \Rightarrow E-3ar^2$

From gauss's law $\phi=\bar{E}.\bar{ds}=\frac{q}{\varepsilon_o} \Rightarrow -3ar^2\left(4\pi r^2\right)=\frac{q}{\varepsilon_o} \Rightarrow -12\pi ar^4=\frac{q}{\varepsilon_o}$

Given $r=1 \Rightarrow q=-12\pi a\varepsilon_o$

$\therefore \boxed{\alpha=-12}$

37. Three charges $+2q,+3q \text{ and } -4q$ are satiated at $(0,-3a),(2a,0) \text{and} (-2a,0)$ respectively in the x y plane. The resultant dipole moment about origin is_____.

1) $2qa\left[3\hat{i}-7\hat{j}\right]$ 2) $2qa\left[3\hat{j}-7\hat{i}\right]$ 3) $2qa\left(7\hat{i}-3\hat{j}\right)$ 4) $2qa\left(3\hat{j}-\hat{i}\right)$

Key: 3

Sol: $q_1=+2q \; r_1=-3a\hat{j}$

$q_1=+3q \; r_2=2a\hat{i}$

$q_3=+4q \; r_3=-2a\hat{i}$

$P=\varepsilon q r=q_1r_1+q_2r_2+q_3r_3$

$P=(2q)\left(-3a\hat{j}\right)+3q(2a)\hat{i}+(-4q)(-2a)\hat{i}$

$P=2qa\left[7\hat{i}-3\hat{j}\right]$

38. Two resistor's of 100Ω each are connected in series with a 9V battery a voltmeter of 400Ω resistance is connected two measure the voltage drop a cross one of the resistance the voltmeter reading is_____V

1) 4.5 2) 4 3) 3 4) 2

Key: 2

Sol: Req =100 + 800 =180

$I=\frac{9}{180}$

Voltmeter reading = $iR=\frac{9}{180}\times 80=4v$

39. Two masses 400g and 350g are suspended from the ends of a light string passing over a heavy pulley of radius 2 cm when released from rest the heavier mass is observed to fall 81 cm is 9s. The rotational inertia of the pulley is ___kg.m^2. (g=9.8 m/s^2)

1) 4.75×10^{-3} 2) 1.86×10^{-2} 3) 9.5×10^{-3} 4) 8.3×10^{-3}

Key: 3

Sol: $a=\dfrac{(m_2-m_1)g}{\left[m_1+m_2+\dfrac{I}{R^2}\right]} \Rightarrow S=21t+\dfrac{1}{2}at^2$

$$\frac{81}{100}=0+\frac{1}{2}\left[\frac{m_2-m_1}{m_1+m_2+\frac{I}{R^2}}\right]g(\not{9})^2$$

$$\rightarrow\left[m_1+m_2+\frac{I}{R^2}\right]=\frac{1}{2}\frac{(m_2-m_1)(g)}{}100$$

$$\left[\frac{750}{1000}+\frac{I}{R^2}\right]=\frac{1}{2}\left[\frac{50}{1000}\right](9.8)100$$

$$\boxed{I=9.5\times10^{-4}.kg\,m^2}$$

40. A boy throw's a ball in to air at 45° from the horizontal to land on a roof of a building of height H. If the ball attains maximum height in 2s and land on the building in 3s after launch then the value of H is ___m (g=10 m/ s^2)

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

Key: 1

Sol: $t_a=2=\dfrac{u\sin\theta}{g}$ $\qquad 2=\dfrac{u}{g}.\left(\dfrac{1}{\sqrt{2}}\right)$

$u=2\sqrt{2}g$ $\qquad Sg=(u\sin\theta)t-\dfrac{1}{2}gt^2$

$$H=2\sqrt{2}g\left(\frac{1}{\sqrt{2}}\right)(3)-\frac{1}{2}g(3)^2$$

$$\boxed{H=15m}$$

41. A brass wire of length 2m and radius 1mm at 27°c is held taut between two rigid supports initially it was cooled to temperature of -43°c creating a tension T in the wire. The temperature to which the wire has to be cooled in order to increase the tension in it to 1.4T is ___°c

1) -80 2) -65 3) -71 4) -86

Key: 3

Sol: Thermal stress $F=yA\alpha\Delta t=yA\alpha[t_2-t_1]$

$$\frac{T}{1.4T}=\frac{yA\alpha[-43-27]}{yA\alpha[t-27]}\Rightarrow\frac{1}{1.4}=\frac{-70}{t-27}\Rightarrow t-27=-70(1.4)\Rightarrow t=-98+27\Rightarrow\boxed{t=-71^oc}$$

42. Three masses 200 kg, 300 kg and 400 kg are placed at the vertices of an equilateral triangle with sides 20 m. They are rearranged on the vertices of a bigger triangle of side 25 m and with same centre. The work done in this process is ____J.

(Gravitational constant $G = 6.7 \times 10^{-11} Nm^2/kg^2$)

1) 2.85×10^{-7} 2) 4.77×10^{-7} 3) 9.86×10^{-6} 4) 1.74×10^{-7}

Key: 4

Sol: $w = \Delta U$

$$U_i = --\left[\frac{Gm_1m_2}{r_{12}} + \frac{m_2m_3}{r_{23}} + \frac{Gm_3m_1}{r_{13}}\right]$$

$$= -\frac{6.67\times10^{-11}}{20}\left[200\times300 + 300\times400 + 400\times200\right]$$

$$= -\frac{6.67\times10^{11}}{20}\left[6+12+8\right]\times10^4$$

$$= -\frac{6.67\times10^{-12}}{\not{2}}\overset{13}{[26]}\times10^4$$

$$= -86.71\times10^{-8}$$

$$U_f = -\frac{6.67\times10^{-11}}{25}\left[26\times10^4\right]$$

$$= -6.93\times10^{-7}$$

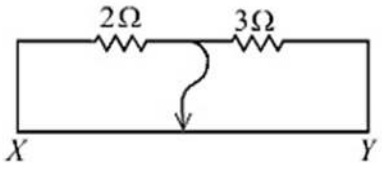
$$= -69.3\times10^{-8}$$

$$W = U_f - U_i = \left[-69.3+86.71\right]10^{-8}$$

$$= 17.41\times10^{-8}$$

$$\boxed{w = 1.741\times10^{-7}\,J}$$

43. Two resistors 2Ω and 3Ω are connected in the gap of bridge as shown in fig the null point is obtained with the contact of jockey at some point on wire XY. When an unknown resistor is connected in parallel with 3Ω resistor , the null point is shifted by 22.5cm towards Y. The resistance of unknown resistor is___Ω



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

Key: 4

Sol: $\frac{P}{Q}=\frac{\quad}{100-}$

$\frac{2}{3}=\frac{\quad}{100-}$

$200-2\ =3$

$200=5\ \Rightarrow\ =\frac{200}{5}=40\text{cm}$

If unknown resistor (R) is connected in parallel with 3Ω

R, 3 are in P$\rightarrow$ $\frac{3R}{R+3}$

$^{1}=\ +22.5=40+22.5$

$=62.5$

From $\frac{P}{Q}=\frac{^{1}}{100-\ ^{1}}$

$\frac{2(R+3)}{3R}=\frac{62.5}{37.5}$

$\frac{2(R+3)}{\not{3}R}=\frac{5}{\not{3}}\Rightarrow 2R+3(2)=5R\ \Rightarrow 6=5R-2R$

$3R=6$

$R=\frac{6}{3}=2\Omega$

44. A spring of force constant 15N/m is cut into two pieces If the ratio of their lengths is 1:3, then force constant of smaller pieces is___N/m

1) 45 2) 15 3) 60 4) 20

Key: 3

Sol: $K\alpha\frac{1}{-}\Rightarrow K\ =\text{Constant}$

$K=k_{\ 1}\ _{1}$ Given $\frac{^{1}}{_{2}}=\frac{1}{3}\Rightarrow\ _{2}=3\ _{1}$

But $=\ _{1}+\ _{2}=\ _{1}+3\ _{1}=4\ _{1}\Rightarrow\ _{1}=\frac{}{4}$

$\therefore 15\ =K_{1}\left(\frac{}{4}\right)$

$K_{1}=15\times 4\Rightarrow\boxed{K_{1}=60\text{N/m}}$

45. The exit surface of prism with Refractive index n is coated with material having Refractive index n/2 when this prism is set for minimum angle of deviation It Exactly meet's the condition of critical angle, the prism angle is ___

1) 15^O 2) 60^O 3)45^O 4) 30^O

Key: 2

Sol: $\sin c = \frac{n/2}{n} = \frac{1}{2}$

At minimum deviation

A $2r = 60^o$

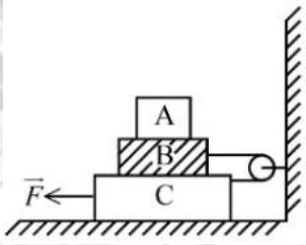
$r_1 = r_2 = c = 30^o$

SECTION-II
(NUMERICAL VALUE TYPE

This section contains **5 Numerical Value Type Questions.** The Answer should be within **0 to 9999.** If the Answer is in **Decimal** then round off to the **Nearest Integer** value (Example I,e. If answer is above **10** and less than **10.5** round off is **10** andIf answer is from **10.5** and less than **11** round off is **11).**

Marking scheme: +4 for correct answer, 0 if not attempt and -1 in all other cases

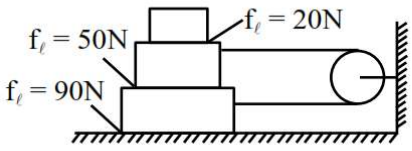
46. In the given figure the blocks A, B and C weigh 4 kg , 6 kg and 8 kg respectively. The co-efficient of sliding friction between any two surfaces is 0.5. The force F required to slide the block C with constant speed is ____N. (Use g=10 m/s^2)



Key: 210

Sol:

For 8kg to move with constant velocity $F_{net} = 0$.



$\therefore$ F = 90 + T + 50 (for 8kg block)

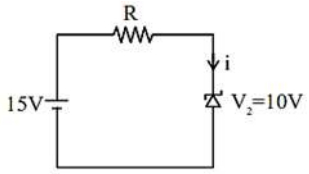
T = 20 + 50 (for 6kg block)

$\therefore$ F = 210 N.

47. A voltage regulating circuit consisting of Zener diode, having break-down voltage of 10 V and maximum power dissipation of 0.4 W, is operated at 15 V. The approximate value of protective resistance in this circuit is ____Ω

Key: 125

Sol:



$P_D = 0.4w = 10i$

$i = 0.04A$

$R = \frac{15-10}{0.04} = \frac{5}{0.04} = 125\ \Omega$

48. A gas of certain mass filled in a closed cylinder at a pressure of 3.23 kPa has temperature 50 ^{0}C. The gas is now heated to double its temperature. The modified pressure is ____Pa.

Key: 3730

Sol: $\frac{P_1}{P_2} = \frac{T_1}{T_2}$ $\frac{3.23\times10^3}{P_2} = \frac{273+50}{273+100} = \frac{323}{373}\ P_2 = 3730P$

49. A short bar magnet placed with its axis at 30^0 with an external field of 800 Gauss, experiences a torque of 0.016 N.m. The work done in moving it from most stable to most unstable position is $\alpha\times10^{-3}J$. The value of α is _____

Key: 64

Sol:

$\tau = \mu B\sin\theta \Rightarrow 0.016 = \mu\times B\times\frac{1}{2}$

$\Rightarrow \mu = \frac{0.032}{B}$

$W_{ext} = U_f - U_i = \mu B - (\mu B) = 2\mu B$

$= 2\times\frac{0.032}{B}\times B$

$= 0.064\ J$

50. Sixty four rain drops of radius 1 mm each falling down with a terminal velocity of 10 cm/s coalesce to form a bigger drop. The terminal velocity of bigger drop is ____ cm/s.

Key: 160

Sol:

$V_T = \frac{2r^2g}{9\eta}[\sigma-\rho]$

$V_T \propto r^2$

64 drop

$64\left(\frac{4}{3}\pi R_1^3\right) = \frac{4}{3}\pi R_2^3$

$R_2 = 4R_1$

$\frac{(V_T)_1}{(V_T)_2} = \left(\frac{R_1}{R_2}\right)^2 = \left(\frac{1}{4}\right)^2$

$\frac{10}{(V_T)_2} = \frac{1}{16}$

$(V_T)_2 = 160$ cm/sec

CHEMISTRY **Max Marks: 100**

SECTION-I
(SINGLE CORRECT ANSWER TYPE)

This section contains **20 Multiple Choice Questions.** Each question has 4 options (1), (2), (3) and (4) for its answer, out of which ONLY ONE option can be correct.

Marking scheme: +4 for correct answer, 0 if not attempted and –1 in all other cases.

51. Given below are two statements:

Statement-I: Hybridisation, shape and spin only magnetic moment of $K_3[Co(CO_3)_3]$ is sp^3d^2, octahedral and 4.9 BM respectively.

Statement-II: Geometry, hybridisation and spin only magnetic moment values (BM) of the ions $\left[Ni(CN)_4 \right]^{2-}$, $[MnBr_4]^{2-}$ and $[CoF_6]^{2-}$ respectively are square planar, tetrahedral, octahedral; dsp^2, sp^3, sp^3d^2 and 0, 5.9, 4.9.

In light of the above statements, choose the correct answer from the options given below

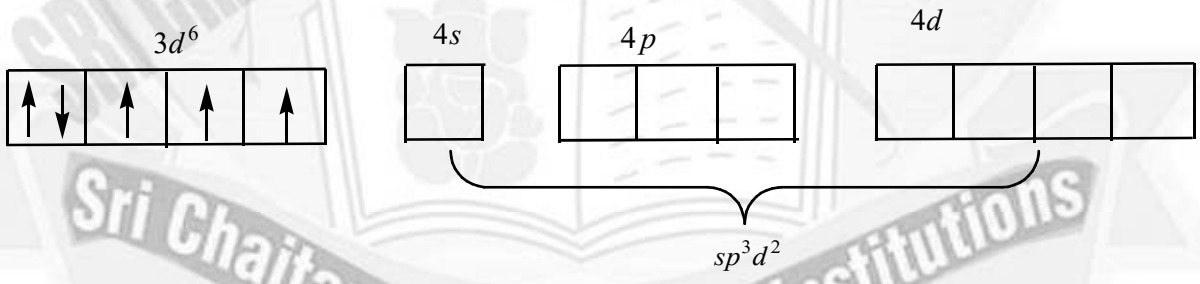
1) S-I is true but S-II is false
2) Both S-I and S-II are true
3) S-I is false but S-II is true
4) Both S-I and S-II are false

Key: 2

Sol: S-I $K_3\left[Co(CO_3)_3\right]$

$Co^{+3} - 3d^6 4s^0 4p^0$

Co_3^{-2}-Weak field ligand, no pairing of electrons



No. of unpaired electrons $\mu = 4$

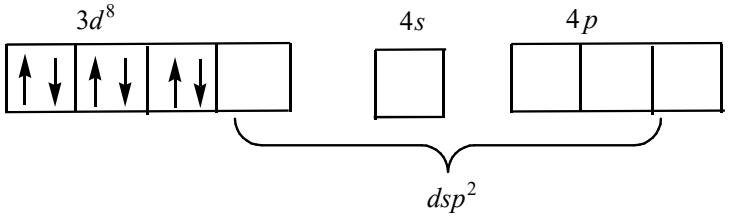
Magnetic moment $\mu = \sqrt{n(n+2)}BM$

$\mu = \sqrt{4(4+2)} = \sqrt{24} = 4.9\text{BM}$

S-II : $\left[Ni(CN)_4\right]^{2-}$

$Ni^{+} - 3d^8$

CN^{-} - strong field ligand, pairing takes place

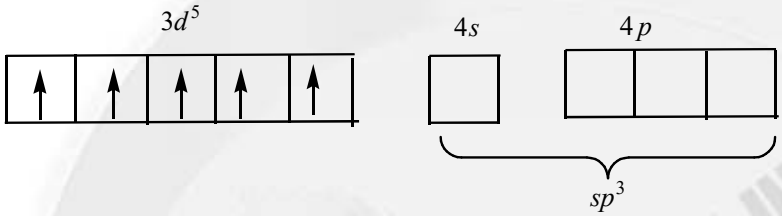


N=0, $\mu = 0$

$[MnBr_4]^{2-}$

$Mn^{+2} - 3d^5$

Br^- -weak field ligand, no pairing



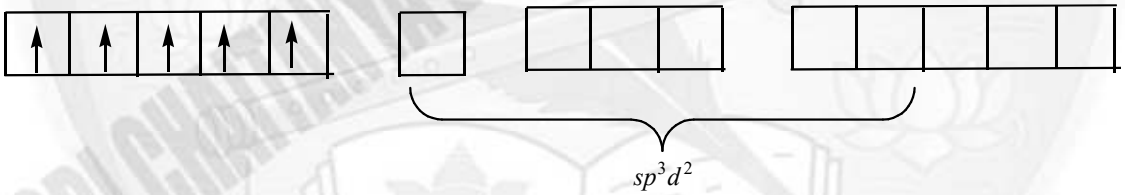
n=5

$\mu = \sqrt{5(5+2)} = \sqrt{35}$ =5.9BM

$[CoF_6]^{3-}$

$Co^{+3} - 3d^6$

F^- -weak field ligand, no pairing



N=4, $\mu = \sqrt{4(4+2)} = \sqrt{24}$ =4.9 BM

52. Given below are statements about some molecules/ions.

Identify the CORRECT statements.

A. The dipole moment value of NF_3 is higher than that of NH_3.

B. The dipole moment value of BeH_2 is zero.

C. The bond order of O_2^{2-} and F_2 is same.

D. The formal charge on the central oxygen atom of ozone is -1.

E. In NO_2, all the three atoms satisfy the octet rule, hence it is very stable.

Choose the correct answer from the options given below:

1) B & C only

2) B, C & D only

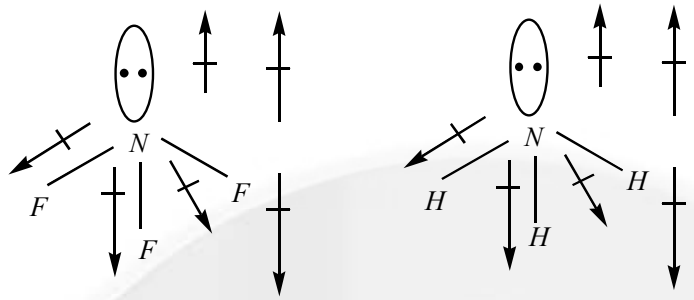
3) A, C & D only

4) A, B, C, D & E

Key:1

Sol:

A)



B) $H-Be-H$

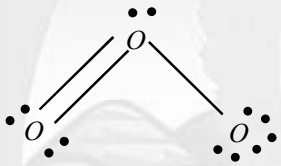
Linear $\mu=0$

C) $O_2^{-2}, F_2 = 18e^-$

σ_{1s^2} $\overset{*}{\sigma}_{1s^2}$ σ_{2s^2} $\overset{*}{\sigma}_{2s^2}$ $\sigma_{2s_2^2}$ $\pi_{2px}^2 = \pi_{2py}^2 \pi_{2px}^{*2} = \pi_{2py}^{*2}$

B.O.= $\frac{1}{2}[N_b - N_a]$ $= \frac{1}{2}[10-8] = \frac{2}{2} = 1$

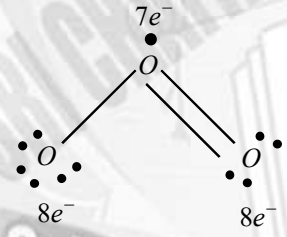
D)



Formal charge $N_A = N_{l.p} - \frac{1}{2}N_{B.P}$

Central oxygen= $6-2-\frac{1}{2}(6) = 6-5 = +1$

E)



53. Arrange the following combinations in the decreasing order of stability

I. $p-Br-C_6H_4-\overset{\ominus}{\ddot{C}}H_2$

II. $C_6H_5-\overset{\ominus}{\ddot{C}}H_2$

III. $p-CH_3O-C_6H_4-\overset{\ominus}{\ddot{C}}H_2$

IV. $p - CHO - C_6H_4 - \overset{\ominus}{\underset{\cdot\cdot}{C}}H_2$

V. $p - CH_3 - C_6H_4 - \overset{\ominus}{\underset{\cdot\cdot}{C}}H_2$

Choose the correct answer from the options given below:

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

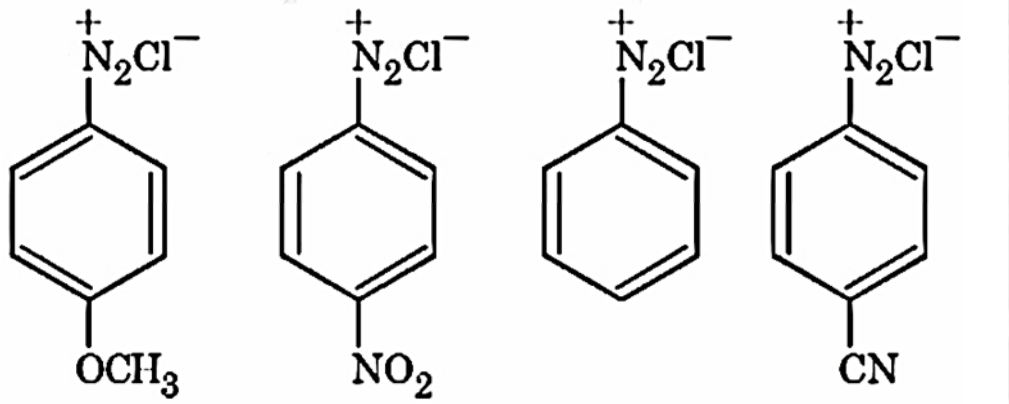
Key: 4

Sol: Stability of carbanion directly proportional to -j groups (E.W.G)

$$P-HO-C_6H_4-CH_2 > P-Br-C_6H_4-CH_2 > C_6H_5-CH_2 >$$

$$P-CH_3-C_6H_4-CH_2 > P-CH_3O-C_6H_4-CH_2$$

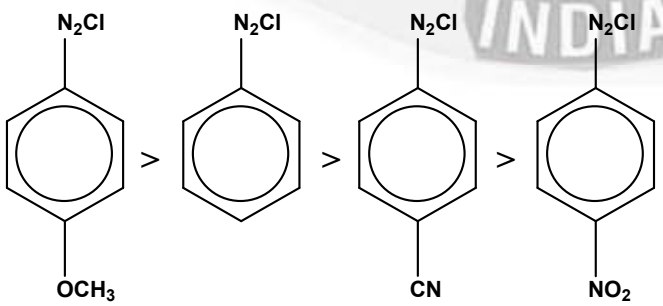
54. The correct stability order of the following diazonium salts is



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

Key: 3

Sol: Diazonium salt stabilized by E.D.G.



55. Among the following, the correct combinations are

A. $IF_3 \rightarrow T-shaped\left(sp^3d\right)$ B. $IF_5 \rightarrow Square\ pyramidal\left(sp^3d^2\right)$

C. $IF_7 \rightarrow Pentagonal\ bipyramidal\left(sp^3d^3\right)$ D. $ClO_4^- \rightarrow Square\ planar\left(sp^2d\right)$

Choose the correct answer from the options given below:

1) A, B and C only 2) A and B only

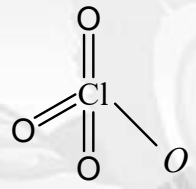
3) A, B, C and D 4) B, C and D only

Key: 1

Sol: A) $IF_3 - AB_3E_2$ type - T-shape - Sp^3d

B) $IF_5 - AB_5E$ type - Square pyramidal - Sp^3d^2

C) $IF_7 - AB_7$ type - Pentagonal bipyramidal $\left(Sp^3d^3\right)$

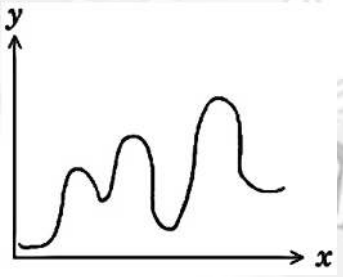
d) ClO_4^- –  $-Sp^3-$ Tetrahedral

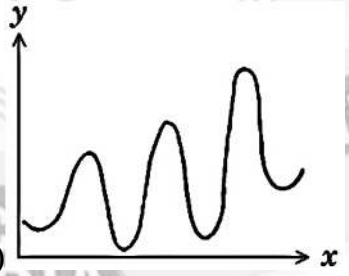
56. A → D is an endothermic reaction occurring in three steps (elementary).

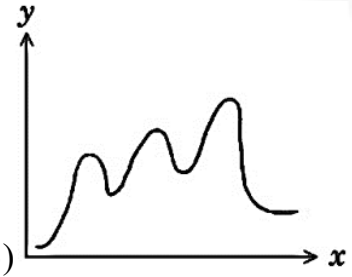
(i) $A \rightarrow B\ \Delta H_i = +ve$ (ii) $B \rightarrow C\ \Delta H_{ii} = -ve$

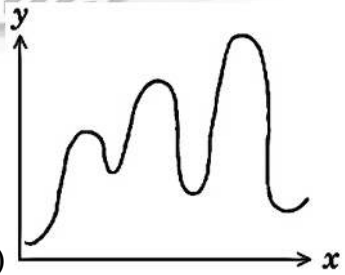
(iii) $C \rightarrow D\ \Delta H_{iii} = -ve$

Which of the following graphs between potential energy (y-axis) vs reaction coordinate (x-axis) correctly represents the reaction profile of A → D?

1) 

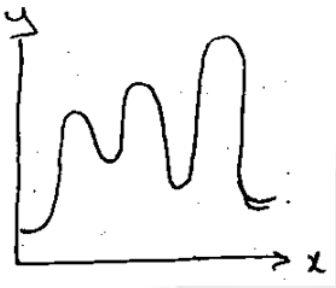
2) 

3) 

4) 

Key: 4

Sol: A → D $\Delta H = +ve$ $\Delta H = H_P - H_R \left(H_p > H_R\right)$



(i) A → B $\Delta H_i = +ve$ $\left(H_p > H_R\right)$

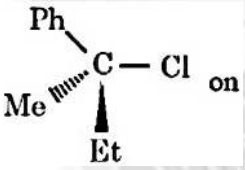
(ii) B → C $\Delta H_{ii} = -ve$ $\left(H_p < H_R\right)$

(iii) C → D $\Delta H_{iii} = -ve$ $\left(H_p < H_R\right)$

57. Given below are two statements

Statement-I: 'C – Cl' bond is strong in $CH_2 = CH - Cl$ than $CH_3 - CH_2 - Cl$

Statement-II: The given optically active molecule,



on hydrolysis gives a solution that can rotate the plane polarized light.

In the light of the above statements, choose the correct answer from the options given below.

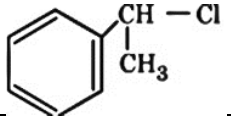
1) S-I is true but S-II is false 2) Both S-I and S-II are false

3) Both S-I and S-II are true 4) S-I is false but S-II is true

Key: 3

Sol: Conceptual

58. Match List-I with List-II

	List-I Chloro derivative		**List-II Example**
A.	Vinyl Chloride	I.	$CH_2 = CH - CH_2Cl$
B.	Benzyl Chloride	II.	$CH_3 - CH(Cl)CH_3$
C.	Alkyl Chloride	III.	$CH_2 = CHCl$
D.	Allyl Chloride	IV.	

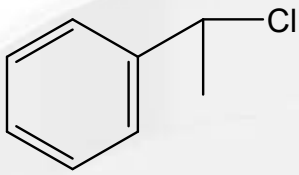
Choose the correct answer from the options given below:

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

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

Key: 4

Sol: Vinyl chloride $CH_2 = CH - Cl$



Benzyl chloride

Alkyl chloride $CH_3 - CH(Cl) - CH_3$

Allyl chloride $CH_2 = CH - CH_2 - Cl$

59. Consider a mixture 'X' which is made by dissolving 0.4 mol of $\left[Co(NH_3)_5 SO_4 \right] Br$ and 0.4 mol of $\left[Co(NH_3)_5 Br \right] SO_4$ in water to make 4 L of solution. When 2 L of mixture 'X' is allowed to react with excess of $AgNO_3$, it forms precipitate 'Y'. The rest 2 L of mixture 'X' reacts with excel $BaCl_2$ to form precipitate 'Z'. which of the following statements is CORRECT?

1) 0.1 mol of 'Y' is formed 2) 0.2 mol of 'Z' is formed

3) 0.4 mol of 'Z' is formed 4) 'Y' is $BaSO_4$ and 'Z' is $AgBr$

Key: 2

Sol: $[CO(NH_3)_5 SO_4]Br \longrightarrow \underset{0.4\,mol}{[CO(NH_3)_5 SO_4]^+} + \underset{0.4\,mol}{Br^-}$

$[CO(NH_3)_5 Br]SO_4 \longrightarrow \underset{0.4\,mol}{[CO(NH_3)_5 Br]SO_4}[CO(NH_3)_5 Br]^{+2} + \underset{0.4\,mol}{SO_4^{-2}}$

X & Y mixed in 4 L

2 L solution contain 0.2 mol Br^- & 0.2 mol SO_4^{-2}

2 L Mixture + $AgNO_3 \longrightarrow \underset{0.2mol}{AgBr} \downarrow$

2 L mixture + $BaCl_2 \longrightarrow \underset{0.2mol}{BaSO_4} \downarrow$

60. Consider three metal chlorides x, y and z, where x is water soluble at room temperature, y is sparingly soluble in water at room temperature and z is soluble in hot water. x, y and z re respectively

1) $MgCl_2, AgCl$ and $AlCl_3$ 2) $CuCl_2, AgCl$ and $PbCl_2$

3) $AgCl, Hg_2Cl_2$ and $PbCl_2$ 4) $AlCl_3, PbCl_2$ and $BaCl_2$

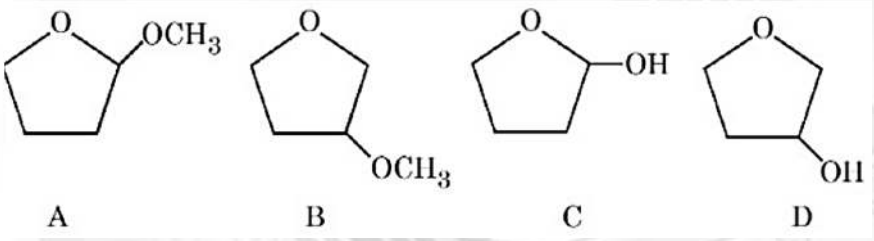
Key: 2

Sol: $X = CuCl_2$ soluble in water at room temperature

$Y = AgCl$ sparingly soluble in water at room temperature.

$Z = PbCl_2$ soluble in hot water.

61. A student is given one compound among the following compounds that gives positive test with Tollen's reagent.



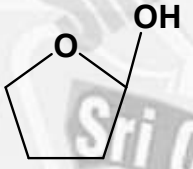
A B C D

The compound is

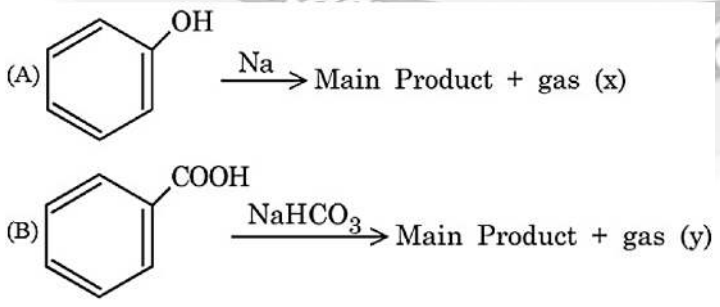
1) A 2) D 3) C 4) B

Key: 3

Sol: Only hemiacetals givesTollen's test



62. Consider the following two reactions A and B

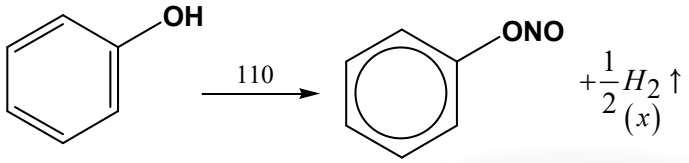


Numerical value of [molar mass of x + molar mass of y] is …

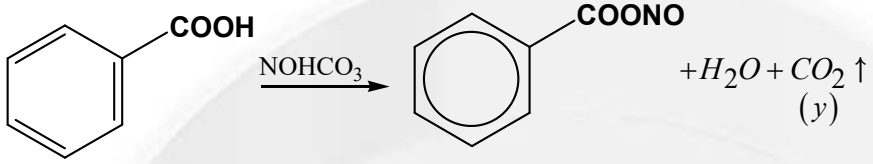
1) 4 2) 46 3) 88 4) 160

Key: 2

Sol: A)



B)



Molar mass of $H_2(x)=2$

Molar mass of $CO_2(y)=44$

$x+y=46$

63. Given below are two statements;

Statement-I: The number of paramagnetic species among

$[CoF_6]^{3-}, [TiF_6]^{3-}, V_2O_5$ and $[Fe(CN)_6]^{3-}$ is 3.

Statement-II:

$K_4[Fe(CN)_6] < K_3[Fe(CN)_6] < [Fe(H_2O)_6]SO_4.H_2O < [Fe(H_2O)_6]Cl_3$

$[Fe(H_2O)_6]Cl_3$ is the correct order in terms of number of unpaired element(s) present in the complexes.

In the light of the above statements, choose the correct answer from the options given below

1) Both S-I and S-II are true
2) S-I is false but S-II is true
3) S-I is true but S-II is false
4) Both S-I and S-II are false

Key: 1

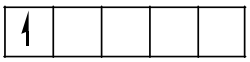
Sol: S-I

$\left[COF_6\right]^{3-} CO^{+3} - 3d^6$ 

F^- - weatfield ligand, no pairing.

No. of unpaired $e's(n)=4$

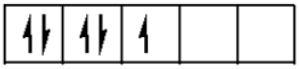
$\therefore$ *Paramagnetic*

$[TiF_6]^{3-}$ $Ti^{+3} - 3d^1$ 

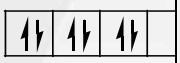
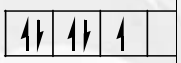
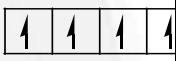
$n = 1$, paramagnetic

V_2O_5 $V^{+5} - 3d^0, n = O, diamagnetic$

$[Fe(CN)_6]^{3-}$ $Fe^{+3} - 3d^5$ 

CN^- - Strong field ligand, pairing of $e's$ 

S-II

$K_4[Fe(CN)_6]$	$K_3[Fe(CN)_6]$	$[Fe(H_2O)_6]SO_4.H_2O$	$[Fe(H_2O)_6]Cl_3$
$Fe^{+2} - 3d^6$	$Fe^{+3} - 3d^5$	$Fe^{+2} - 3d^6$	$Fe^{+3} - 3d^5$
CN – SFL	CN – SFL	H_2O – W.F.L.	H_2O – W.F.L.
			
$n = 0$	$n = 1$	$n = 4$	$n = 5$

64. Given below are two statements:

Statement-I: K > Mg > Al > B is the correct order in terms of metallic character.

Statement-II: Atomic radius is always greater than the ionic radius for any element.

In the light of the above statements, the correct answer from the options given below

1) Both S-I and S-II are false 2) Both S-I and S-II are true

3) S-I is false but S-II is true 4) S-I is true but S-II is false

Key: 4

Sol: S-I : Correct

S-II: Ionic radius of cation smaller than atomic radius.

65. A solution is prepared by dissolving 0.3 g of non-volatile non-electrolyte solute 'A' of molar mass 60 g mol^{-1} and 0.9 g of non-volatile non-electrolyte solute 'B' of molar mass 180 g mol^{-1} in 100 mL H_2O at 27°C. Osmatic pressure of the solution will be

[Given: R = 0.082 L atm K^{-1} mol^{-1}]

1) 1.23 atm 2) 1.47 atm 3) 2.46 atm 4) 0.82 atm

Key: 3

Sol: $\pi = C_1 + C_2 = \left(\frac{0.3 \times 1000}{60 \times 100} + \frac{0.9 \times 1000}{180 \times 100} \right) \times 0.821 \times 300 = 2.46 \ atm$

66. The hydroxy compound (X) with molar mass 122 g mol^{-1} is acetylated with acetic anhydride, using a large excess of the reagent ensuring complete acetylation of all hydroxyl groups. The product obtained has a molar mass of 290 g mol^{-1}. The number of hydroxyl groups present in compound (X) is:

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

Key: 1

Sol: No. of hydroxyl groups = $\frac{\text{molar mass of acetylated product} - \text{molar mass of original compound}}{42}$

$= \frac{290-122}{42} = \frac{168}{142} = 4$

67. At 27°C in presence of a catalyst, activation energy of a reaction is lowered by 10 kJ mol^{-1}. The logarithm of ratio of $\frac{k(catalysed)}{k(uncatalysed)}$ is ....

(Consider that the frequency factor for both reactions is same)

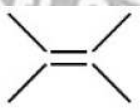
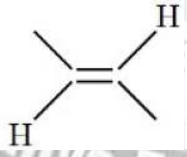
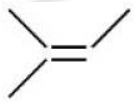
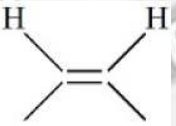
1) 3.482 2) 1.741 3) 17.41 4) 0.1741

Key: 2

Sol: $\frac{K_{catalyst}}{K_{uncatalyst}} = e^{-Eq/RT}$

$\log\frac{K_c}{K_u} = \frac{\Delta E}{2.303RT} = \frac{10\times1000}{2.303\times8.314\times300} = 1.741$

68. Arrange the following alkenes in decreasing order of stability

I.  II.  III.  IV. 

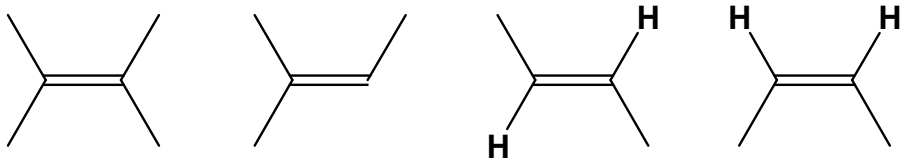
Choose the correct answer from the options given below:

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

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

Key: 1

Sol: More substituted alkeny are more stable by hyper conjugation



I III II IV

69. 'W' g of non-volatile electrolyte solid solute of molar mass 'M' g mol^{-1} when dissolved in 100 mL water, decreases vapour pressure of water from 640mm Hg to 600 mm Hg. If aqueous solution of the electrolyte boils at 375 K and K_b for water is 0.52 K kg mol^{-1}, then the mole fraction of the electrolyte solution (x_2) in the solution can be expressed as (Given: Density of water = 1 g/mL and boiling point of water = 373 K)

1) $\frac{16}{2.6}\times\frac{W}{M}$ 2) $\frac{1.3}{8}\times\frac{M}{W}$ 3) $\frac{2.6}{16}\times\frac{M}{W}$ 4) $\frac{1.3}{8}\times\frac{W}{M}$

Key: 4

Sol: $\Delta T_b = i\,K_b m$

$$2 = i\times 0.52\times\frac{\frac{w}{m}}{\frac{100}{1000}}$$

$$i\times\frac{w}{m} = 2\times\frac{100}{1000}\times\frac{1}{52}$$

$$i = \frac{1}{2.6}\times\frac{m}{w}$$

$$RLVP = \frac{P^o - Ps}{P^o} = i\times X_{solute}$$

$$\frac{640-600}{640} = i\times X_{solute}$$

$$\frac{1w}{16} = \frac{1}{2.6}\times\frac{m}{w}\times X_{solute}$$

$$X_{solute} = \frac{1.3}{8}\times\frac{w}{m}$$

70. Match List-I with List-II

List-I Isothermal process for ideal gas system		List-II Work done $(V_f > V_i)$	
A.	Reversible expansion	I.	$w = 0$
B.	Free expansion	II.	$w = -nRT \ln \frac{V_f}{V_i}$
C.	Irreversible expansion	III.	$w = -P_{ex}(V_f - V_i)$
D.	Irreversible compression	IV.	$w = -P_{ex}(V_i - V_f)$

Choose the correct answer from the options given below:

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

Key: 2

Sol: Reversible expansion $w = -nRT \ln \frac{V_f}{V_i}$

Free expansion w = 0

Irreversible expansion $w = -P_{ex}(V_f - V_i)$

Irreversible compression $w = -P_{ex}(V_i - V_f)$

Section-II
(NUMERICAL VALUE Type

This sectioncontains**5Numerical Value Type Questions.** The Answer should be within **0 to 9999.** If the Answer is in **Decimal** then round off to the **Nearest Integer** value (Example i,e. If answer is above **10** and less than **10.5** round off is **10** andIf answer is from **10.5** and less than **11** round off is **11).**

Marking scheme: +4 for correct answer, 0 if not attempt and -1 in all other cases

71. X and Y are the number of electrons involved, respectively during the oxidation of I^- to I_2 and S^{2-} to S by acidified $K_2Cr_2O_7$. The value of X + Y is____.

Key: 12

Sol: a) $Cr_2O_7^{-2} + 14H^+ + 6e^- \rightarrow 2Cr^{+3} + 7H_2O$

b) $\left(2I^- \rightarrow I_2 + 2e^-\right) \times 3$

$$Cr_2O_7^{-2} + 6I^- + 14H^+ \xrightarrow{6\,e(x)} 2Cr^{+3} + 3I_2 + 7H_2O$$

c) $\left(S^{-2} \rightarrow S + 2e^-\right) \times 3$

$$Cr_2O_7^{-2} + 3S^{-2} + 14H^+ \xrightarrow{6\,e(y)} 2Cr^{+3} + 7H_2O + 3S$$

$$x + y = 6 + 6 = 12$$

72. Electricity is passed through an acidic solution of Cu^{2+} till all the Cu^{2+} was exhausted, leading to the deposition of 300 mg of Cu metal. However, a current of 600 mA was continued to pass through the same solution for another 28 minutes by keeping the total volume of the solution fixed at 200 mL. The total volume of oxygen evolved at STP during the entire process is __mL. (nearest integer)

$Cu^{2+}(aq) + 2e^- \rightarrow Cu(s)\ E^o_{red} = +0.34\,V$

$O_2(g) + 4H^+ + 4e^- \rightarrow 2H_2O\ E^o_{red} = +1.23\,V$

Molar mass of Cu = 63.54 g mol^{-1}

Molar mass of O_2 = 32 g mol^{-1}

Faraday Constant = 96500 C mol^{-1}

Molar volume at STP = 22.4 L]

Key: 111

Sol: Equation of Cu = Equation of O_2

$$\frac{300 \times 10^{-3} \times 2}{63.54} = {}^{n}O_2 \times 4$$

$${}^{n}O_2 = 2.36 \times 10^{-3}$$

When current is further passed ${}^{n}O_2 \times 4 = \frac{600 \times 28 \times 60}{96500 \times 1000}$

$${}^{n}o_2 = 2.611 \times 10^{-3}$$

Total O_2 released $= \left[10^{-3} \times (2.36 + 2.611)\right] \times 22400 = 111.35ml$

73. Consider two group IV metal ions X^{2+} and Y^{2+}

A solution containing 0.01 M X^{2+} and 0.01 M Y^{2+} is saturated with H_2S. The pH at which the metal sulphide YS will form as a precipitate is … (nearest integer)

(Given: K_{sp} (XS) $= 1 \times 10^{-22}$ at 25°C, K_{sp} (YS) $= 4 \times 10^{-16}$ at 25°C, $[H_2S] = 0.1M$ in solution, $K_{a1} \times K_{a2}$ $(H_2S) = 1.0 \times 10^{-21}$, log 2 = 0.30, log 3 = 0.48, log 5 = 0.70)

Key: 4

Sol: ppt of YS begins when I.P. of $\left(Y^{+2}\right)\left(S^{-2}\right) > K_{SP}$ of YS

$$\left[Y^{+2}\right] = 0.01M \ \& \ K_{SP}(YS) = 4 \times 10^{-16}$$

min sulphide ion conc. Required

$$\left[S^{-2}\right]_{\min} = \frac{K_{SP}(YS)}{\left[Y^{+2}\right]} = \frac{4 \times 10^{-16}}{10^{-2}} = 4 \times 10^{-14}$$

For the dissociation of H_2S in solution. The overall equation constant K_a, K_{a_2} is given by

$$H_2S \rightleftharpoons 2H^+S^{-2}$$

$$K_{a_1}.K_{a_2} = \frac{\left[H^+\right]^2\left[S^{-2}\right]}{[H_2S]}$$

$$K_{a_1}.K_{a_2} = 1 \times 10^{-21} \ \& \ [H_2S] = 0.1M$$

$$\left[H^+\right]^2 = \frac{K_{a_1}.K_{a_2}[H_2S]}{\left[S^{-2}\right]} = \frac{1 \times 10^{-21} \times 10^{-1}}{4 \times 10^{-14}}$$

$$\left[H^+\right] = 0.5 \times 10^{-4}M \quad pH = 4.3$$

74. The hydrogen spectrum consists of several spectral lines in Lyman series (L_1, L_2, L_3…..; L_1 has lowest energy among Lyman series). Similarly it consists of several spectral lines in Balmer series (B_1, B_2, B_3…; B_1 has lowest energy among Balmer lines). The energy of L_1 is x times the energy of B_1. The value of x is … x 10^{-1} (Nearest integer)

Key: 54

Sol: $\Delta E_L = 13.6 \times Z^2 \left[\frac{1}{1^2} - \frac{1}{2^2} \right] = 13.6 \times Z^2 \times \frac{3}{4}$

$\Delta E_B = 13.6 \times Z^2 \left[\frac{1}{2^2} - \frac{1}{3^2} \right] = 13.6 \times Z^2 \times \frac{5}{4 \times 9}$

$\frac{\Delta E_L}{\Delta E_B} = \frac{3}{5} \times 9 = \frac{27}{5} = 5.4 = 54 \times 10^{-1}$

$\therefore x = 54$

75. In Dumas method for estimation of nitrogen, 0.50 g of an organic compound gave 70 mL of nitrogen collected at 300 K and 715 mm pressure. The percentage of nitrogen in the organic compound is ….% (Aqueous tension at 300 K is 15 mm).

Key: 15

Sol: $\%N = \frac{28}{22400} \times \frac{\text{vol. no.} N_2 \text{ at STP}}{\text{wt of O.C.}} \times 100$

$= \frac{28}{22400} \times \frac{69.16}{0.5} \times 100$

$= 14.65\%$

≈ 15

STP given

$\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$

$\frac{760 \times 70}{300} = \frac{(715 - 15) V_2}{273}$

$V_2 = \frac{760 \times 70}{300} \times \frac{273}{700} = 69.16$

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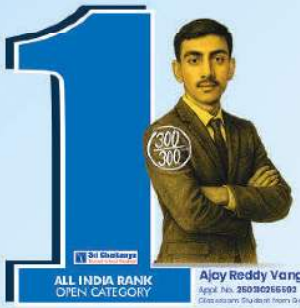

1 ALL INDIA RANK OPEN CATEGORY

Ajay Reddy Vangala
Appl. No. 250310255593
Classroom Student from Grade XI-XII

1 ALL INDIA RANK OPEN CATEGORY

Devdutta Majhi
Appl. No. 250310011885*

10 All India Rank Open Category

295/300 Marks

Saksham Jindal
Appl. No. 250310236696*

Secured 31 ranks in Top 100 All INDIA Open Category

12 RANK
SAURAV
Appl. No. 250310254844*

22 RANK
LAKSHYA SHARMA
Appl. No. 250310034153*

31 RANK
BANDARI RUSHMITH
Appl. No. 250310395238

32 RANK
BHAVESH JAYANTHI
Appl. No. 250310259939

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UJJWAL KESARI
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PRADISH GANDHI S
Appl. No. 250310788252*

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S SAI RISHANTH REDDY
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Appl. No. 250310488636

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Appl. No. 250310322700

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71 RANK
D CHETAN RAO
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73 RANK
V PRAVAS REDDY
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P SAI SURYA KARTHIK
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YASH KUMAR
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P PRANAYA SAI MUKESH
Appl. No. 250310606114

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V ESWAR KARTHIK
Appl. No. 250310238425

96 RANK
SAKSHAM GARG
Appl. No. 250310026726*

97 RANK
RANVEER SINGH VIRDE
Appl. No. 250310790734

BELOW 100	31	BELOW 500	95	BELOW 10	10	BELOW 100	98	BELOW 1000	579	TOTAL QUALIFIED RANKS FOR JEE ADVANCED-2025	22,094

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JEE ADVANCED 2025

29 Ranks in Top 100 in All-India Open Category

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30 RANK OM PRAKASH BEHERA HT. No. 252021018*	32 RANK SUNKARA SAI RISHANTH REDDY HT. No. 256165327	34 RANK DHRUBA JYOTHI PANJA HT. No. 252048248*	35 RANK BHAVESH JAYANTHI HT. No. 251043080	36 RANK ADVAY MAYANK HT. No. 252104113*	37 RANK KARMANYA GUPTA HT. No. 252081477*
42 RANK MD ANAS HT. No. 252046210*	45 RANK RAMIT GOYAL HT. No. 257001113*	52 RANK MAULIK JAIN HT. No. 252079407*	54 RANK GARV HT. No. 252056188*	59 RANK LARISSA HT. No. 252079071*	60 RANK ARYAN BALABADRULA HT. No. 256132077
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BELOW 100 ALL INDIA OPEN CATEGORY RANKS 29	BELOW 500 ALL INDIA OPEN CATEGORY RANKS 113	BELOW 1000 ALL INDIA OPEN CATEGORY RANKS 205	BELOW 1000 ALL INDIA CATEGORY RANKS COUNT 745	NUMBER OF QUALIFIED RANKS 4,212

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