JEE MAINS 2026

PAPER SOLUTION

06 APR, SHIFT 2

•LIVE

PHYSICS

Q) Minimum deviation for an equilateral prism is 30°, refractive index is

(A) 2 (B) 4

(C) $\sqrt{2}$ (D) $\sqrt{3/2}$

$A = 60$

$$\mu = \frac{\sin\left(\frac{\delta_m + A}{2}\right)}{\sin\left(\frac{A}{2}\right)}$$

$$\mu = \frac{\sin\left(\frac{30+60}{2}\right)}{\sin\left(\frac{60}{2}\right)} = \frac{1}{1/\sqrt{2}}$$

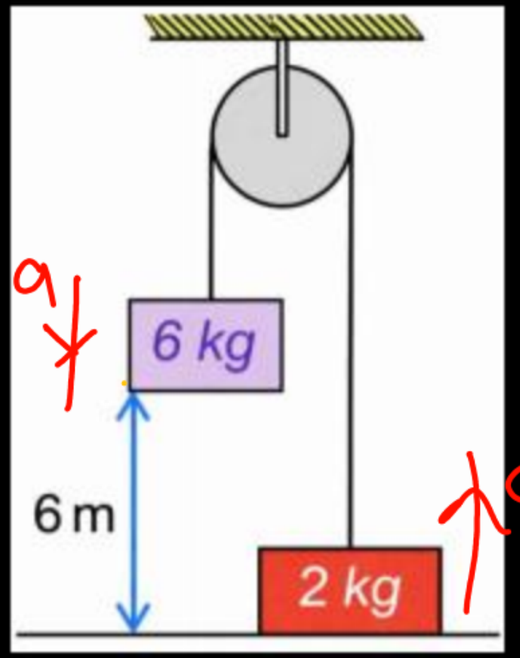
$$\mu = \sqrt{2}$$

Ans. (C)

Q) If system given below is released from rest, then find speed of 6 kg block just before hitting ground. ($g = 10\ m/s^2$)

(A) 4.70 m/s (B) 5.20 m/s

(C) 6.20 m/s (D) 7.74 m/s



$$a = \frac{60-20}{8}$$

$$a = \frac{40}{8} = 5\ m/s^2$$

$$v^2 = u^2 + 2as \quad (u = 0)$$

$$v^2 = 2 \times 5 \times 6$$

$$v^2 = 60$$

$$v = \sqrt{60}$$

Ans. (D)

Q) Find electric field, for given electrostatic potential field, at point p(2, 3);

$v = 5(x^2 - y^2)$.

(A) $30\hat{i} - 20\hat{j}$

(B) $20\hat{i} + 30\hat{j}$

(C) $-20\hat{i} + 30\hat{j}$

(D) $30\hat{i} + 10\hat{j}$

$$E = -\left(\frac{\partial v}{\partial x}\hat{i} + \frac{\partial v}{\partial y}\hat{j} + \frac{\partial v}{\partial z}\hat{k}\right)$$

$$E = -5\left[2x\hat{i} + (-2y\hat{j}) + 0\right]$$

$$E = -10x\hat{i} + 10y\hat{j}$$

$x = 2$

$y = 3$

$$E = -20\hat{i} + 30\hat{j}$$

Ans. (C)

Q) $V = 2x^2$ find work done in displacement from $x = 0$ to $x = 5$.
Mass of particle is 2 kg.

$$W_{total} = K_f - K_i$$

$$= \frac{1}{2}mv_f^2 - \frac{1}{2}mv_i^2$$

$$= \frac{2}{2}\left((50)^2 - 0^2\right)$$

$$W_{total} = 2500\ J$$

Q) If percentage change in radius of sphere is 2%, then find % change in the volume of sphere.

$$V = \frac{4}{3}\pi R^3$$

$$\frac{\Delta V}{V} \times 100 = 3\left(\frac{\Delta R}{R} \times 100\right)$$

$$= 3 \times 2\%$$

$$= 6\%$$ Ans

Q) $H_1^2 + H_1^2 \rightarrow He_2^4$

Biding energy per nucleon of H_1^2 and H_2^4 are 1.1 MeV and 7 MeV respectively. Find energy released in the nuclear reaction given above.

(A) 23.6 MeV (B) 4 MeV (C) 5.9 MeV (D) 3 MeV

$$Q\text{-value} = BE_P - BE_R$$

$$= (4\times7 - 2\times2\times1.1)\,MeV = 28 - 4.4$$

$$= 23.6\,MeV$$

Ans. (A)

CHEMISTRY

Q) Highest X–O bond order is, (X is central atom)

(A) CO **(B) CO_2** **(C) H_2O** **(D) F_2O**

14

BO = 3

BO = 2

O = C = O

BO = 1

Ans. (A)

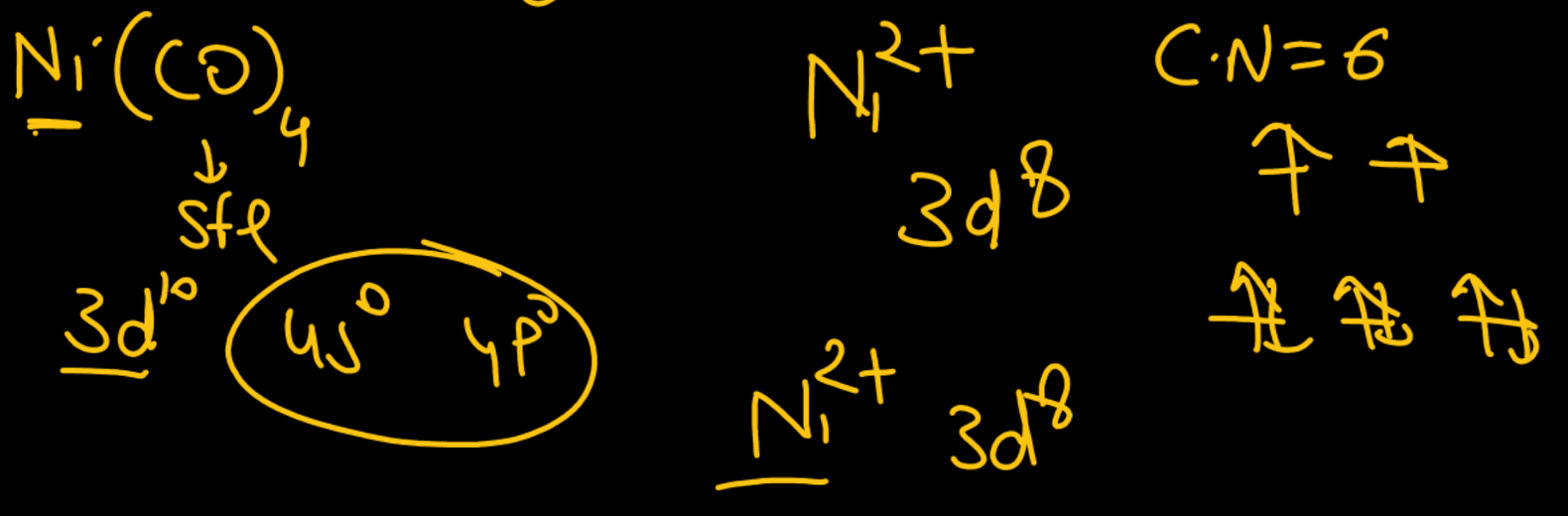
Q) The hybridisation states of Ni in the 3 complexes $Ni(CO)_4$ $[Ni(NH_3)_6]^{2+}$, & $[Ni(CN)_4]^{2-}$ are,

(A) sp^3, d^2sp^3, dsp^2

(B) sp^3, sp^3d^2, sp^3

(C) dsp^2, sp^3d^2, sp^3

(D) sp^3, sp^3d^2, dsp^2



Ans. (D)

Q) In a period, ionisation energy of the extreme left and electronegativity of extreme right element is respectively_____. (Don't consider Noble gases).

(A) Lowest/Highest
(B) Lowest/Lowest
(C) Highest/Lowest
(D) Highest/Highest

Alkali metal
Li

F

Ans. (A)

Q) Given, $k = Ae^{-\frac{28000}{T}}$. Find activation energy

(A) 232.80 kJ/mol
(B) 256 kcal/mol
(C) 23.28 kJ/mol
(D) 5600 kcal/mol

$$-\frac{E_a}{R} = -28000$$

$$E_a = 28000\,R$$

$$= \frac{28000 \times 8.314}{1000} = 232.8 \text{ kJ/mol}$$

Ans. (A)

Q) An alkane need 8 moles of O_2 for complete combustion. The alkane gives only one monochloro product. How many primary carbon it has ?

$$C_5H_{12} + 8\,O_2 \longrightarrow 5CO_2 + 6H_2O$$

4

Ans. (4)

Q) Statement I : Glucose and NaCl can be separated by using alcohol by solvent extraction method.

Statement(I : Rose essence is distilled out through steam distillation.

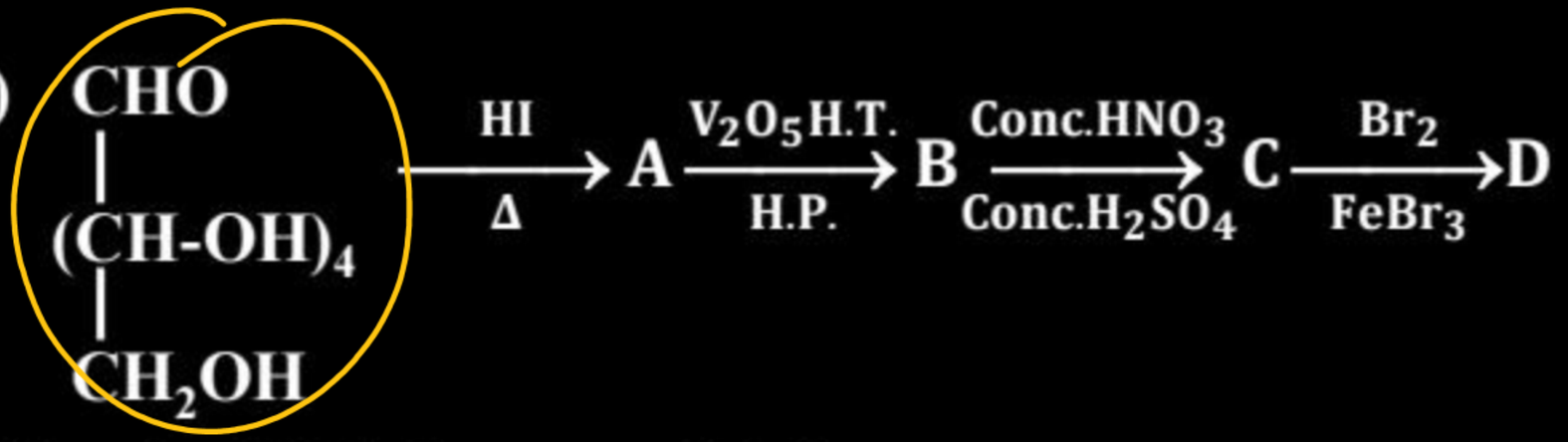
(A) Statement I is correct but statement II is incorrect

(B) Statement I is incorrect but statement II is correct

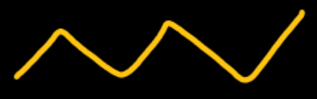
(C) Both statement I and statement II are correct

(D) Both statement I and statement II are incorrect

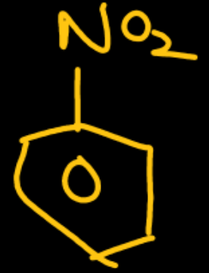
Ans. (C)

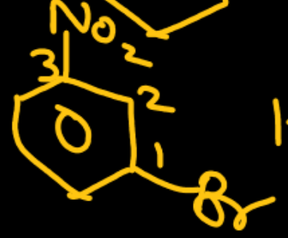
Q) 

Write the IUPAC name of D ?

A = 

B = 

C = 

D = 

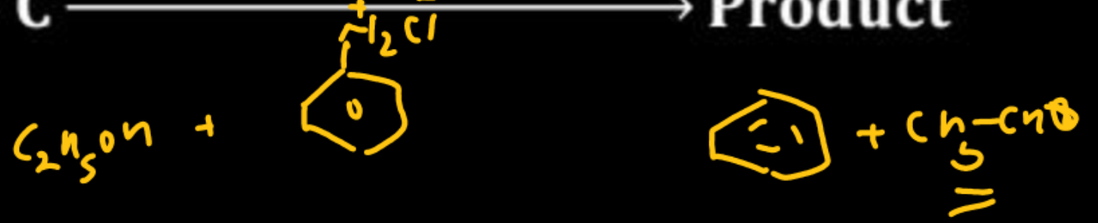
1- Bromo-3-nitrobenzene

Q) $CH_3 - CH_2 - COOH \xrightarrow[(ii)\Delta]{(i)NH_3} A \xrightarrow{Br_2+KOH} B \xrightarrow[HCl]{NaNO_2} C \xrightarrow{\text{Benzene diazonium chloride}} \text{Product}$

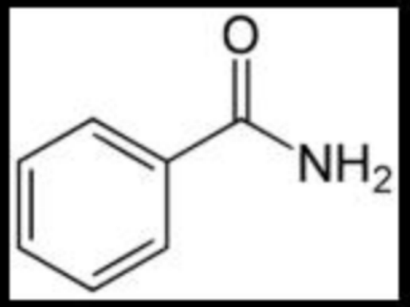
A :- $CH_3-CH_2-\overset{O}{\overset{\|}{C}}-NH_2$

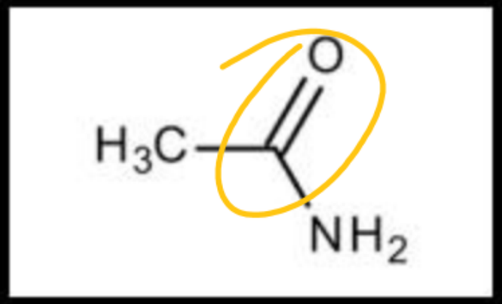
B :- $CH_3-CH_2-NH_2$

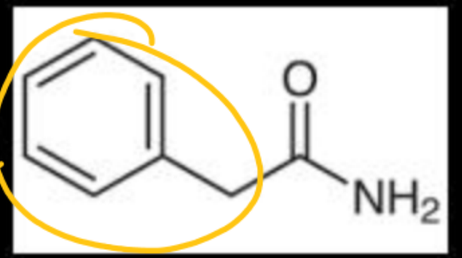
C :- CH_3-CH_2-OH.

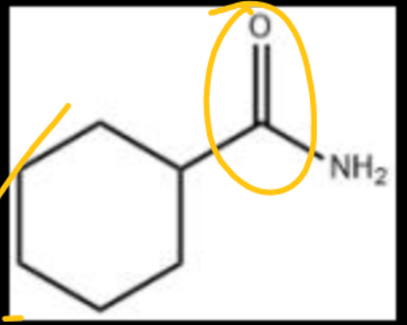


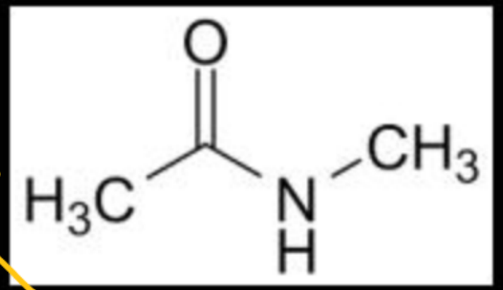
Q) Which of the following compound give product on reaction with KOH/Br_2 same as Gabriel phthalimide synthesis.

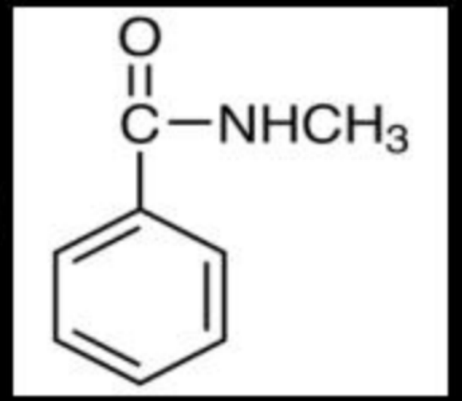
(1) 

(2) 

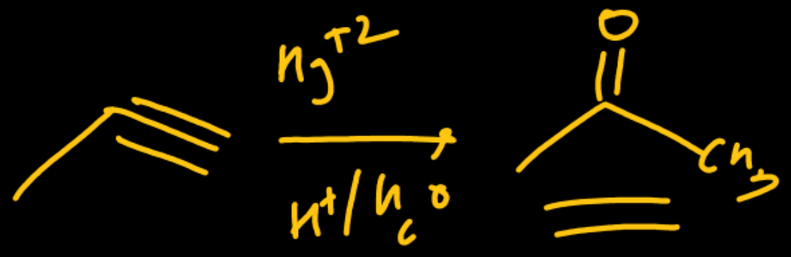
(3) 

(4) 

(5) 

(6) 

Q) Propyne $\xrightarrow[HgSO_4]{dil.H_2SO_4}$ Product



Following test is given by the product

(A) It gives Tollen's test ✗

(B) It gives Fehling's test ✗

(C) It gives iodoform test ✓

(D) It gives Lucas test ✗

Ans. (C)

Q) Energy of hydrogen like species is given as 54.4 eV. The n and z respectively are

(A) 1,2 (B) 2,2 (C) 1,1 (D) 2,1

$E = -13.6 \frac{z^2}{n^2}$ eV/atom $= -54.4$ eV

$\frac{z^2}{n^2} = 4$ $z=2$, $n=1$

Ans. (A)

Q) Match : For ideal monoatomic gas,

(A) Isothermal reversible expansion	(P) $w = -nRT\ln\frac{V_f}{V_i}$
(B) Isothermal irreversible expansion	(Q) $w = -p_{ext}(V_f - V_i)$
(C) Adiabatic reversible expansion	(R) $w = \frac{nR}{\gamma-1}(T_f - T_i)$
(D) Free expansion	(S) $w = 0$

(A) A→S ; B→Q ; C→R ; D→P
(B) A→P ; B→Q ; C→R ; D→S
(C) A→P ; B→R ; C→S ; D→Q
(D) A→S ; B→R ; C→Q ; D→P

Ans. (B)

against const external p_n.

$W = -\int P dV$
$= -\int \frac{nRT}{V} dV$

$P_{ext} = 0$
$W = 0$

Adiabatic
$Q = 0 =$
$\Delta E = W = \frac{P_2V_2 - P_1V_1}{\gamma - 1}$
$= \frac{nR(T_2 - T)}{\gamma - 1}$

Q) If ΔH represents ionisation energy

(a) ΔH_1 (Cr) > ΔH_1 (Mn)

(b) ΔH_1 (Cr) < ΔH_1 (Mn)

(c) ΔH_2 (Cr) > ΔH_2 (Mn)

(d) ΔH_2 (Cr) < ΔH_2 (Mn)

Select the correct combination

(A) a,b (B) c,d (C) b,c (D) b,d

Cr ⇒ $[Ar]3d^5 4s^1$ Mn ⇒ $[Ar]3d^5 4s^2$

$IE_1(Cr) < IE_1(Mn)$

IE_2 ↓

$[Ar]3d^5$ $[Ar]3d^5 4s^1$

$IE_2(Cr) > IE_2(Mn)$

Ans. (C)

MATH

Q) The area (in square units) of the region $\{(x, y): x^2 - 8x \leq y \leq -x\}$ is:

(A) $\frac{323}{6}$ **(B) $\frac{241}{6}$** **(C) $\frac{221}{6}$** **(D) $\frac{343}{6}$**

$x^2 - 8x \leq y$

$(4, 0)$

$-16 \leq 0$

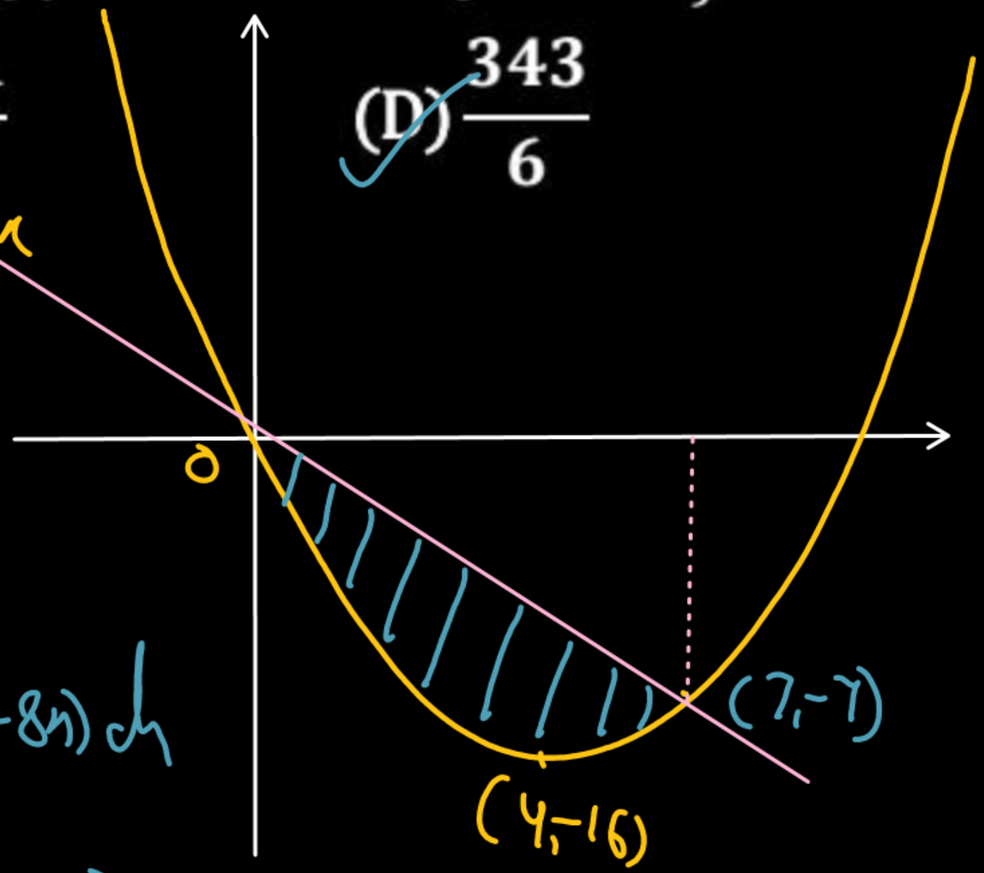
$y \leq -x$

$y = x^2 - 8x$, $y = -x$

$x^2 - 8x = -x$

$x = 0, 7$

$(7, -7)$



$$\text{Req. Area} = \int_0^7 (-x - x^2 + 8x)\,dx$$

$$= \left(\frac{7x^2}{2} - \frac{x^3}{3}\right)_0^7 = 7^3\left(\frac{1}{2} - \frac{1}{3}\right)$$

$$= 343/6$$

Ans. (D)

Q) Sum of $1+\frac{1}{2}(1^2+2^2)+\frac{1}{3}(1^2+2^2+3^2)+\cdots$ up to 10 terms is

(A) $\frac{315}{2}$ **(B) $\frac{313}{2}$** **(C) 313** **(D) 315**

$$S=\sum_{n=1}^{n}\frac{1}{n}(1^2+2^2+--+n^2)$$

$$=\sum_{n=1}^{n}\frac{1}{n}\frac{n(n+1)(2n+1)}{6}=\sum_{n=1}^{n}\frac{2n^2+3n+1}{6}$$

$$S_{10}=\frac{1}{6}\left(2\left(\frac{10\times11\times21}{6}\right)+3\times\frac{10\times11}{2}+10\right)$$

$$=\frac{945}{6}=\frac{315}{2}$$

Ans. (A)

Q) $\int_{-1}^{1} \frac{x^3+|x|+1}{x^2+|x|+1} dx$

(A) $\ln 3 - \frac{\pi}{3\sqrt{3}}$ (B) $\ln 3 + \frac{\pi}{3\sqrt{3}}$ (C) $\frac{\pi}{3\sqrt{3}}$ (D) $\ln 3$

$$I = \int_{-1}^{1} \frac{x^3}{x^2+|x|+1} dx + \int_{-1}^{1} \frac{|x|+1}{x^2+|x|+1}$$

$$I = 0 + 2\int_{0}^{1} \frac{|x|+1}{x^2+|x|+1} = \int_{0}^{1} \frac{2x+2}{x^2+x+1} dx$$

$$I = \int_{0}^{1} \frac{2x+1+1}{(x^2+x+1)} dx$$

$$I_1 = \int_{0}^{1} \frac{2x+1}{x^2+x+1} dx + \int_{0}^{1} \frac{1}{x^2+x+1} dx$$

$$= \left(\ln(x^2+x+1)\right)_0^1 + \int_{0}^{1} \frac{1}{(x+\frac{1}{2})^2+(\sqrt{3}/2)^2} dx$$

$$= \ln(3) + \frac{1}{\frac{\sqrt{3}}{2}} \tan^{-1}\left(\frac{x+1/2}{\sqrt{3}/2}\right)_0^1$$

Ans. (B)

Q) The sum of all possible values of $\theta \in [0, 2\pi]$, for which the system of equations:

$$x\cos 3\theta - 8y - 12z = 0$$
$$x\cos 2\theta + 3y + 3z = 0$$
$$x + y + 3z = 0$$

has a non-trivial solution, is equal to:

(A) π (B) 4π (C) 2π (D) 3π

$\theta = \frac{\pi}{2}, \frac{3\pi}{2}, \frac{\pi}{3}, 2\pi - \frac{\pi}{3}$

$\Delta = 0 \Rightarrow \begin{vmatrix} \cos(3\theta) & -8 & -12 \\ \cos(2\theta) & 3 & 3 \\ 1 & 1 & 3 \end{vmatrix} = 0$

$\cos(3\theta)(6) - \cos(2\theta)(-12) + 1(12) = 0$

$\cos(3\theta) + 2(1 + \cos 2\theta) = 0$

$4\cos^3\theta - 3\cos\theta + 4\cos^2\theta = 0$

$\cos\theta(4\cos^2\theta + 4\cos\theta - 3) = 0$

$\cos\theta = 0, \frac{1}{2}, \frac{-3}{2}$ ✗

Ans. (B)

Q) Suppose α is minimum value of product of roots and β is maximum value of sum of roots of the quadratic equation $(n^2 - 2n + 2)x^2 - 3x + (n^2 - 2n + 2)^2 = 0$. If the sum of first six terms of a G.P., whose first term is α and common ratio is $\frac{\alpha}{\beta}$, is $\frac{p}{q}$ (where p and q are co-prime numbers), then the value of p + q is:

Product of Roots $= n^2 - 2n + 2$

$= (n-1)^2 + 1$

$\alpha = 1$

$\beta = 3$

G.P: $T_1 = 1$: $r = \frac{1}{3}$.

$S_6 = 1\left(\frac{1 - r^6}{1 - r}\right) = \frac{3}{2}\left(1 - \left(\frac{1}{3}\right)^6\right) = \frac{3}{2}\left(\frac{728}{3^6}\right)$

SOR $= \frac{3}{n^2 - 2n + 2}$

$= \frac{3}{364}$

$= \frac{3}{243}$

Ans. (607) ✓

$2+1-8+$

$16x^3+4x^2-16x+5=0$

Q) The value of x for which $\sin^{-1}\left(\frac{2}{3}\sqrt{1-x^2}\right)=\cot^{-1}(2\sqrt{x})$ is

(A) 1/4 **(B) 1/2** **(C) 1/6** **(D) 1/8**

$\frac{2}{3}\sqrt{1-x^2}=\frac{1}{\sqrt{1+4x}}$ $\frac{2}{3}\sqrt{1-x^2}=\sin(\cot^{-1}2\sqrt{x})$

$\theta=\cot^{-1}(2\sqrt{x})$

$\theta\in(0,\pi/2]$

$\cot\theta=2\sqrt{x}$.

$4(1-x^2)(1+4x)$ $\frac{2}{3}\sqrt{1-x^2}=\frac{1}{\operatorname{cosec}\theta}$

$=9$

$4(1+4x-x^2-4x^3)=9$ $=\frac{1}{\sqrt{1+\cot^2\theta}}$

Ans. (B)

Q) If mean and variance of 7 observations 2, a, b, 4, 8, 12, 14 are 8 and 16 respectively then the quadratic equation whose roots are 2a + 1 and 3b + 2 is:

(A) $x^2 - 36x + 512 = 0$
(B) $x^2 - 45x + 416 = 0$
(C) $x^2 - 45x + 512 = 0$
(D) $x^2 - 36x + 416 = 0$

$8 = \frac{40 + a + b}{7} \Rightarrow a + b = 16$

$16 = \frac{2^2 + a^2 + b^2 + 4^2 + 8^2 + 12^2 + 14^2}{7} - 8^2$

$80 \times 7 = a^2 + b^2 + 424$

$\therefore a^2 + b^2 = 560 - 424 = 136$

(C-1) $a = 10, b = 6$

$21, 20 \Rightarrow x^2 - 41x + 420 = 0$

(C-2) $a = 6, b = 10 \Rightarrow 13, 32$

$x^2 - 45x + 416 = 0$

Ans. (B)

Q) If matrix $A = \begin{bmatrix} 1 & 0 & 0 \\ 3 & 1 & 0 \\ 3 & 3 & 1 \end{bmatrix}$ and matrix $[b_{ij}] = B = A^{99} - I_{3\times3}$, then the value of $\left(\frac{b_{31}+b_{32}}{b_{32}}\right)$ is equal to:

(A) 149 (B) 147 (C) 160 (D) 159

$1+\frac{b_{31}}{b_{32}} = 1+\frac{99\times3}{99\times3} = 1+49$

$A = \begin{bmatrix} 1 & 0 & 0 \\ 3 & 1 & 0 \\ 3 & 3 & 1 \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} + \begin{bmatrix} 0 & 0 & 0 \\ 3 & 0 & 0 \\ 3 & 3 & 0 \end{bmatrix}$

$A^{99} = (I+X)^{99}$

$X^2 = \begin{bmatrix} 0 & 0 & 0 \\ 3 & 0 & 0 \\ 3 & 3 & 0 \end{bmatrix}\begin{bmatrix} 0 & 0 & 0 \\ 3 & 0 & 0 \\ 3 & 3 & 0 \end{bmatrix} = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 9 & 6 & 0 \end{bmatrix}$

$X^3 = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 9 & 0 & 0 \end{bmatrix}\begin{bmatrix} 0 & 0 & 0 \\ 3 & 0 & 0 \\ 3 & 3 & 0 \end{bmatrix} = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$

$A^{99} = {}^{99}C_0 I + {}^{99}C_1 IX + {}^{99}C_2 X^2$

$\therefore B = 99X + {}^{99}C_2 X^2$

Ans. (A)

Q) The shortest distance between the lines $\frac{x-4}{1}=\frac{y-3}{2}=\frac{z-2}{-3}$ $(4,3,2)$ and $\frac{x+2}{2}=\frac{y-6}{4}=\frac{z-5}{-5}$ $(-2,6,5)$ is:

(A) $3\sqrt{5}$ (B) $4\sqrt{5}$ (C) $5/\sqrt{6}$ (D) $2\sqrt{5}$

$$SD=\left|\frac{(\bar{a}_2-\bar{a}_1)\cdot(\bar{b}_1\times\bar{b}_2)}{|\bar{b}_1\times\bar{b}_2|}\right| = \left|\frac{(6,-3,-3)\cdot(2,1,0)}{\sqrt{5}}\right| = \frac{12+3}{\sqrt{5}}$$

$$b_1\times b_2=\begin{vmatrix} i & j & k \\ 1 & 2 & -3 \\ 2 & 4 & -5 \end{vmatrix} = 2\hat{i}+\hat{j}$$

$$|b_1\times b_2|=\sqrt{5}$$

Ans. (A)

Q) $\vec{a} = 2\hat{i} + 3\hat{j} + 3\hat{k}$
$\vec{b} = 6\hat{i} + 3\hat{j} + 3\hat{k}$

$\Delta = \frac{1}{2}|\vec{x} \times \vec{y}|$

If $2\vec{a} + 3\vec{b}$ and $\vec{a} - \vec{b}$ are two adjacent sides of a triangle, then the square of area of triangle is:

(A) 1800 (B) 900 (C) 902 (D) 680

$(4, 6, 6)$
$+ (18, 9, 9)$
$\vec{x} = (22, 15, 15)$

$\vec{y} = (-4, 0, 0)$

$\Delta = \frac{1}{2}\left|(4)\left(\sqrt{15^2+15^2}\right)\right|$

$\Delta = 2(15\sqrt{2})$

$\boxed{\Delta = 30\sqrt{2}}$

Ans. (A)

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