JEE MAINS 2026

PAPER SOLUTION

24 JAN, SHIFT 1

Physics

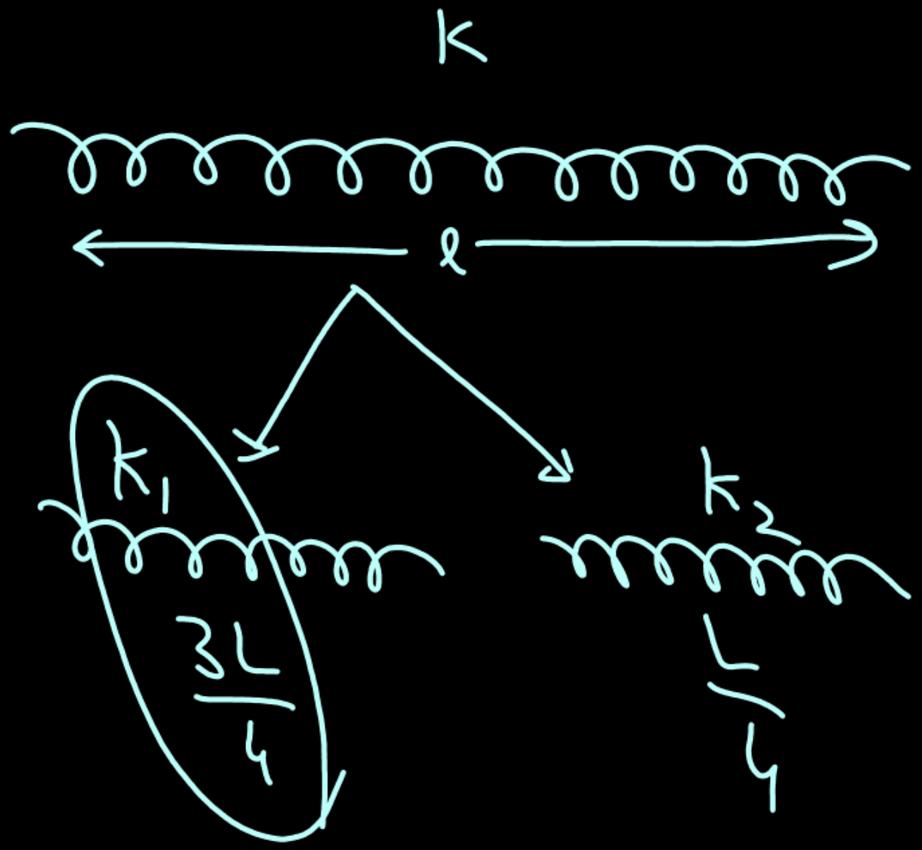
Q) A spring of stiffness k = 15 N/m is cut into a ratio of 3: 1. Find the spring constant of smaller length spring thus formed.

(A) 60 N/m **(B) 45 N/m**

(C) 50 N/m **(D) 15 N/m**

$$k\ell = k_2 \frac{\ell}{4}$$

$$k_2 = 4k = 60\ N/m$$



Ans. (A)

Q) EM waves and their source are given

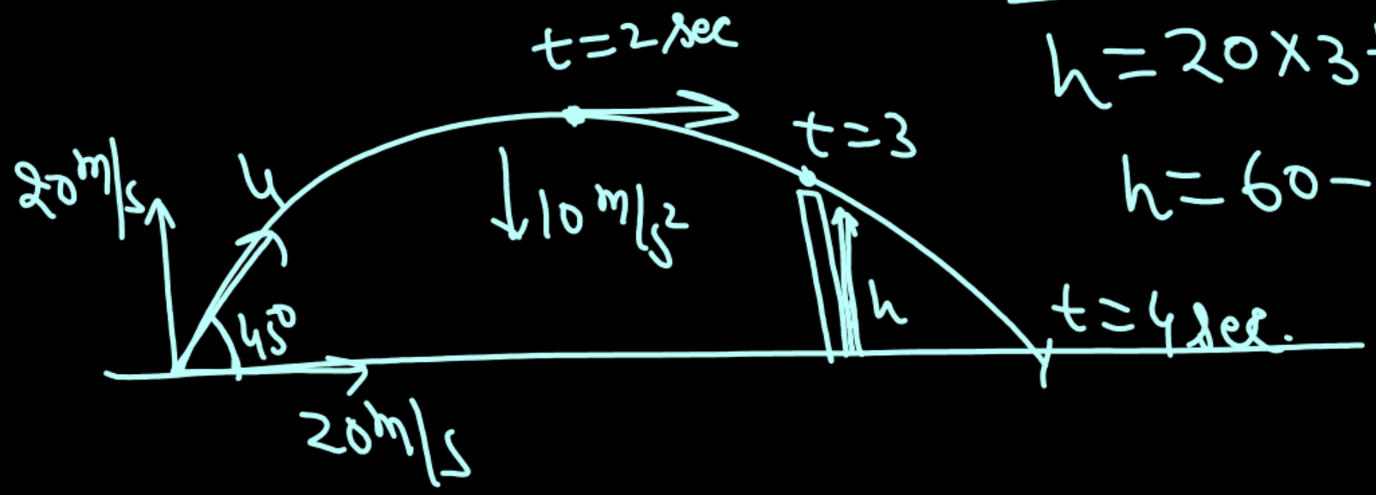
Column-I	Column-II
(a) X-rays	(p) Hot bodies and molecules
(b) Infrared Rays	(q) Oscillatory current in Atenas
(c) Microwaves	(r) Magnetron
(d) Radio waves	(s) Fast moving electrons striking a metal plate

(A) a-p, b-s, c-r, d-q
(B) a-s, b-p, c-r, d-q
(C) a-s, b-p, c-s, d-q
(D) a-s, b-r, c-p, d-q

Ans. (B)

Q) A particle is projected with an initial velocity at an angle of 45° to the horizontal. It reaches its maximum height at t = 2s and passes the top of a building at t = 3s after projection. Find the height of the building.

(A) 10 m (B) 15 m (C) 20 m (D) 25 m



y-axis

$h = 20 \times 3 + \frac{1}{2}(-10)(3)^2$

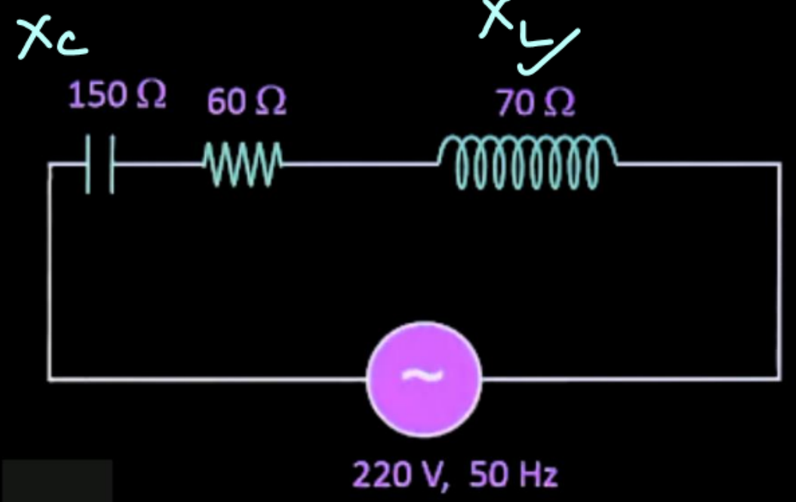
$h = 60 - 45 = 15\ m$

Ans. (B)

Q) For the given ac circuit, find the power factor.

(A) 4/5 **(B) 3/5**

(C) 4/3 **(D) 3/4**



$$\cos\phi = \text{P.f.} = \frac{R}{Z}$$

$$= \frac{60}{\sqrt{(80)^2 + (60)^2}}$$

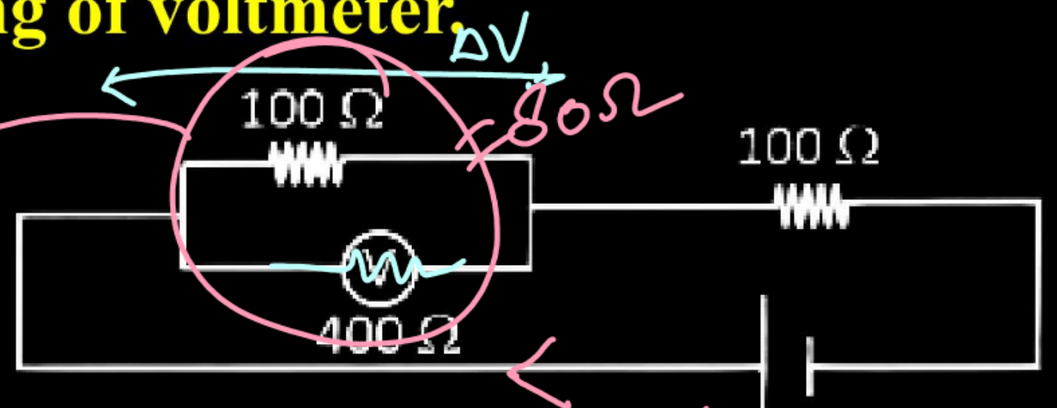
$$= \frac{60}{100} = 3/5$$

$$\text{P.f} =$$

Ans. ()

Q) A voltmeter of 400 W resistance is in parallel with 100 W resistor. And the combination is connected with 100 W resistor and a battery of 9 volt in series as shown. Find the reading of voltmeter.

(A) 3 volts (B) 4 volts
(C) 5 volts (D) 6 volts



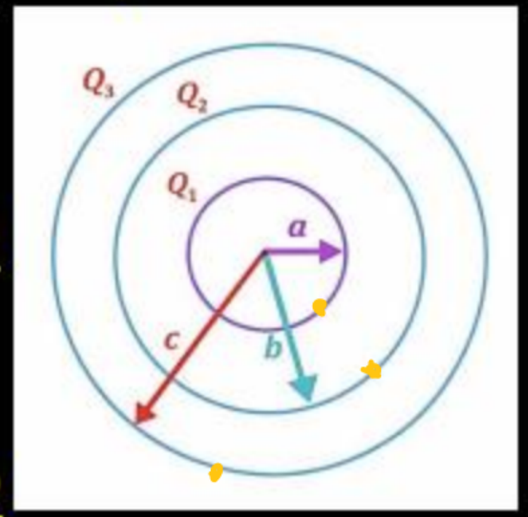
$\frac{400 \times 100}{500} = 80\Omega$

$\frac{9}{180} = \frac{1}{20}A$

$\Delta V = \frac{1}{20} \times 80 = 4V$

Ans. (B)

Q) Three uniformly concentric charged shells are kept as shown. Find potential of each shell.



(A) $V_A = \frac{kQ_1}{a} + \frac{kQ_2}{b} + \frac{kQ_3}{c}, V_B = \frac{k(Q_1+Q_2+Q_3)}{b}, V_C = \frac{k(Q_1+Q_2+Q_3)}{c}$

(B) $V_A = \frac{kQ_1}{a} + \frac{kQ_2}{b} + \frac{kQ_3}{c}, V_B = \frac{k(Q_1+Q_2)}{b} + \frac{kQ_3}{c}, V_C = \frac{k(Q_1+Q_2+Q_3)}{c}$

(C) $V_A = \frac{kQ_1}{a} + \frac{k(Q_2+Q_3)}{c}, V_B = \frac{k(Q_1+Q_2)}{b} + \frac{kQ_3}{c}, V_C = \frac{k(Q_1+Q_2+Q_3)}{c}$

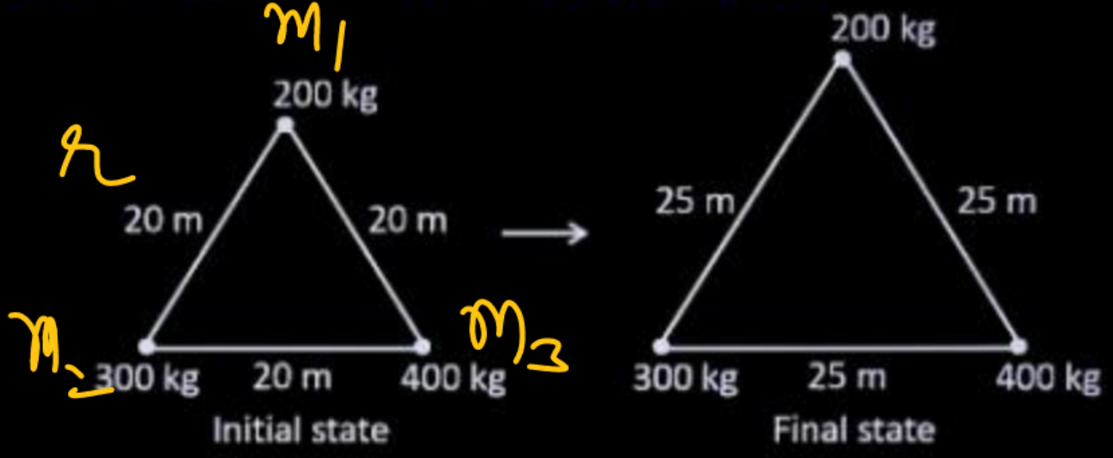
(D) $V_A = \frac{kQ_1}{a} + \frac{kQ_2}{b} + \frac{kQ_3}{c}, V_B = \frac{k(Q_1+Q_2)}{a} + \frac{kQ_2}{b}, V_C = \frac{k(Q_1+Q_2+Q_3)}{c}$

$\frac{k(Q_1+Q_2)}{b} + \frac{kQ_3}{c}$ $\qquad$ $\frac{k(Q_1+Q_2+Q_3)}{c}$

Ans. (B)

Q) Find the work done. (Given: $G = 6.67 \times 10^{-11}\ N - m^2/kg^2$)

(A) 1.7342×10^{-7} J
(B) 1.6253×10^{-7} J
(C) 2.5232×10^{-7} J
(D) 6.6325×10^{-7} J



$W_{ext} = U_f - U_i$

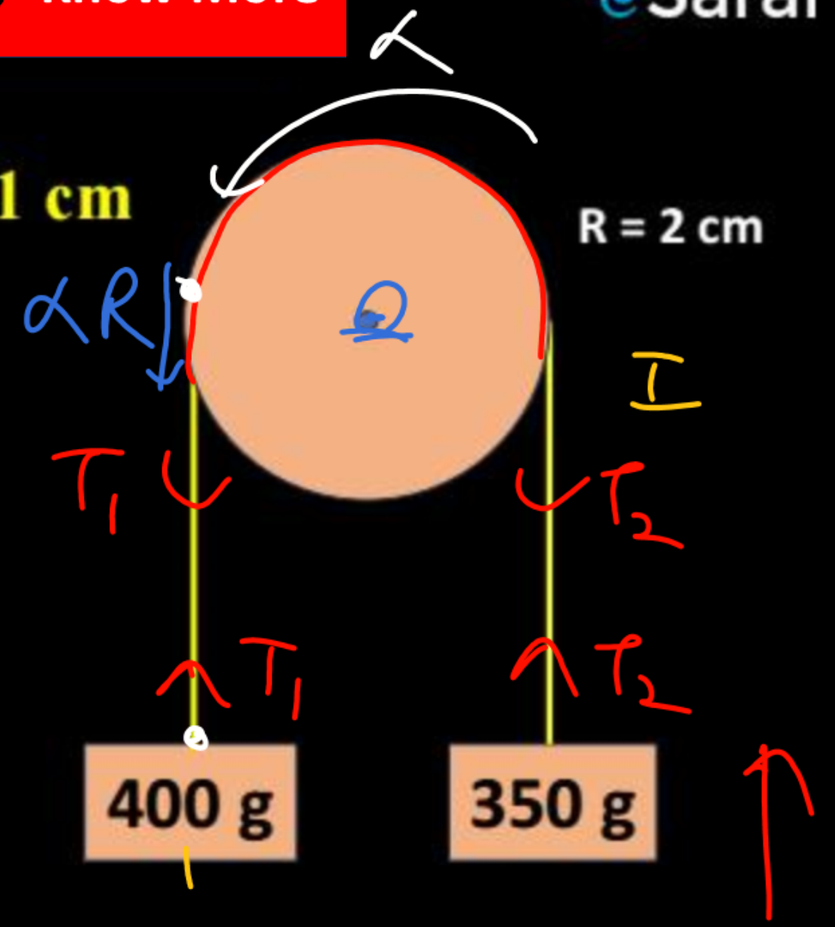
$U_f =$

$U_i = -\frac{G m_1 m_2}{r} - \frac{G m_1 m_3}{r}$

$- \frac{G m_2 m_3}{r}$

Ans. (A)

Q) On releasing the system 400 g mass fall down by 81 cm in 9s, then determine the determine the moment of inertia of pulley



$a = \alpha R$

$\alpha = \smile$

$\frac{81}{100} = \frac{1}{2} a \times 9^2$

$a = \frown$

$(T_1 - T_2)R = I\alpha$

$\frac{400}{1000} \times g - T_1 = \frac{400}{1000} \times a$

9 sec | $(T_1 - T_2)R$

$T_2 - \frac{350}{1000} \times g = \frac{350}{1000} \times a$

Ans. ()

Q) In a spherical distribution potential is given by $v = ar^2 + b$. Determine the charge present in sphere of radius R.

$$\frac{\rho}{\varepsilon_0} = \frac{1}{r^2}\frac{\partial(-2ar^3)}{\partial r}$$

$$\frac{\rho}{\varepsilon_0} = -6a$$

$$\rho = -6a\varepsilon_0$$

$$V = ar^2 + b$$

$$E = -\frac{\partial V}{\partial r} = -2ar$$

$$\frac{\rho}{\varepsilon_0} = \frac{1}{r^2}\frac{\partial(Er^2)}{\partial r}$$

$$q = \int_0^R \rho\, 4\pi r^2\, dr$$

Ans. ()

Q) A dipole is placed in uniform magnetic field B = 800 gauss at an angle 30° then it experiences the torque of 16×10^{-3} N – m. Find the work done in slowly moving the dipole from stable equilibrium to unstable equilibrium.

(A) 64×10^{-3} J
(B) 5×10^{-3} J
(C) 24.5×10^{-3} J
(D) 7.6×10^{-3} J

$1\,T = 10^{+4}$ Gauss

$U_f - U_i$

$\tau = MB\sin\theta$

$U = -MB\cos\theta$

Ans. (A)

$U_i = -MB\cos 0$

$U_f = -MB\cos 180$

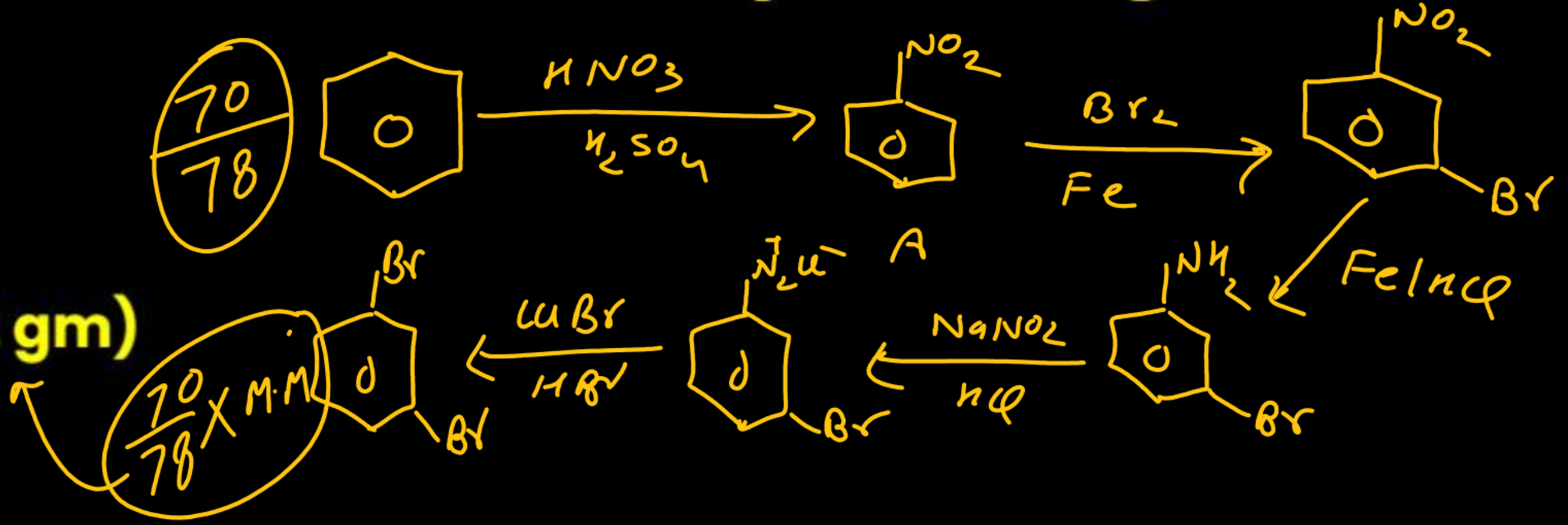
Chemistry

Q) Match list-I with list-II

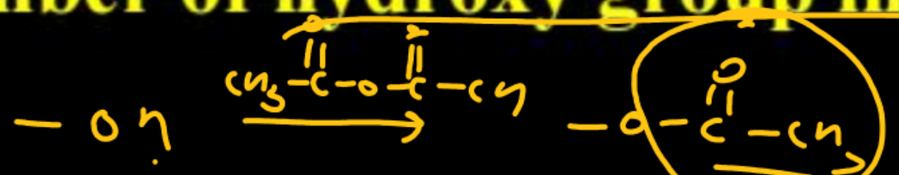
List-I	List-II
(A) Vinyl chloride	(P) $CH_2 = CH - CH_2 - Cl$
(B) Allyl chloride	(Q) $CH_2 = CH - Cl$
(C) Aryl Chloride	(R) $C_6H_5 - Cl$
(D) Benzyl chloride	(S) $C_6H_5 - CH_2 - Cl$

Q) When benzene (70gm) react with nitrating mixture and form product A, which further react with Br_2 in presence of Fe produce B. B on further show reduction with Fe/HCl and after diazotization give C and C on reaction with CuBr/HBr give product D. Find out mass of product D in gm.

Ans. (212 gm)



Q) Hydroxy compound react with excess of acetic anhydride give compound X which molecular mass increase by 210 unit then find out number of hydroxy group in given compound

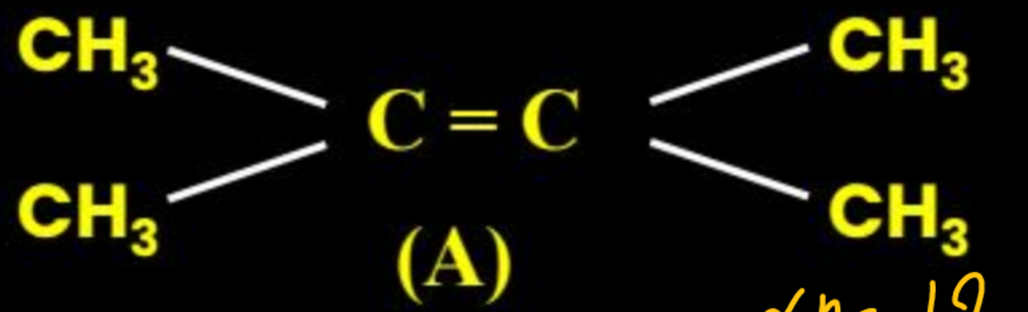


$-1+42=42$

$\frac{210}{42}=5$

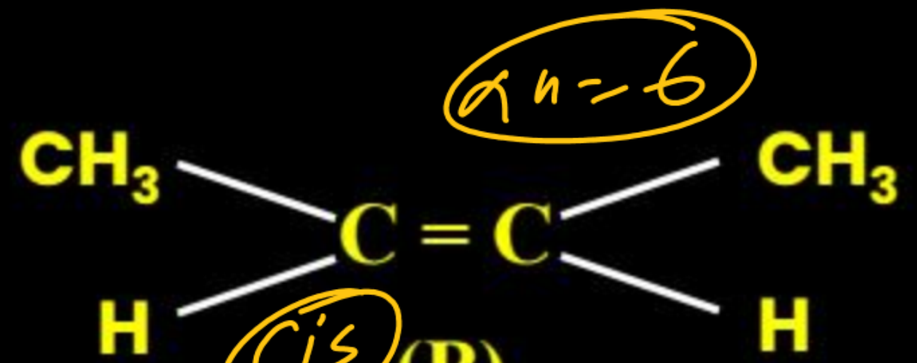
Ans. (5)

Q) Decreasing order of stability



(A)

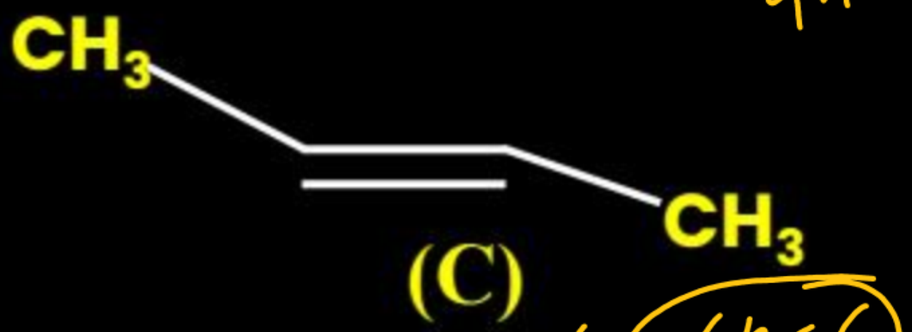
$q_n = 12$



$q_n = 6$

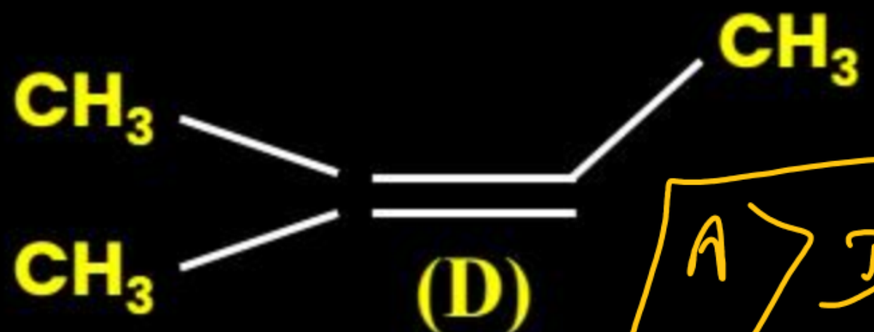
Cis

(B)



(C)

Trans $q_n = 6$



(D)

$q_n = 9$

A > D > C > B

Q) Write decreasing stability order of following carbanion

P-Br-C_6H_4 – CH_2^- (I)

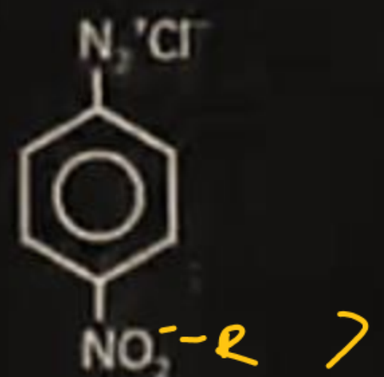
$C_6H_5 - CH_2^-$ (II)

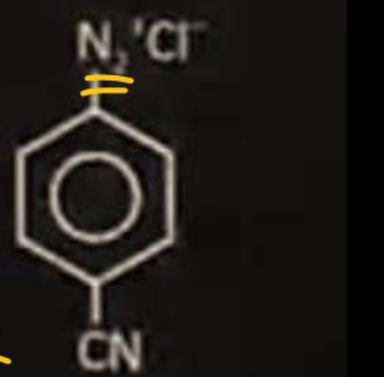
P – CHO – C_6H_4 – CH_2^- (III)

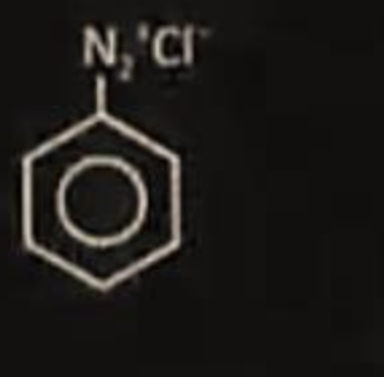
P – CH_3O – C_6H_4 – CH_2^- (IV)

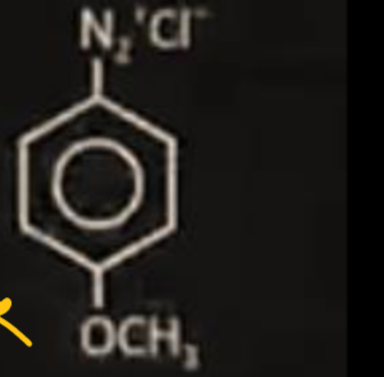
3 > 1 > 2 > 4

Q) The correct order of stability of following diazonium ions is

a. 

b. 

c. 

d. 

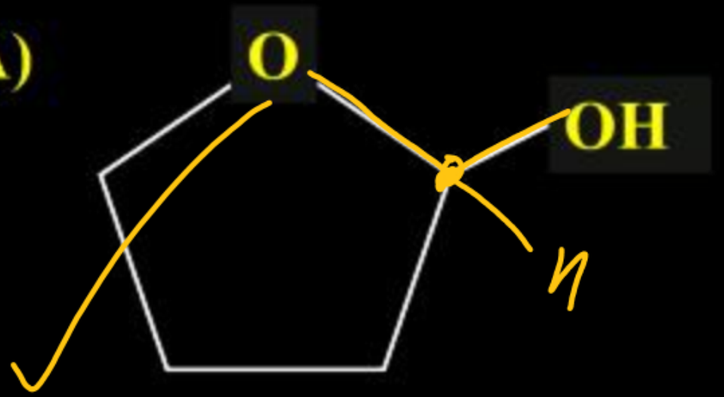
C^+

stability ∝ +R ∝ I+n / +I

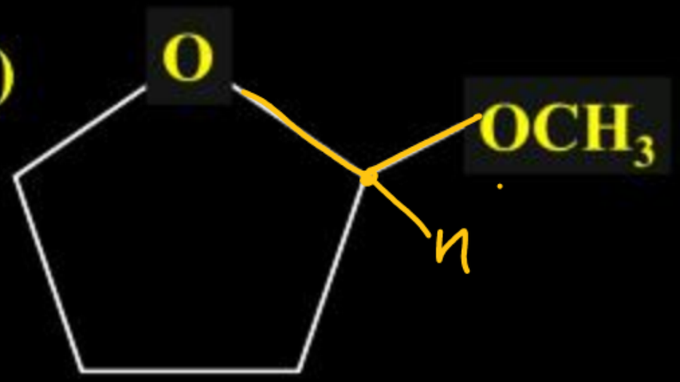
d > c > b > a

Q) Which of the following will show positive tollens test

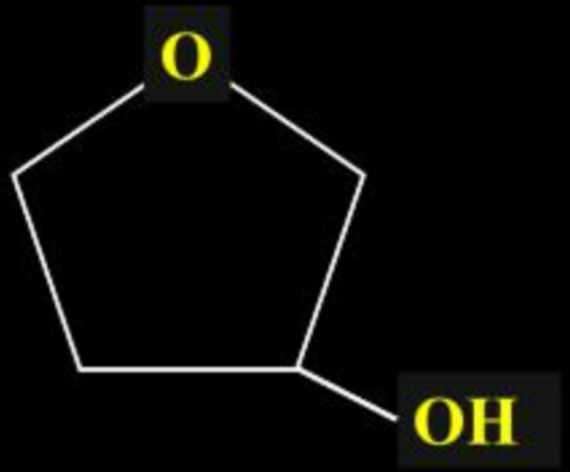
(A)



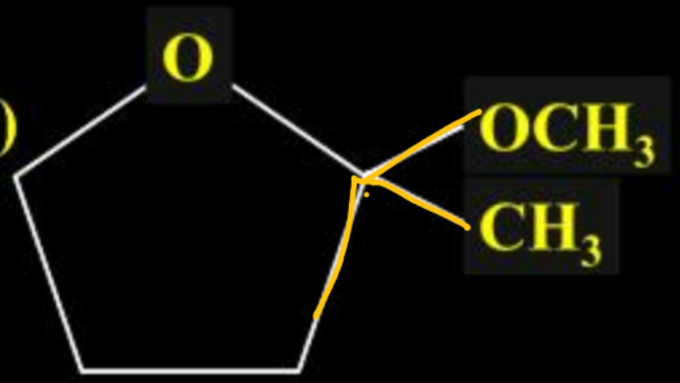
(B)



(D)



(D)



Q) In Dumas method, 292 mg of organic compound yields 50 mL $N_2(g)$ at 300 K and 715 mm Hg pressure. Find % of 'N' in organic compound.
Aqueous tension i = 15 mm Hg

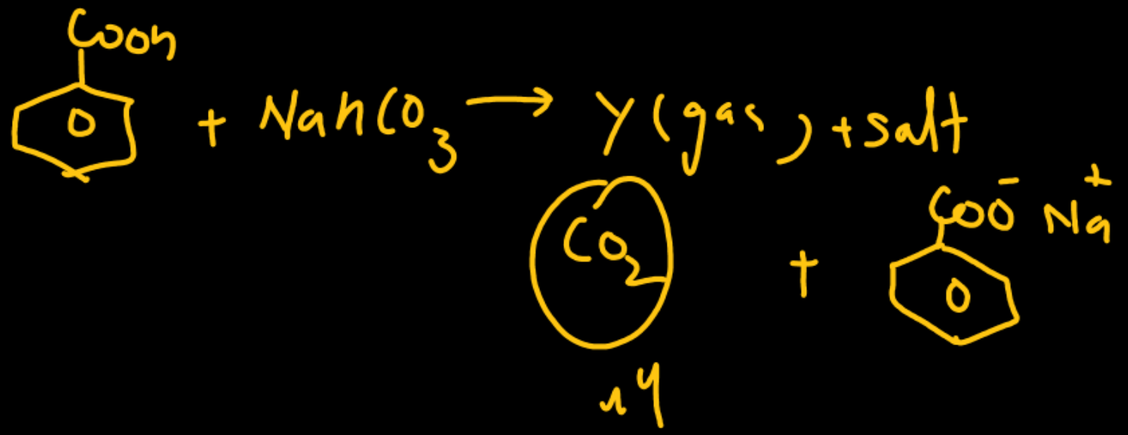
$$N_2 = \frac{2B}{22400} \times \frac{V_{N_2 \text{ at STP}}}{W} \times 100$$

$$\frac{P_1V_1}{T_1} \times \frac{273}{760} = \frac{50 \times 700}{300} \times \frac{273}{760}$$

Ans. (18)

Q) Phenol react with Na give gas X and benzoic acid react with $NaHCO_3$ give gas Y find out molecular mass of X + Y

(A) ~~48~~ 46 **(B) 86** **(C) 4** **(D) 60**



Ans. (A)

$i = 1$

Q) Two non electrolyte solutes A and B of 0.3 g and 0.9 g respectively are dissolved in 100ml solution. (molar mass of A and B are 30 g / mol and 90g / mol respectively. Calculate of osmotic pressure at 300 K (in atm)

$$\pi = \frac{n}{V} RT = \frac{n_1 + n_2}{V} RT = \frac{.02}{.1} RT$$

$$n_A = \frac{.3}{30} = .01 \qquad n_B = \frac{.9}{90} = .01$$

$\frac{1}{12}$ → 300

$\Rightarrow 5$ atm

Q) In H-like atom ratio of speed in two orbits is 3:2, then ratio of energy is

(A) 5 : 3

(B) 2 : 1

(C) 9 : 4

(D) 2 : 3

$V = 2.18 \times 10^6 \frac{Z}{n}$ m/s

$V \propto \frac{1}{n}$

$\frac{V_1}{V_2} = \frac{n_2}{n_1} = \frac{3}{2}$

$E = -13.6 \frac{Z^2}{n^2}$

$\frac{E_1}{E_2} = \left(\frac{n_2}{n_1}\right)^2 = \left(\frac{3}{2}\right)^2 = \frac{9}{4}$

Q) Which of following compound contains 3 unpaired electrons ?

(A) $[CoF_6]^{4-}$

(B) $[TiF_6]^{3-}$

(C) V_2O_5

(D) $[Fe(CN)_6]^{3-}$

Co^{2+} $3d^7$ ↑ ↑ ↑↓ ↑↓ ↑ $n=3$

Ti^{3+} $3d^1$ $n=1$

V^{5+} $[Ar]$ $n=0$

Fe^{3+} $3d^5$ — — ↑↓ ↑↓ ↑ —

Q) $K_2Cr_2O_7 + I^- + H^+ \rightarrow I_2$

(x = number of moles of e^- exchanged per mol I_2)

$n_f = 2 = x$

$K_2Cr_2O_7 + S^{2-} \rightarrow S$

(y = number of moles of e^- exchanged for 1 mole of S)

$n_f = 2 = y$

$x + y$ is

(A) 6 (B) 9 (C) 4 (D) 12

$2e^- + I_2 \rightarrow 2I^-$

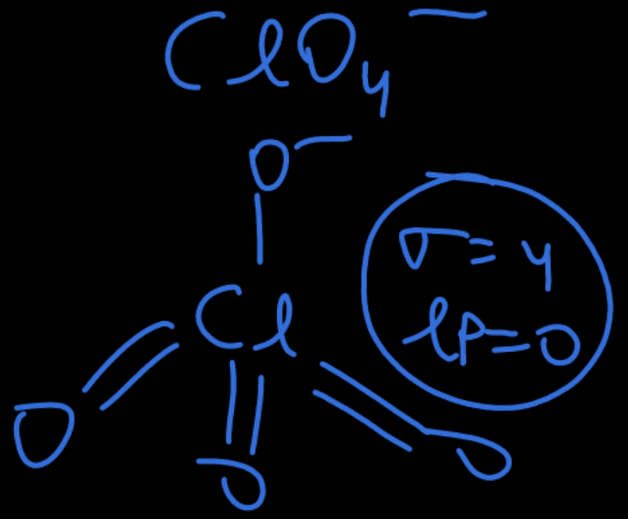
$2e^- + S \rightarrow S^{2-}$

$x + y = 2 + 2$

$= 4$

Q) Match the column

Column-I	Column-II
(A) IF_3	(P) sp^3d^3, pentagonal bipyramidal
(B) IF_5	(Q) sp^3d , T-shaped
(C) IF_7	(R) sp^3, Tetrahedral
(D) ClO_4^-	(S) sp^3d^2, Square pyramidal



A - Q
B - S
C - P
D - R

IF_3 $\sigma = 3$ $lp = 2$ T-shaped

IF_5 $\sigma = 5$ $lp = 1$ Sq. pyramidal

IF_7 $\sigma = 7$ $lp = 0$

Math

Q) The value of $\dfrac{\sqrt{3}\operatorname{cosec}20^\circ - \sec 20^\circ}{\cos 20^\circ \cos 40^\circ \cos 60^\circ \cos 80^\circ}$ is

(A) 12 (B) 64 (C) 16 (D) 32

$(\cos 60^\circ)\left(\frac{1}{4}\cos 60^\circ\right) = \frac{1}{2}\cdot\frac{1}{4}\cdot\frac{1}{2} = \frac{1}{16}$

$\dfrac{\sqrt{3}}{\sin 20^\circ} - \dfrac{1}{\cos 20^\circ}$

$\dfrac{\sqrt{3}\cos 20^\circ - \sin 20^\circ}{\frac{2\sin 20^\circ \cos 20^\circ}{2}} = \dfrac{2\left(\frac{\sqrt{3}}{2}\cos 20^\circ - \frac{1}{2}\sin 20^\circ\right)}{\frac{1}{2}\sin 40^\circ}$

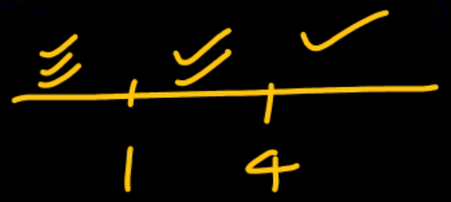
$= 4\left(\dfrac{\sin(40^\circ)}{\sin 40^\circ}\right) = 4$

$\dfrac{4}{\frac{1}{16}} = 64$

Ans. (B)

Q) The number of solution for $x \in R, x|x-4| + |x-1| - 2 = 0$

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



(I) $x \geq 4$

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

$x^2 - 3x - 3 = 0$

$x = \frac{3 \pm \sqrt{9+12}}{2} = \frac{3+\sqrt{21}}{2}$ ✗

(II) $1 \leq x < 4$

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

$-x^2 + 5x - 3 = 0 \Rightarrow x^2 - 5x + 3 = 0 \Rightarrow x = \frac{5 \pm \sqrt{25-12}}{2}$

No Soln

$\frac{3-\sqrt{21}}{2}$ ✗

(III) $x < 1$

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

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

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

$x = \frac{3 \pm \sqrt{5}}{2} = \frac{3-\sqrt{5}}{2}, \frac{3+\sqrt{5}}{2}$

No Soln

$= \frac{5+\sqrt{13}}{2}$ ✗

$\frac{5-\sqrt{13}}{2}$ ✗

Ans. (A)

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

$d = -3/4$ $\quad a + (n-1)\frac{-3}{4} = \frac{a}{4}$

(A) 189 **(B) 238** **(C) 276** **(D) 258**

$\frac{n}{2}\left(2(n-1) + (n-1)\left(\frac{-3}{4}\right)\right) = \frac{525}{2}$

$n\left(\frac{8n - 8 - 3n + 3}{4}\right) = 525$

$n(8)(n-1) = 8(105)(4)$

$n(n-1) = 420$

$n = 21$

$(n-1)(-3/4) = \frac{-3a}{4}$

$a = 20$ $\quad a = n-1$

$S_{17} = \frac{17}{2}\left(2(20) + 16\left(\frac{-3}{4}\right)\right)$

$\frac{17}{2}(29) = 17 \times 14 = 238$

Ans. (B)

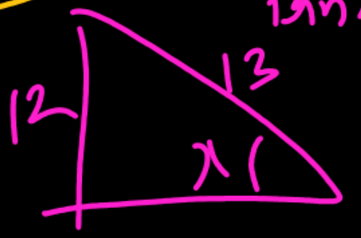
Q) If $\cot x = \frac{5}{12}$ for some $x \in \left(\pi, \frac{3\pi}{2}\right)$ then

$$\sin 7x\left(\cos\frac{13x}{2} + \sin\frac{13x}{2}\right) + \cos 7x\left(\cos\frac{13x}{2} - \sin\frac{13x}{2}\right)$$ **is equal to**

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

$\sin x/2 + \cos x/2$

$\tan x = 12/5$



$\sin x = \frac{12}{13}$ 3rd

$\sin x = -\frac{12}{13}$

$\left(\sin x/2 + \cos x/2\right)^2 = 1 + \sin x = 1 - \frac{12}{13} = \frac{1}{13}$

$\sin x/2 + \cos x/2 = \frac{1}{\sqrt{13}}$

Ans. $\left(\frac{1}{\sqrt{13}}\right)$

Q) If $F(t) = \int \frac{1-\sin(\ln t)}{1-\cos(\ln t)}\,dt$ and $F(e^{\pi/2}) = -e^{\pi/2}$ then $F(e^{\pi/4})$ is:

(A) $(-1-\sqrt{2})e^{\frac{\pi}{4}}$ (B) $(1-\sqrt{2})e^{\frac{\pi}{4}}$

(C) $(1+\sqrt{2})e^{\frac{\pi}{4}}$ (D) $(-2-\sqrt{2})e^{\frac{\pi}{4}}$

$\ln t = x \Rightarrow t = e^x$

$\frac{1}{t}dt = dx$

$dt = e^x\,dx$

$$\int e^x \left(\frac{1-\sin x}{1-\cos x}\right)dx$$

$$\int e^x \left(\frac{1-2\sin\frac{x}{2}\cos\frac{x}{2}}{2\sin^2\frac{x}{2}}\right)dx$$

$$\int e^x \left(\frac{1}{2}\operatorname{cosec}^2\frac{x}{2} - \cot\frac{x}{2}\right)dx$$

$f \quad f' \quad f$

$e^x\left(-\cot\frac{x}{2}\right)+C$

$F(t) = -t\cot\left(\frac{\ln t}{2}\right)+C$

$-e^{\pi/2} = -e^{\pi/2}(1)+C$

$C = 0$

$F(e^{\pi/4}) = -e^{\pi/4}\cot\frac{\pi}{8}$

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

Ans. (A)

$\lim_{g(x)\to 0} \frac{e^{g(x)}-1}{g(x)} = 1$

$\sec x + \tan x + \sec^2 x$

Q) $$f(x) = \frac{e^x(e^{\tan x - x} - 1) + \log(\sec x + \tan x) - x}{\tan x - x}$$

If f(x) is continuous at x = 0, then find f(0)

$$\lim_{x\to 0} \frac{e^x\left(e^{\tan x - x} - 1\right)}{(\tan x - x)} + \lim_{x\to 0} \frac{\log(\sec x + \tan x) - x}{\tan x - x}$$

$$\lim_{x\to 0} \frac{\sec x - 1}{(\sec x - 1)(\sec x + 1)} = \frac{1}{2}$$

$$1 + \lim_{x\to 0} \frac{\frac{1}{\sec x + \tan x}\left(\sec x(\sec x + \tan x)\right) - 1}{(\sec^2 x - 1)}$$

Ans. (1.5) $1 + \frac{1}{2} = 1.5$

Q) $\int_0^{36} f\left(\frac{tx}{36}\right) dt = 4\alpha f(x)$

$\frac{x}{36}dt = dt$ $\frac{tx}{36} = t$ $\frac{36}{x}\int_0^x \beta(t)\,dt = 4\alpha\beta(x)$

$y = cx^{\left(\frac{g-\alpha}{\alpha}\right)}$

$\ln y = \left(\frac{g-\alpha}{\alpha}\right)\ln x + \ln c$

$y = cx^2 \rightarrow y = \frac{x^2}{4}$ $\alpha = 3$ $\beta = 4$

$\frac{g-\alpha}{\alpha} = 2$

$\alpha = 3$

If the curve represented by y = f(x) is a standard parabola passing through (2, 1) and (-4, β) then find B^{α}

$4^3 = 64$

$\frac{gy}{x} - \frac{\alpha y}{x} = \alpha\frac{dy}{dx}$

$\frac{36}{x}\cdot\beta(x) - \frac{36}{x^2}\int_0^x \beta(t)\,dt = 4\alpha\beta'(x)$

$\frac{dy}{dx} = \frac{y}{x}\left(\frac{g-\alpha}{\alpha}\right)$

$\frac{36}{x}y - \frac{36}{x^2}\left(\frac{4\alpha yx}{36}\right) = 4\alpha\frac{dy}{dx}$

$\int\frac{dy}{y} = \int\frac{dx}{x}\left(\frac{g-\alpha}{\alpha}\right)$

Ans. (64)

Q) A bag contains 100 balls in which 10 are defective and 90 are non-defective balls. Find the number of ways to select 8 balls without replacement in which at least 7 balls should be defective?

8b → 7D 1ND + 8D 0ND ✓

$^{10}C_7 \times {}^{90}C_1 + {}^{10}C_8 \times {}^{90}C_0$

$= 120 \times 90 + 45 \times 1$

$= 10845$

With Replacement

$^8C_7 \times \left(\frac{1}{10}\right)^7 \left(\frac{9}{10}\right)^1 + {}^8C_8 \times \left(\frac{1}{10}\right)^8 \left(\frac{9}{10}\right)^0$

Ans. (10845)

$n = 10 \qquad \bar{x} = 10 \qquad \sigma^2 = 2$

Q) Consider 10 data such that their mean is 10 and variance is 2 . If one of the data α is removed and new data entry β is inserted. Now new mean is 10.1 and new variance is 1.99 then (α + β) is equal to

(A) 10 $\bar{x}_{new}$ **(B) 20** σ^2_{new} **(C) 1** **(D) 2**

old $\Sigma x_i = 10 \times 10 = 100$

new $\dfrac{\Sigma x_i - \alpha + \beta}{10} = 10.1$

$100 + \beta - \alpha = 101$

$\beta - \alpha = 1$

old $2 = \dfrac{\Sigma x_i^2}{10} - 100$

$1020 = \Sigma x_i^2$

new $1.99 = \dfrac{\Sigma x_i^2 - \alpha^2 + \beta^2}{10} - (10.1)^2$

$1040 = 1020 + (\beta^2 - \alpha^2)$

$\beta^2 - \alpha^2 = 20$

$(\beta + \alpha)1 = 20$

$\beta + \alpha = 20$

$\beta = 10.5$

$\alpha = 9.5$

Ans. (B)

Q) Consider a sequence 729, 81, 9, 1, ... $3^6, 3^4, 3^2, 3^0, \ldots$

Let P_n = product of first n terms of the given sequence and

$$\sum_{n=1}^{40} (P_n)^{\frac{1}{n}} = \frac{3^{\alpha}-1}{2\times 3^{\beta}}.$$ **Then the value of $\alpha + \beta$ is** $\alpha+\beta = 40+33 = 73$

(A) 75 **(B) 73** **(C) 76** **(D) 81**

Ans. (B)

$$\sum_{n=1}^{40} 3^{(7-n)} = \frac{3^{\alpha}-1}{2\cdot 3^{\beta}}$$

$$\Rightarrow 3^7\left(\frac{1}{3^1}+\frac{1}{3^2}+\cdots+40\text{ terms}\right) =$$

$$\Rightarrow 3^7 \frac{\frac{1}{3^1}\left(1-\frac{1}{3^{40}}\right)}{1-\frac{1}{3}} = \frac{1\cdot(3^{40}-1)}{2\cdot 3^{33}}$$

$$P_n = 3^{6+4+2+0+\cdots+n\text{ terms}}$$

$$= 3^{\frac{n}{2}(12+(n-1)(-2))}$$

$$P_n = 3^{n(7-n)}$$

Q) Number of matrices A of order 3 × 2 such that all of its elements are from the set {-2, -1, 0, 1, 2} such that trace of AA^T is 5, is equal to

(A) 120 (B) 192 (C) 312 (D) 126

$\Rightarrow a_1^2+b_1^2+a_2^2+b_2^2+a_3^2+b_3^2=5$

$0,0,0,0,1,4 = {}^6C_4 . 1 . {}^2C_1 . 2 . 2$

$= 15 . 8 = 120$

$0,1,1,1,1,1$

$= {}^6C_1 . 1 . (2)^5 = 6 . 32$

$= 192$

$192 + 120 = 312$

$$A = \begin{bmatrix} a_1 & b_1 \\ a_2 & b_2 \\ a_3 & b_3 \end{bmatrix}$$

$$AA^T = \begin{bmatrix} a_1 & b_1 \\ a_2 & b_2 \\ a_3 & b_3 \end{bmatrix} \begin{bmatrix} a_1 & a_2 & a_3 \\ b_1 & b_2 & b_3 \end{bmatrix}$$

$$= \begin{bmatrix} a_1^2+b_1^2 & & \\ & a_2^2+b_2^2 & \\ & & a_3^2+b_3^2 \end{bmatrix}$$

Ans. (C)

$h = \frac{-\sqrt{2}\alpha}{3}$, $k = \frac{\sqrt{3}\beta}{3}$ $\quad \alpha^2+\beta^2 = 32 - (1) \Rightarrow \frac{9x^2}{2} + \frac{9y^2}{3} = 32$

Q) Let a circle passes through origin and the points $A(-\sqrt{2}\alpha, 0)$, $B(0, \sqrt{3}\beta)$, where α and β are non zero real parameters, such that its radius is 4. Then the radius of locus of centroid of triangle OAB is

$x^2+y^2 = \frac{64}{9}$

(A) $\frac{2}{3}$ (B) $\frac{4}{3}$ (C) $\frac{11}{3}$ (D) $\frac{8}{3}$

$2 \cdot \frac{9h^2}{2} + 3 \cdot \frac{3k^2}{3} = 64$

$9h^2 + 3k^2 = 64$

$AB^2 = 64$

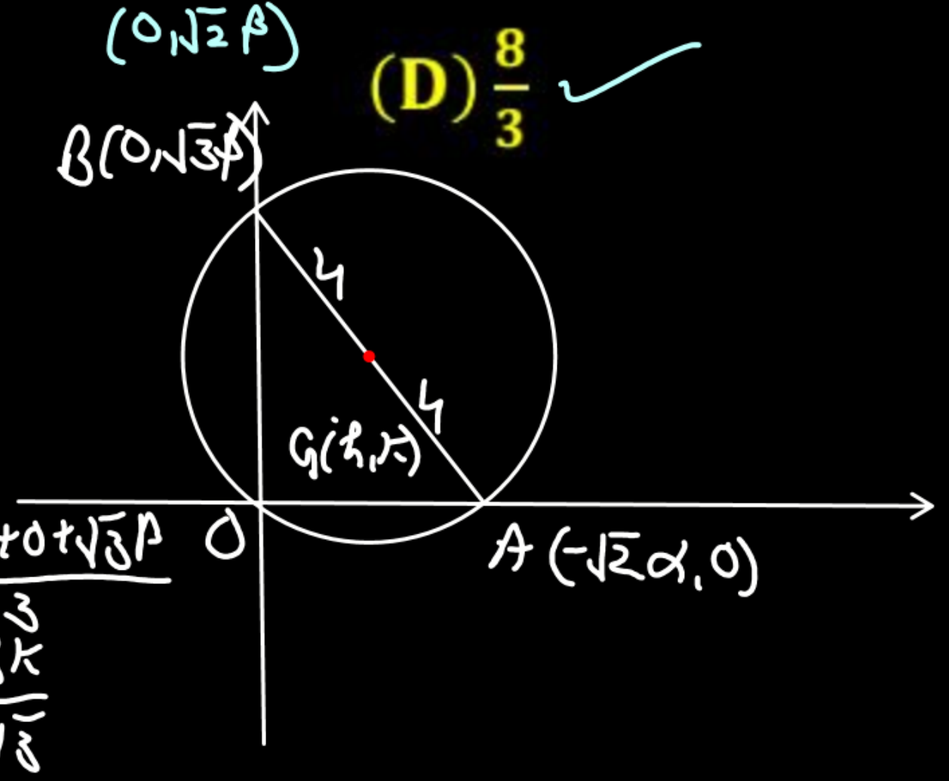
$2\alpha^2 + 3\beta^2 = 64 - (1)$

$h = \frac{0+0-\sqrt{2}\alpha}{3}$

$\alpha = -\frac{3h}{\sqrt{2}}$

$k = \frac{0+0+\sqrt{3}\beta}{3}$

$\beta = \frac{3k}{\sqrt{3}}$



Ans. (D)

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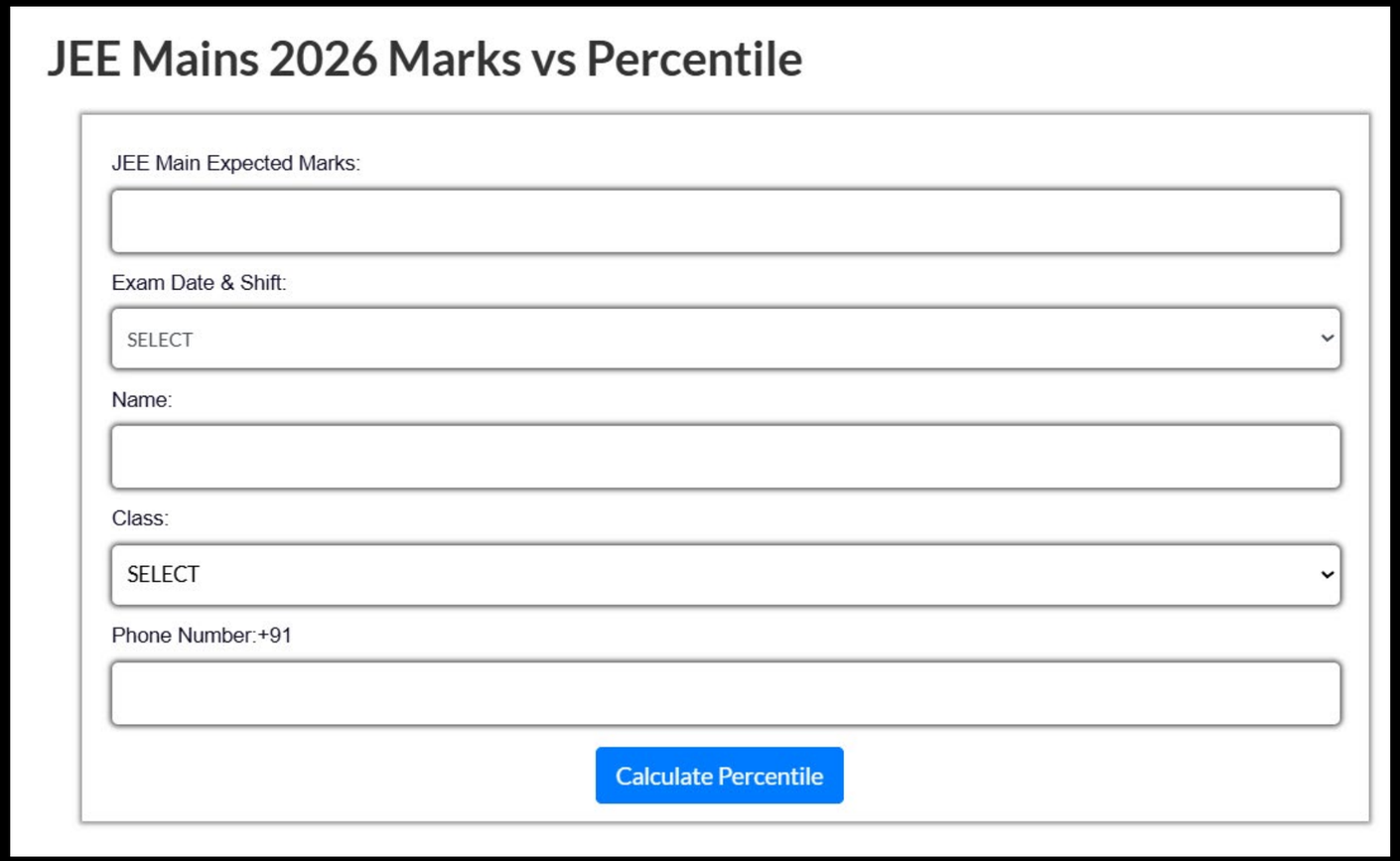

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