JEE MAIN (Session 2) 2023
Paper Analysis

PHYSICS | 12th April 2023 _ Shift-1

Continuing to keep the pledge
of **imparting education** for the **last 16 Years**

49600+
SELECTIONS SINCE 2007

JEE (Advanced)	JEE (Main)	NEET/AIIMS	NTSE/OLYMPIADS
9395	**26591**	**11383** (Under 50000 Rank)	**2235** (6th to 10th class)

Most Promising RANKS
Produced by MOTION Faculties

NEET / AIIMS

- **AIR-1 to 10** 25 Times
- **AIR-11 to 50** 83 Times
- **AIR-51 to 100** 81 Times

JEE MAIN+ADVANCED

- **AIR-1 to 10** 8 Times
- **AIR-11 to 50** 32 Times
- **AIR-51 to 100** 36 Times

Nation's Best SELECTION
Percentage (%) Ratio

Student Qualified in NEET

(2022)
4837/5356 = **90.31%**
(2021)
3276/3411 = **93.12%**

Student Qualified in JEE ADVANCED

(2022)
1756/4818 = **36.45%**
(2021)
1256/2994 = **41.95%**

Student Qualified in JEE MAIN

(2022)
4818/6653 = **72.41%**
(2021)
2994/4087 = **73.25%**

NITIN VIIJAY (NV Sir)
Founder & CEO

SECTION - A

31. The ratio of escape velocity of a planet to the escape velocity of earth will be :-
Given : Mass of the planet is 16 times mass of earth and radius of the planet is 4 times the radius of earth.
(1) 1 : 4 (2) 4 : 1 (3) 2 : 1 (4) 1 : $\sqrt{2}$

Sol. **(3)**

Given mass of planet = 16 mass of the earth ($m_p = 16\ m_e$)

$$r_p = 4r_e$$

We know $V_{escape} = \sqrt{\frac{2Gm}{R}}, \frac{V_{es\,planet}}{V_{es\,earth}} = ?$

$$\frac{V_{es\ planet}}{V_{es\ earth}} = \sqrt{\frac{2GM_p}{R_p} \times \frac{R_e}{2GM_e}}$$

$$= \sqrt{\frac{M_P}{M_e} \times \frac{R_e}{R_p}}$$

$$= \sqrt{\frac{16m_e}{m_e} \times \frac{R_e}{4R_e}}$$

$$= \sqrt{\frac{16}{4}} = 2:1$$

$$\boxed{\frac{V_{es\,planet}}{V_{es\,earth}} = \frac{2}{1}}$$

32. An engine operating between the boiling and freezing points of water will have
A. efficiency more than 27%
B. efficiency less than the efficiency of a Carnot engine operating between the same two temperatures.
C. efficiency equal to 27%
D. efficiency less than 27%
Choose the correct answer from the options given below :
(1) B and C only (2) B and D only (3) B, C and D only (4) A and b only

Sol. **(2)**

Engine is operating between FP and BP of water.

We asked to find efficiency :

$T_1 = 100°C \Rightarrow 100 + 273 = 373$ K

$T_2 = 0°C \Rightarrow 0 + 273 = 273$ K

We know $\eta = 1 - \frac{T_2}{T_1}$

$$\eta = 1 - \frac{273}{373}$$

$$\eta = \frac{373 - 273}{373} = \frac{100}{373}$$

$$\eta = 0.268$$

and $\eta\% = 0.268 \times 100$

$$\eta\% = 26.8\%$$

33. A wire of resistance 160 Ω is melted and drawn in a wire of one-fourth of its length. The new resistance of the wire will be

(1) 640 Ω (2) 40 Ω (3) 10 Ω (4) 16 Ω

Sol. **(3)**

Voulme remain same

$$A\ell = A'\ell'$$

$$A' = \frac{A\ell}{\ell'} = \frac{A\ell}{\ell/4}$$

$$A' = 4A$$

$$L' = \frac{L}{4}$$

$$\frac{R'}{R} = \frac{\rho\frac{L'}{A'}}{\rho\frac{L}{A}}$$

$$R' = R\left[\frac{L'}{A'} \times \frac{A}{L}\right]$$

$$R' = 160\left[\frac{L}{4L} \times \frac{A}{4A}\right]$$

$$\boxed{R' = 10\Omega}$$

34. Three forces $F_1 = 10$ N, $F_2 = 8$ N, $F_3 = 6$ N are acting on a particle of mass 5 kg. The forces F_2 and F_3 are applied perpendicularly so that particle remains at rest. If the force F_1 is removed, then the acceleration of the particle is :

(1) 4.8 ms^{-2} (2) 0.5 ms^{-2} (3) 7 ms^{-2} (4) 2 ms^{-2}

Sol. **(4)**

$F_1 = 10N$

$F_2 = 8N$

$F_3 = 6N$

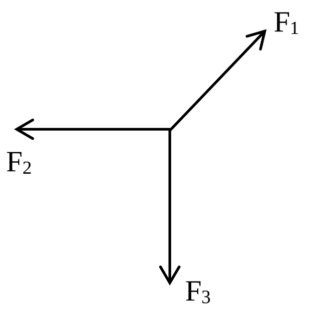
$$\vec{a} = \frac{F_2\hat{i} + F_3\hat{j}}{5}$$

$$\vec{a} = \frac{8\hat{i} + 6\hat{j}}{5}$$

$$|\vec{a}| = \frac{\sqrt{64+36}}{5}$$

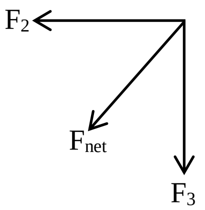
$$= \frac{10}{5} = 2m/sec^2$$

OR



$$F_1^2 = F_2^2 + F_3^2$$

Now F1 is removed then net force



$$F_{net} = \sqrt{F_2^2 + F_3^2}$$

$$= \sqrt{64 + 36}$$

$$F_{net} = 10$$

10 = 5a

a = 2m/sec^2

35. Given below are two statements : one is labelled as Assertion A and the other is labelled as Reason R

Assertion A : EM waves used for optical communication have longer wavelengths than that of microwave, employed in Radar technology.

Reason R : Infrared EM waves are more energetic than microwaves, (used in Radar)

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

(1) A is true but R is false

(2) Both A and R are true and r is the correct explanation of A

(3) A is false but R is true

(4) Both A and R are true but R is NOT the correct explanation of A

Sol. **(3)**

36. If the r. m. s speed of chlorine molecule is 490 m/s at 27°C, the r. m. s speed of argon molecules at the same temperature will be (Atomic mass of argon = 39.9 u, molecular mass of chlorine = 70.9 u)

(1) 651.7 m/s (2) 451.7 m/s (3) 551.7 m/s (4) 751.7 m/s

Sol. **(1)**

Molar mass of chlorine = 70.9 u

Atomic mass of argon = 39.9 u

$$V_{rms} = \sqrt{\frac{3RT}{m}}$$

$$V_{rms} \propto \sqrt{\frac{1}{m}}$$

$$\frac{V_{rms\,chlorine}}{V_{rms\,argon}} = \sqrt{\frac{m_{argon}}{m_{chlorine}}}$$

$$\frac{490}{V_{rms\,argon}} = \sqrt{\frac{39.9}{70.9}}$$

$$V_{rms\,argon} = 490 \times 1.33$$

$$\boxed{V_{rms\,argon} = 651.7\,m/sec}$$

37. Two satellites A and B move round the earth in the same orbit. The mass of A is twice the mass of B. The quantity which is same for the two satellites will be

(1) Kinetic energy (2) Speed (3) Total energy (4) Potential energy

Sol. **(2)**

Speed $V = \sqrt{\frac{GM_e}{r}}$

m_e = mass of earth

r = radius of orbit

Independent on mass of satellite so speed is same

Other three quantities are mass dependent

$\rightarrow \quad KE = \frac{Gm_e m}{2r}$

$\rightarrow \quad PE = \frac{-Gm_e m}{r}$

$\rightarrow \quad TE = \frac{-Gm_e m}{2r}$

38. Given below are two statements:

Statements I : When the frequency of an a.c source in a series LCR circuit increases, the current in the circuit first increases, attains a maximum value and then decreases

Statements II : In a series LCR circuit, the value of power factor at resonance is one.

In the light of given statements, choose the most appropriate answer from the options given below.

(1) Statement I is correct but Statement II is false.

(2) Both Statement I and Statement II are true.

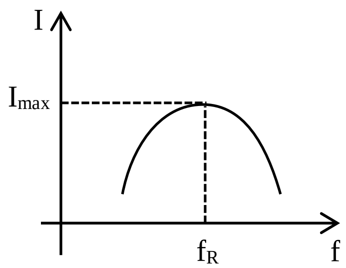
(3) Statement I is incorrect but Statement II is true.

(4) Both Statement I and Statement II are false.

Sol. **(2)**

(i) At resonance frequency power factor of RLC circuit is one

(ii) Graph of RLC circuit is:



At $\omega = \omega_R$

$Z = R$

$\cos\phi = \frac{R}{Z} = 1$

39. A particle is executing simple harmonic motion (SHM). The ratio of potential energy and kinetic energy of the particle when its displacement is half of its amplitude will be

(1) 1 : 1 (2) 1 : 3 (3) 1 : 4 (4) 2 : 1

Sol. **(2)**

Ratio of PE and KE = ?

When $\underset{\text{disp.}}{\underset{\uparrow}{x}} = \frac{A}{2}$

$KE = \frac{1}{2}m\omega^2\left[A^2 - x^2\right]$

$= \frac{1}{2}m\omega^2\left[A^2 - \frac{A^2}{4}\right]$

$$KE = = \frac{1}{2}m\omega^2\left[\frac{3A^2}{4}\right] \quad \ldots(1)$$

And $PE = \frac{1}{2}m\omega^2x^2$

$$= \frac{1}{2}m\omega^2\frac{A^2}{4}$$

$$\frac{PE}{KE} = \frac{m\omega^2A^2 \times 8}{8m\omega^2A^2 \times 3} = \frac{1}{3}$$

$\Rightarrow$ 1 : 3

40. Given below are two statements : one is labelled as Assertion A and the other is labelled as Reason R

Assertion A : If an electric dipole of dipole moment 30×10^{-5} C m is enclosed by a closed surface, the net flux coming out of the surface will be zero.

Reason R : Electric dipole consists of two equal and opposite charges.

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

(1) Both A and R are true but R is NOT the correct explanation of A

(2) A is false but R is true

(3) Both A and R are true and R is the correct explanation of A

(4) A is true but R is false

Sol. **(3)**

(i) An electric dipole is enclosed in a closed question surface the total flux through the enclosed surface is zero.

(ii) net charge inside the enclosed surface is zero.

41. Given below are two statements :

Statements I : The diamagnetic property depends on temperature.

Statements II : The induced magnetic dipole moment in a diamagnetic sample is always opposite to the magnetizing field.

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

(1) Both Statement I and Statement II are true.

(2) Both Statement I and Statement II are False.

(3) Statement I is correct but Statement II is false.

(4) Statement I is incorrect but Statement II is true.

Sol. **(4)**

Diamagnetism do not depends on temperature. So statement-1 is wrong

Statement-1 is given as: Diamagnetic property depends on temperature. Wrong

Statement-2 : in diamagnetic material induced B is apposite to applied magnetic field.

42. Match List I with List II

LIST I		LIST II	
A.	Spring constant	I.	$[T^{-1}]$
B.	Angular speed	II.	$[MT^{-2}]$
C.	Angular momentum	III.	$[ML^2]$
D.	Moment of Inertia	VI.	$[ML^2T^{-1}]$

Choose the correct answer from the options given below :

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

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

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

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

Sol. **(4)**

(i) Spring constant

$F = Kx$

$K = \frac{F}{x} = \frac{kgm\,sec^{-2}}{m} = kg.sec^{-2} = [ML^0T^{-2}]$

(ii) Angular speed : (ω)

$\omega = \frac{2\pi}{T}$

$\omega = [M^0L^0T^{-1}]$

(iii) Angular momentum

$L = MVR \Rightarrow Kg.m\,sec^{-1}m = kgm^2sec^{-1}$

$= [ML^2T^{-1}]$

(iv) Moment of Inertia

$I = MR^2 = Kg.m^2$

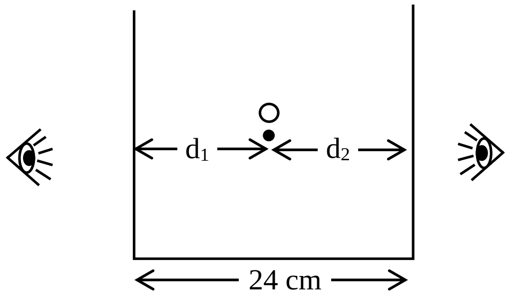
$= [ML^2T^0]$

43. An ice cube has a bubble inside. When viewed from one side the apparent distance of the bubble is 12 cm. When viewed from the opposite side, the apparent distance of the bubble is observed as 4 cm. If the side of the ice cube is 24 cm, the refractive index of the ice cube is

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

Sol. **(2)**

Question says small bubble is trapped inside a cube of length 24 cm. If apparent distance of bubble is 12 cm and 4 cm from one and other side and find x = ?



Using $\frac{\text{Apparent depth}}{\text{Real depth}} = \frac{\mu_2}{\mu_1}$

$\mu_2 = 1$ μ_1 is glass

$\mu_1 = \mu$ μ_2 is air

$\frac{12}{d_1} = \frac{1}{\mu}$

$\boxed{12\mu = d_1}$ ....(1)

$\frac{4}{d_2} = \frac{1}{\mu} \Rightarrow \boxed{4\mu = d_2}$

$d_1 + d_2 = 24m \Rightarrow 12\mu + 4\mu = 24 \Rightarrow \mu = \frac{24}{16} = \frac{6}{4} = \frac{3}{2}$

44. The amplitude of 15 sin (100 πt) is modulated by 10 sin (4 πt) signal. The amplitude modulated signal contains frequencies of
A. 500 Hz
B. 2 Hz
C. 250 Hz
D. 498 Hz
E. 502 Hz
Choose the correct answer from the options given below :
(1) A and B only (2) A and D only (3) A and C only (4) A, D and E only

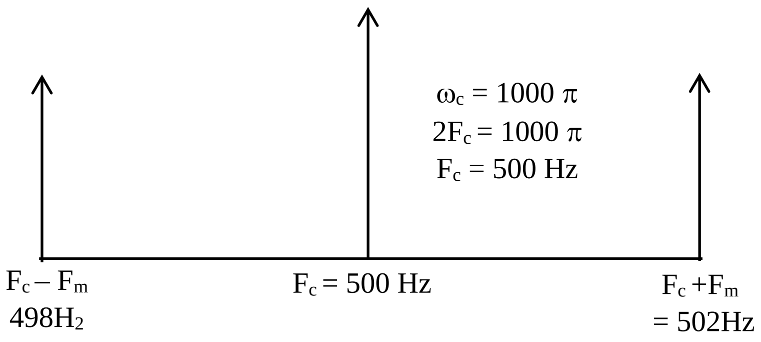
Sol. **(4)**

Signal = $15\sin(1000\pi t)$ is modulated by $10\sin(4\pi t)$

$\omega_m = 4\pi$

$2\pi f_m = 4\pi$

$f_m = 2H$



45. A 12.5 eV electron beam is used to bombard gaseous hydrogen at room temperature. The number of spectral lines emitted will be :
(1) 2 (2) 3 (3) 4 (4) 1

Sol. **(2)**

$12.5 = -13.6\left[\frac{1}{n_f^2} - \frac{1}{n_i^2}\right]$ ni = 1

$12.5 = -13.6\left[\frac{1}{n_f^2} - 1\right]$

$12.5 = 13.6 - \frac{13.6}{n_f^2}$

$-1.1 = -\frac{13.6}{n_f^2}$

$n_f \simeq 3.5$

$\boxed{n_f = 3}$ so transition is 3 to 1

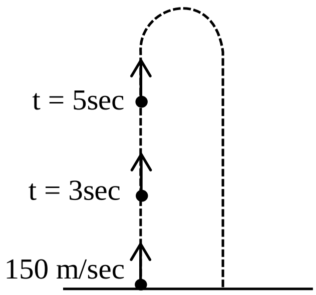
No. of lines = $^3C_2$ $\left({}^nC_r = \frac{\lfloor n}{\lfloor(n-r)\lfloor r}\right)$

$= \frac{\lfloor 3}{\lfloor(3-2)(\lfloor 2)}$

$\frac{3\times2\times1}{1\times2} = 3$ lines

46. A ball is thrown vertically upward with an initial velocity of 150 m/s. The ratio of velocity after 3 s and 5 s is $\frac{x+1}{x}$. The value of x is ______.
{take, g = 10 m/s^2}
(1) 6 (2) 5 (3) -5 (4) 10

Sol. **(2)**



$$\text{ToF} = \frac{24}{g} = \frac{2\times150}{10} = 30\,\text{sec}$$

ToA = 15 sec.

$$\frac{V_1}{V_2} = \frac{u+at_1}{u+at_2}$$

$$\frac{V_1}{V_2} = \frac{150-10\times3}{150-10\times5} = \frac{120}{100}$$

$$\frac{V_1}{V_2} = \frac{6}{5}$$

$$x+1=6$$

$$\boxed{x=5}$$

47. In an n-p-n common emitter (CE) transistor the collector current changes from 5 mA to 16 mA for the change in base current from 100 μA and 200 μA, respectively. The current gain of transistor is ______.
(1) 110 (2) 9 (3) 0.9 (4) 210

Sol. **(1)** $\beta = \frac{\Delta I_C}{\Delta I_B}$ $\Delta I_C = 16-5 = 11\text{mA}$, $\Delta I_B = 200-100 = 100\mu A$

$$\beta = \frac{11\times10^{-3}}{100\times10^{-6}}$$

$$\beta = \frac{11000}{100}$$

$$\beta = 110$$

48. A body cools from 80ºC to 60ºC in 5 minutes. The temperature of the surrounding is 20ºC. The time it takes to cool from 60ºC to 40ºC is:
(1) 450 s (2) 500 s (3) 420 s (4) $\frac{25}{3}$s

Sol. **(2)**
Body cools from 80°C to 60°C in 5 min
$T_{surrounding} = 20°C$
Time taken to cool from 60°C to 40°C?
we know newton's law of cooling is

$$-\frac{d\theta}{dt} = b(\underset{\downarrow}{\theta-\theta_0})$$

surrounding temp.

We take approx value of v as $\frac{80+60}{2}=70°$

$\frac{20}{5}=b[70-20]$ ….(1)

$\frac{20}{t}=b[50-20]$ …..(2)

After solving $t=\frac{25}{3}\min$

In second $t=\frac{25}{3}\times 60$

= 500 sec.

49. A proton and an α -particle are accelerated from rest by 2 V and 4 V potentials, respectively. The ratio of their de-Broglie wavelength is :

(1) 2 : 1 (2) 4 : 1 (3) 8 : 1 (4) 16 : 1

Sol. **(2)**

De Broglie wavelength $\lambda=\frac{h}{\sqrt{2mqV}}$

$m_\alpha=4m\to 4V$

$m_p=m\to 2V$

$\lambda=\frac{h}{\sqrt{2mKE}}$

$\lambda_p=\frac{h}{\sqrt{2mq(2V)}}$ ….(1), $\lambda_\alpha=\frac{h}{\sqrt{4mq(4V)}}$

$\frac{\lambda_p}{\lambda_\alpha}=\frac{h}{\sqrt{2mq(2V)}}\times\frac{\sqrt{4mq(4V)}}{h}$

$\frac{\lambda_p}{\lambda_\alpha}=4 \quad\Rightarrow\quad \frac{\lambda_p}{\lambda_\alpha}=4:1$

50. Given below are two statements :

Statements I : A truck and a car moving with same kinetic energy are brought to rest by applying breaks which provide equal retarding forces. Both come to rest in equal distance.

Statements II : A car moving towards east takes a turn and moves towards north, the speed remains unchanged. The acceleration of the car is zero.

In the light of given statements, choose the most appropriate answer from the options given below

(1) Statements I is correct but Statements II is incorrect.

(2) Statements I is incorrect but Statements II is correct.

(3) Both Statements I and Statements II are correct.

(4) Both Statements I and Statements II are incorrect.

Sol. **(1)**

Statement-1 true

Stament-2 false

SECTION - B

51. To maintain a speed of 80 km/h by a bus of mass 500 kg on a plane rough road for 4 km distance, the work done by the engine of the bus will be _______ KJ. [The coefficient of fiction between tyre of bus and road is 0.04.]

Sol. **(784)**

F = 0.04 × 500 × 9.8

= 20 × 9.8 = 196

WD = F × disc

= 196 × 4000

= 784 kJ

52. A conducting circular loop is placed in a uniform magnetic field of 0.4 T with its plane perpendicular to the field. Somehow, the radius of the loop starts expending at a constant rate of 1 mm/s. The magnitude of induced emf in the loop at an instant when the radius of the lop is 2 cm will be ______ μV.

Sol. **(50)**

$B = 0.4T$

Rate $\frac{dr}{dt} = 1mm/sec$ Einduced = ?

R = 2cm

$\phi = B\pi r^2 \quad ((\phi = B.A)$

$\varepsilon = \frac{d\phi}{dt} = B\pi(2r)\frac{dr}{dt}$

$Ein = 0.4 \times \pi \times 4 \times 10^{-2} \times 10^{-3}$

$Ein = 16\pi \times 10^{-6}$

$Ein = 50\mu V$

53. A common example of alpha decay is

$^{238}_{92}U \rightarrow {}^{234}_{90}Th + {}_2He^4 + Q$

Given :

$^{238}_{92}U = 238.05060\,u,$

$^{234}_{90}Th = 234.04360\,u,$

$^{4}_{2}He = 4.00260\,u$ and

$lu = 931.5\frac{MeV}{c^2}$

The energy released (Q) during the alpha decay of $^{238}_{92}U$ is ________ MeV

Sol. **(4.25)**

$\alpha = (m_u - M_{th} - M_{He})C^2$

$\alpha = 0.00456 \times 931.5$

$\alpha = 4.25MeV$

54. 64 identical drops each charged upto potential of 10 mV are combined to form a bigger drop. The potential of the bigger drop will be _____ mV.

Sol. **(0.16)**

We know $V = \frac{kq}{r}$, $\quad q' = 64q$

Voulme remain const so

$$\frac{4}{3}\pi r^3 \times 64 = \frac{4}{3}\pi R^3$$

$$\boxed{R = 4r}$$

Now new potential $V' = \frac{K64q}{4r} = \frac{16kq}{r}$

V' = 16. V and $V = \frac{Kq}{r} = 10\text{mV}$

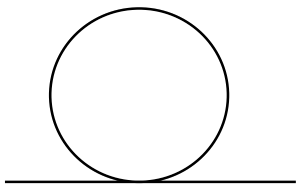
$$V' = 16 \times 10 \times 10^{-3}$$

$$V' = 0.16V$$

OR V' = 160 mV

55. For a rolling spherical shell, the ratio of rotational kinetic energy and total kinetic energy is $\frac{x}{5}$. The value of x is _____

Sol. **(2)**



$$KE_T \frac{1}{2}mV^2$$

$$KE_R = \frac{1}{2}\left(\frac{2}{5}mR^2\right)\omega^2 = \frac{1}{3}mR^2.\frac{V^2}{R^2} = \frac{1}{3}mV^2$$

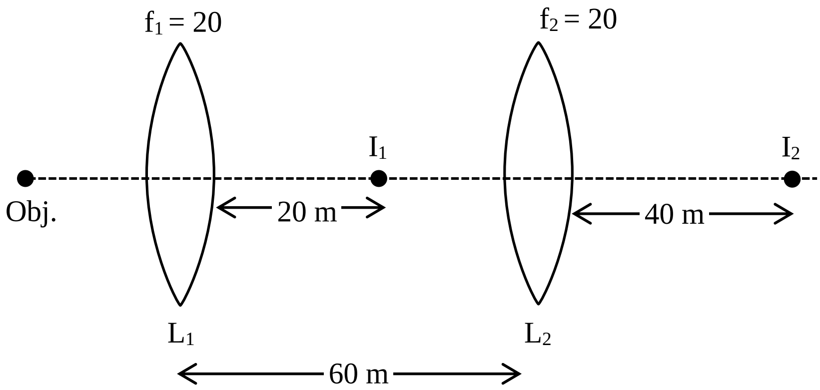
$$KE_T = \frac{1}{2}mV^2 + \frac{mV^2}{3}$$

$$KE_T = \frac{5}{6}mV^2$$

$$\frac{K_R}{K_T} = \frac{1/3mV^2}{5/6mV^2} = \frac{2}{5}$$

x = 2

56. Two convex lenses of focal length 20 cm each are placed coaxially with a separation of 60 cm between them. The image of the distant object formed by the combination is at ________ cm from the first lens.



Sol. **(100)**

For I[st] lens

$$\frac{1}{V_1} - \frac{1}{\infty} = \frac{1}{20}$$

$$\boxed{V_1 = 20\text{cm}}$$

For 2[nd] lens

$$\frac{1}{V_2} - \frac{1}{-40} = \frac{1}{20}$$

$$\boxed{V_2 = 40\text{cm}}$$

So dist = 40 + 60 = 100 cm

57. A compass needle oscillates 20 times per minute at a place where the dip is 30° and 30 times per minute where the dip is 60°. The ratio of total magnetic field due to the earth at two places respectively is $\frac{4}{\sqrt{x}}$. The value of x is

Sol. **(243)**

Period of oscillation $\alpha \frac{1}{\sqrt{B_H}}$

$$T\alpha \frac{1}{\sqrt{B\cos\theta}} \Rightarrow \frac{T_1}{T_2} = \sqrt{\frac{B_2\cos\theta_2}{B_1\cos\theta_1}}$$

$$\Rightarrow \frac{60/20}{60/30} = \sqrt{\frac{B_2}{B_1}\frac{\cos 60^\circ}{\cos 30^\circ}} \Rightarrow \frac{3}{2} = \sqrt{\frac{B_2}{\sqrt{3}B_1}}$$

$$\Rightarrow \frac{9}{4} = \frac{B_2}{\sqrt{3}B_1} \Rightarrow \frac{B_1}{B_2} = \frac{4}{9\sqrt{3}} = \frac{4}{\sqrt{243}}$$

58. For a certain organ pipe, the first three resonance frequencies are in the ratio of 1 : 3 : 5 respectively. If the frequency of fifth harmonic is 405 Hz and the speed of sound in air is 324 ms^{-1} the length of the organ pipe is ______m

Sol. **(1)**

Resonance frequency in closed organ pipe

$$f = (2n+1)\frac{V}{4\ell}$$

Given is 5^{th} harmonic

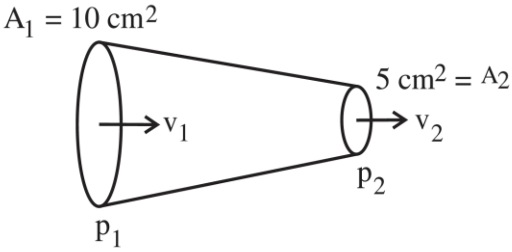
So $5\frac{V}{4\ell} = 405$

$\frac{5\times 324}{4\times 405} = \ell$

$\ell = 1m$

59. Glycerin of density 1.25×10^3 kg m^{-3} is flowing through the conical section of pipe. The area of cross-section of the pipe at its ends are 10 cm^2 and 5 cm^2 and pressure drop across its length is 3 Nm^{-2}. The rate of flow of glycerin through the pipe is $x \times 10^{-5}$ m^3 s^{-1}. The value of x is ________.

Sol. **(4)**



$\Delta P = P_1 - P_2 = 3N/m^2$ (given)

By continuity equation

$A_1v_1 = A_2v_2$

$\therefore v_1 = \frac{A_2}{A_1}v_2$ ....(1)

By bernoulli's equation

$P_1 + \frac{1}{2}\rho v_1^2 = P_2 + \frac{1}{2}\rho v_2^2$

$P_1 - P_2 = \frac{1}{2}\rho(v_2^2 - v_1^2)$

$\Delta P = \frac{1}{2}\rho(v_2^2 - \frac{A_2^2}{A_1^2}v_2^2)$

$\Delta P = \frac{1}{2}\rho\left[1-\left(\frac{A_2}{A_1}\right)^2\right]v_2^2$

$3 = \frac{1}{2} \times 1.25 \times 10^3 \left(1-\left(\frac{5}{10}\right)^2\right)v_2^2$

$3 = \frac{1}{2} \times 1.25 \times 10^3 \left[1-\frac{1}{4}\right]v_2^2$

$3 = \frac{1}{2} \times 1.25 \times 10^3 \times \frac{3}{4} v_2^2$

$\therefore$ $v_2 = 8 \times 10^{-2}$ m/s
So discharge rate = A_2v_2
$= 5 \times 10^{-4} \times 8 \times 10^{-2}$
$= 4 \times 10^{-5}$ m^3/s

60. The current flowing through a conductor connected across a source is 2 A and 1.2 A at 0ºC and 100ºC respectively. The current flowing through the conductor at 50ºC will be ______ $\times 10^2$ mA.

Sol. **(15)**

$i_0R_0 = i_{100}R_{100}$ (For same source)

$\Rightarrow 2R_0 = 1.2\, R_0\,(1 + 100\alpha)$ ….(1)

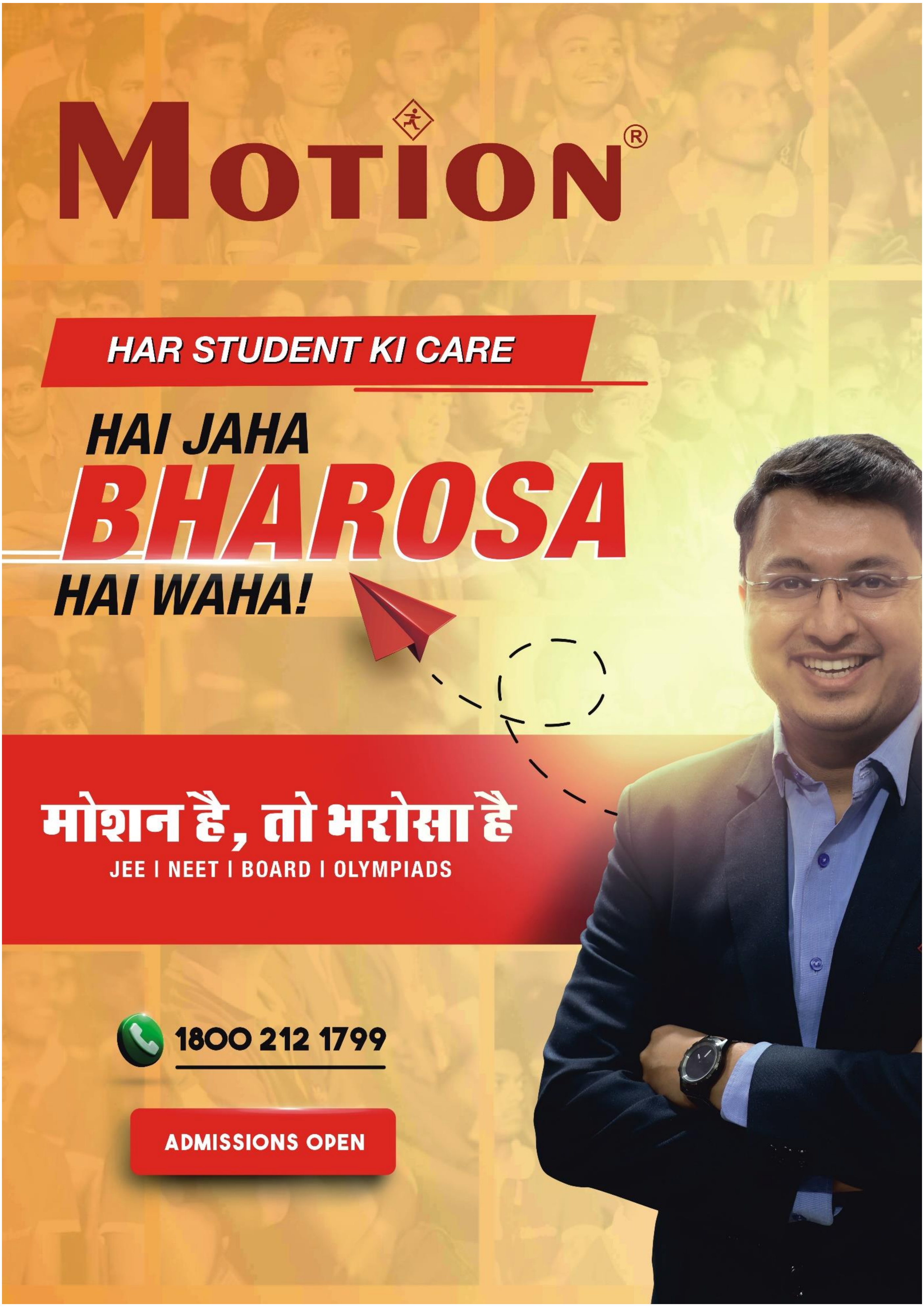
$\Rightarrow 1 + 100\,\alpha = \frac{5}{3} \Rightarrow 100\,\alpha = \frac{2}{3}$

$\Rightarrow 50\,\alpha = \frac{1}{3}$

$\therefore$ $i_{50}R_{50} = i_0R_0$

$\Rightarrow i_{50} = \frac{i_0R_0}{R_{50}} = \frac{2 \times R_0}{R_0(1+50\alpha)} = \frac{2}{1+\frac{1}{3}} = 1.5$ A

$= 15 \times 10^2$ mA


MOTION®
HAR STUDENT KI CARE
HAI JAHA
BHAROSA
HAI WAHA!
मोशन है, तो भरोसा है
JEE | NEET | BOARD | OLYMPIADS
1800 212 1799
ADMISSIONS OPEN