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PREVIOUS YEAR PAPER · 2023

OLYMPIAD · STAGE I

NSEP

National Standard Examination in Physics

2023

Question paper, answer key and Zigyan solutions

60	216	120 min	61
Questions	Maximum marks	Time	Paper code

Question paper and official answer key: Indian Association of Physics Teachers (IAPT), NSEP 2023, paper code 61.
Solutions and notes: Zigyan. This booklet is not an IAPT publication.

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AIR 168	AIR 811
	99.95 percentile



Sulokya Bibhuty

3 YEARS CLASSROOM

JEE ADVANCED 2026	JEE MAIN 2026
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- Anay Gupta — 3 Years Classroom
- Akshat Khator — 3 Years Classroom
- Harshit Goyal — 4 Years Classroom
- Hardik Sharma — 3 Years Classroom
- Aarush Kumar — 1 Year Classroom

PHYSICS

- Sulokya Bibhuty — 3 Years Classroom
- Saksham Bishnoi — 4 Years Classroom

ASTRONOMY

- Sulokya Bibhuty — 3 Years Classroom

MATHEMATICS (IOQM)

- Priyanshi — 4 Years Classroom

Saksham Bishnoi qualified the Chemistry Olympiad twice and was selected for the Orientation-cum-Selection Camp at HBCSE, Mumbai.

16 selections	16 of 35	AIR 168
in JEE Advanced 2026	students of the batch selected	best JEE Advanced rank

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Given in the question paper

Physical constants you may need….

Magnitude of charge on electron $e = 1.60 \times 10^{-19}\,C$	Avogadro's constant $A = 6.023 \times 10^{23}\,mol^{-1}$
Mass of electron $m_e = 9.11 \times 10^{-31}\,kg$	Speed of light in free space $c = 3 \times 10^{8}\ ms^{-1}$
Mass of proton $m_p = 1.67 \times 10^{-27}\,kg$	Speed of sound in dry air at 0°C $v = 332\ ms^{-1}$
Acceleration due to gravity $g = 9.81\ ms^{-2}$	Permittivity of free space $\varepsilon_0 = 8.85 \times 10^{-12} C^2 / Nm^2$
Universal gravitational constant $G = 6.67 \times 10^{-11} Nm^2 / kg^2$	Permeability of free space $\mu_0 = 4\pi \times 10^{-7}\ Hm^{-1}$
Universal gas constant $R = 8.31\ J / mol\,K$	Planck's constant $h = 6.625 \times 10^{-34}\ Js$
Boltzmann constant $k = 1.38 \times 10^{-23}\ J / K$	Faraday constant $= 96,500\ C\,mol^{-1}$
Stefan's constant $\sigma = 5.67 \times 10^{-8}\ W / m^2 K^4$	Rydberg constant $R = 1.097 \times 10^{7}\ m^{-1}$
Atmospheric pressure (at STP) = $1.013 \times 10^5\ Nm^{-2}$	Astronomical unit $= 1.50 \times 10^{11}\ m$

PART A-1 · ONE CORRECT OPTION

Q. 1 – 48 · +3 for a correct answer, –1 for a wrong one

1. Two balls are projected from the top of a cliff with equal initial speed u. One starts at angle θ above the horizontal while the other starts at angle θ below. Difference in their ranges on ground is

(A) $2\frac{u^2 \tan\theta}{g}$ (B) $\frac{u^2 \sin 2\theta}{2g}$

(C) $\frac{u^2 \sin 2\theta}{g}$ (D) $\frac{u^2 \cos 2\theta}{g}$

Solution · Q1 **Answer: (C)**

Both balls have the same horizontal velocity u cos θ. For a cliff of height H, with flight times t_1 (upward throw) and t_2,

$$-H = u t_1 \sin\theta - \frac{1}{2} g t_1^2$$

$$-H = -u t_2 \sin\theta - \frac{1}{2} g t_2^2$$

Subtracting,

$$t_1 - t_2 = \frac{2u \sin\theta}{g}$$

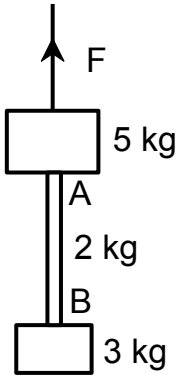
Difference in ranges:

$$R_1 - R_2 = u \cos\theta\,(t_1 - t_2)$$

$$\therefore R_1 - R_2 = \frac{u^2 \sin 2\theta}{g}$$

IAPT answer: (C) | **Zigyan answer:** (C)

2. A solid block of mass 3 kg is suspended from the bottom of a 5 kg block with the help of a rope AB of mass 2 kg as shown in the figure. When pulled by an upward force F, the whole system experiences an upward acceleration a = 2.19 ms^{-2}. Choose the correct option



(A) Net force on the rope AB is 24 N

(B) Tension at the midpoint of the rope AB is 48 N

(C) Force F is 20 N

(D) Force F is 60 N

Solution · Q2 **Answer: (B)**

Taking

$$g = 9.81 \text{ m s}^{-2}$$

$$g + a = 9.81 + 2.19$$

$$\Rightarrow g + a = 12.00 \text{ m s}^{-2}$$

For the whole system of 10 kg,

$$F = 10 \times 12.00$$

$$\Rightarrow F = 120 \text{ N}$$

So (C) and (D) are wrong.

Net force on the rope:

$$2 \times 2.19 = 4.38 \text{ N}$$

So (A) is wrong.

Below the midpoint of the uniform rope, the total mass is 4 kg.

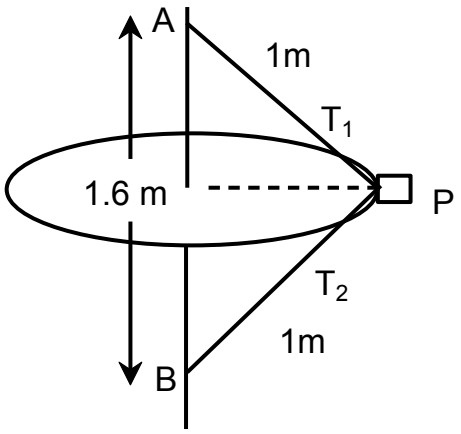
$$\Rightarrow T = 4 \times 12.00$$

$$\Rightarrow T = 48 \text{ N}$$

So (B) is correct.

IAPT answer: (B) | **Zigyan answer:** (B)

3. A block P of mass 0.4 kg is attached to a vertical rotating spindle by two strings AP and BP of equal length 1.0 m as shown in the figure. The period of rotation is 1.2 s. Tensions T_1 and T_2 in string AP and BP are



(A) $T_1 = 15.86$ N $T_2 = 10.97$ N

(B) $T_1 = 15.86$ N $T_2 = 3.04$ N

(C) $T_1 = 7.94$ N $T_2 = 3.03$ N

(D) $T_1 = T_2 = 5.48$ N

Solution · Q3 **Answer: (C)**

From the figure, AB is 1.6 m. The radius of the circle is

$$r = \sqrt{1.0^2 - 0.8^2}$$

$$\Rightarrow r = 0.6 \text{ m}$$

Each string makes angle ϕ with the spindle.

$$\cos\phi = 0.8 \text{ and } \sin\phi = 0.6$$

$$\omega = \frac{2\pi}{1.2}$$

$$\Rightarrow \omega = 5.236 \text{ rad s}^{-1}$$

Horizontally, with string length L,

$$(T_1 + T_2)\sin\phi = m\omega^2 r$$

$$\Rightarrow T_1 + T_2 = m\omega^2 L$$

$$\Rightarrow T_1 + T_2 = 10.97 \text{ N}$$

Vertically,

$$(T_1 - T_2)\cos\phi = mg$$

$$\Rightarrow T_1 - T_2 = \frac{0.4 \times 9.81}{0.8}$$

$$\Rightarrow T_1 - T_2 = 4.905 \text{ N}$$

$$\therefore T_1 \approx 7.94 \text{ N}$$

$$\therefore T_2 \approx 3.03 \text{ N}$$

IAPT answer: (C) | **Zigyan answer:** (C)

4. A particle of mass m moves in a straight line under the influence of a certain force such that the power (P) delivered to it remains constant. Starting from rest, the straight line distance traveled by the moving particle in time t is

(A) $\left(\frac{8Pt^3}{27m}\right)^{1/2}$ (B) $\left(\frac{4Pt^3}{27m}\right)^{1/2}$

(C) $\left(\frac{8Pt^2}{9m}\right)^{1/2}$ (D) $\left(\frac{8Pt^3}{9m}\right)^{1/2}$

Solution · Q4 **Answer: (D)**

Work done by the constant power equals the gain in kinetic energy.

$$\frac{1}{2}mv^2 = Pt$$

$$\Rightarrow v = \sqrt{\frac{2Pt}{m}}$$

$$x = \sqrt{\frac{2P}{m}}\int_0^t \sqrt{\tau}\, d\tau$$

$$\Rightarrow x = \frac{2}{3}\sqrt{\frac{2P}{m}}t^{3/2}$$

$$\therefore x = \left(\frac{8Pt^3}{9m}\right)^{1/2}$$

IAPT answer: (D) | **Zigyan answer:** (D)

5. A bullet is fired vertically up with half the escape speed from the surface of the Earth. The maximum altitude reached by it (ignore the effect of rotation of the Earth) in terms of radius of Earth R is

(A) $\frac{R}{3}$ (B) $\frac{R}{2}$

(C) R (D) $\frac{2R}{3}$

Solution · Q5 **Answer: (A)**

The escape speed is given by

$$v_e^2 = \frac{2GM}{R}$$

The launch speed u is half of it.

$$u^2 = \frac{GM}{2R}$$

By energy conservation,

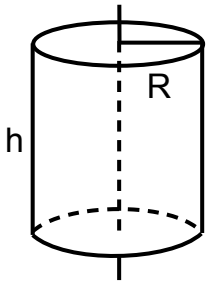
$$\frac{1}{2}mu^2 - \frac{GMm}{R} = -\frac{GMm}{R+h}$$

$$\Rightarrow \frac{1}{R+h} = \frac{3}{4R}$$

$$\therefore h = \frac{R}{3}$$

IAPT answer: (A) | **Zigyan answer:** (A)

6. A **can** is a hollow cylinder of radius R and height h. Its ends are sealed with circular sheets of the same material. The can is made of thin sheet metal of areal mass density $\sigma(kg/m^2)$. Moment of inertia of this closed **can** about its vertical axis of symmetry is



(A) $\pi R^3\sigma(h + 2R)$ (B) $\pi R^3\sigma(h + R)$ (C) $\pi R^3\sigma(2h + R)$ (D) $2\pi R^3\sigma(h + R)$

Solution · Q6 **Answer: (C)**

For the curved wall,

$$I_w = (2\pi Rh\sigma)\, R^2$$

$$\Rightarrow I_w = 2\pi R^3 h\sigma$$

For each end disc,

$$I_d = \frac{1}{2}\left(\pi R^2\sigma\right)R^2$$

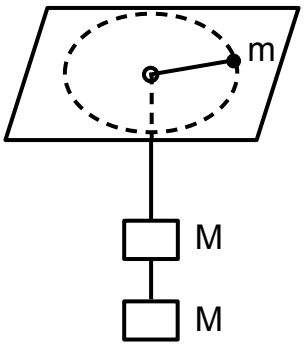
$$\Rightarrow I_d = \frac{\pi\sigma R^4}{2}$$

$$I = I_w + 2I_d$$

$$\therefore I = \pi R^3\sigma\,(2h + R)$$

IAPT answer: (C) | **Zigyan answer:** (C)

7. A particle of mass m is revolving in a horizontal circle on a frictionless horizontal table with the help of a string tied to it and passing through a hole at the center of the table. Two equal masses M are attached to the other end of the string as shown. If one of the hanging masses M is removed gently, the radius of the circular motion of m



(A) decreases by a factor 1.414

(B) increases by a factor 1.260

(C) increases by a factor 1.414

(D) does not change because of the conservation of angular momentum.

Solution · Q7 **Answer: (B)**

The mass is removed gently, so m stays on a nearly circular path. The tension changes from 2Mg to Mg, and the angular momentum L of m stays constant.

$$T = \frac{mv^2}{r}$$

$$\Rightarrow T = \frac{L^2}{mr^3}$$

$$\Rightarrow \frac{2Mg}{Mg} = \left(\frac{r_2}{r_1}\right)^3$$

$$\Rightarrow \frac{r_2}{r_1} = 2^{1/3}$$

$$\Rightarrow \frac{r_2}{r_1} = 1.260$$

So the radius increases by a factor of 1.260.

IAPT answer: (B) | **Zigyan answer:** (B)

8. Three stars of equal mass M rotate in a circular path of radius r about their center of mass such that the stars always remain equidistant from each other. The common angular speed (ω) of rotation of the stars can be expressed as

(A) $\left(\frac{GM\sqrt{3}}{r^3}\right)^{1/2}$

(B) $\left(\frac{GM}{r^3}\right)^{1/2}$

(C) $\left(\frac{GM}{r^3}\frac{2}{\sqrt{3}}\right)^{1/2}$

(D) $\left(\frac{GM}{r^3\sqrt{3}}\right)^{1/2}$

Solution · Q8 **Answer: (D)**

The stars are at the corners of an equilateral triangle of side

$$a = 2r \cos 30°$$

$$\Rightarrow a = \sqrt{3}\ r$$

Force between any two stars:

$$F = \frac{GM^2}{a^2}$$

$$\Rightarrow F = \frac{GM^2}{3r^2}$$

Resultant on one star, towards the centre:

$$F_{net} = 2F\cos 30°$$

$$\Rightarrow F_{net} = \frac{GM^2}{\sqrt{3}\ r^2}$$

$$M\omega^2 r = \frac{GM^2}{\sqrt{3}\ r^2}$$

$$\therefore \omega = \left(\frac{GM}{r^3\sqrt{3}}\right)^{1/2}$$

IAPT answer: (D) | **Zigyan answer:** (D)

9. The density of a liquid is ρ at the surface. The bulk modulus of the liquid is B. The increase Δρ in the density of the liquid at a depth h from the surface is (with $\Delta\rho << \rho$)

(A) $\Delta\rho = \frac{\rho^2 gh}{B}$ (B) $\Delta\rho = \frac{\rho gh}{B}$

(C) $\Delta\rho = \frac{\rho^2 gh}{2B}$ (D) $\Delta\rho = \frac{2\rho^2 gh}{B}$

Solution · Q9 **Answer: (A)**

Increase in pressure at depth h:

$$\Delta p = \rho gh$$

$$\frac{\Delta V}{V} = -\frac{\Delta p}{B}$$

For a fixed mass of liquid,

$$\frac{\Delta\rho}{\rho} = -\frac{\Delta V}{V}$$

$$\Rightarrow \frac{\Delta\rho}{\rho} = \frac{\rho gh}{B}$$

$$\therefore \Delta\rho = \frac{\rho^2 gh}{B}$$

IAPT answer: (A) | **Zigyan answer:** (A)

10. Water flows at 1.2 m/s through a hose of diameter 1.59 cm. The time required to fill a cylindrical container of radius 2 m to a height of h = 1.25 m will be nearly

(A) 18.3 hour (B) 2.7 hour (C) 550 min (D) 220 min

Solution · Q10 **Answer: (A)**

The radius of the hose is 0.795 cm. Volume flow rate:

$$Q = \pi \times (7.95 \times 10^{-3})^2 \times 1.2$$

$$\Rightarrow Q = 2.383 \times 10^{-4}\ m^3/s$$

Volume to be filled:

$$V = \pi \times 2^2 \times 1.25$$

$$\Rightarrow V = 15.71\ m^3$$

$$t = \frac{V}{Q}$$

$$\Rightarrow t \approx 6.59 \times 10^4\ s$$

$\therefore t \approx 18.3$ hour

IAPT answer: (A) | **Zigyan answer:** (A)

11. A police car, moving at speed of 108 km/hour, approaches a truck moving at 72 km/hour in opposite direction. The natural frequency of the siren of the car is 800 Hz and the surrounding temperature is 27°C. The frequency heard by the truck driver as the car passes him

(A) remains unchanged
(B) decreases nearly by 232 Hz
(C) increases nearly by 231 Hz
(D) decreases nearly by 260 Hz

Solution · Q11 **Answer: (B)**

Speed of sound at 27 °C, using 332 m/s at 0 °C:

$$v = 332\sqrt{\frac{300}{273}}$$

$$\Rightarrow v = 348.0\ m/s$$

The speeds of the car and the truck are 30 m/s and 20 m/s. While approaching,

$$f_1 = 800 \times \frac{348 + 20}{348 - 30}$$

$$\Rightarrow f_1 = 925.8\ Hz$$

After crossing,

$$f_2 = 800 \times \frac{348 - 20}{348 + 30}$$

$$\Rightarrow f_2 = 694.2\ Hz$$

$$f_2 - f_1 = -231.6\ Hz$$

So the frequency decreases nearly by 232 Hz.

IAPT answer: (B) | **Zigyan answer:** (B)

12. A rope of mass M and length L hangs vertically. Time needed for a transverse pulse to travel from its bottom end to the support is

(A) $\sqrt{\frac{2L}{g}}$
(B) $2\sqrt{\frac{L}{g}}$
(C) $\sqrt{\frac{L}{g}}$
(D) $\sqrt{\frac{L}{2g}}$

Solution · Q12 **Answer: (B)**

At height x above the lower end, with mass per unit length μ, the tension is

$$T = \mu g x$$

$$v = \sqrt{\frac{T}{\mu}}$$

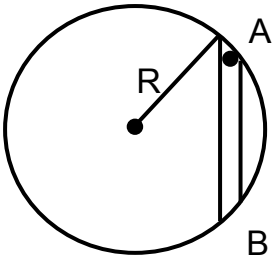
$$\Rightarrow v = \sqrt{gx}$$

$$t = \int_0^L \frac{dx}{\sqrt{gx}}$$

$$\therefore t = 2\sqrt{\frac{L}{g}}$$

IAPT answer: (B) | **Zigyan answer:** (B)

13. The figure shows a smooth tunnel AB (length = 2ℓ) in a uniform density planet (say Earth) of mass M and radius R. A small ball of mass m is released from rest at the end A of the tunnel. Acceleration due to gravity at surface of the planet is g. Time taken by the ball to reach the end B is



(A) $\pi\sqrt{\frac{R}{g}}$

(B) $2\sqrt{\frac{\ell}{g}}$

(C) $\frac{\pi}{2}\sqrt{\frac{2R}{g}}$

(D) $2\pi\sqrt{\frac{R}{g}}$

Solution · Q13 **Answer: (A)**

Inside a uniform planet, the field at distance r from the centre is

$$E = \frac{gr}{R}$$

At distance x from the mid-point of the tunnel, the acceleration along the tunnel is

$$a = -\frac{gr}{R} \times \frac{x}{r}$$

$$\Rightarrow a = -\frac{g}{R}x$$

This is SHM with

$$\omega = \sqrt{\frac{g}{R}}$$

From A to B takes half a period.

$$t = \frac{\pi}{\omega}$$

$$\therefore t = \pi\sqrt{\frac{R}{g}}$$

IAPT answer: (A) | **Zigyan answer:** (A)

14. When the speaker S_1 is switched ON, the sound intensity at a point P in a room is 80 dB. But when the speaker S_2 is switched ON (S_1 is switched OFF), the sound intensity at the same point P in the room is 85 dB. The sound intensity level (in dB) at the same point P in the room, if the two speakers S_1 and S_2 are simultaneously switched ON, is (consider the speakers to be incoherent)

(A) 165 dB (B) 86.2 dB (C) 87.8 dB (D) 88.6 dB

Solution · Q14 **Answer: (B)**

The sound level is

$$\beta = 10\log_{10}\frac{I}{I_0}$$

$$\Rightarrow \frac{I}{I_0} = 10^{\beta/10}$$

$$I_1 = 10^8 I_0 \text{ and } I_2 = 10^{8.5} I_0$$

For incoherent speakers, intensities add.

$$I = I_1 + I_2$$

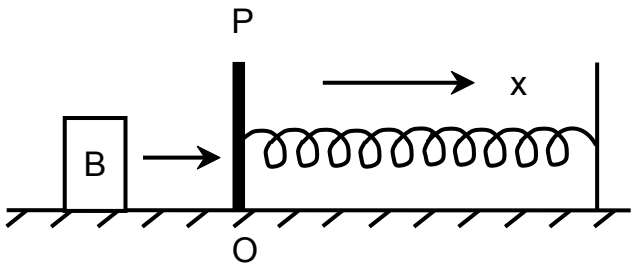
$$\Rightarrow I = 4.162 \times 10^8 I_0$$

$$\beta = 10\log_{10}(4.162 \times 10^8)$$

$$\therefore \beta \approx 86.2 \text{ dB}$$

IAPT answer: (B) | **Zigyan answer:** (B)

15. A block B of mass 0.5 kg moving, on a horizontal frictionless table at 2.0 ms^{-1}, collides with a massless pan P (at origin O) and sticks to it. The pan is connected at the end of a horizontal un-stretched (relaxed) spring of force constant K = 32 Nm^{-1} as shown in figure. After the block collides, the displacement x(t) of the block as a function of time t is given by



(A) 0.25 cos 8t m (B) 0.25 sin 8t m

(C) $2.50\sin\frac{t}{8}$ m (D) $0.50\sin\frac{\pi}{4}t$ m

Solution · Q15 **Answer: (B)**

The pan is massless, so the speed just after the collision is still 2.0 m s^{-1}.

$$\omega = \sqrt{\frac{K}{m}}$$

$$\Rightarrow \omega = \sqrt{\frac{32}{0.5}}$$

$$\Rightarrow \omega = 8 \text{ rad s}^{-1}$$

The block starts from the mean position towards positive x.

$$x = A \sin \omega t$$

$$A = \frac{u}{\omega}$$

$$\Rightarrow A = \frac{2.0}{8}$$

$$\Rightarrow A = 0.25 \text{ m}$$

$$\therefore x = 0.25 \sin 8t \text{ m}$$

IAPT answer: (B) | **Zigyan answer:** (B)

16. Which of the following functions does not represent a traveling wave

(A) $y = A\sin^2\left[\pi\left(t - \frac{x}{v}\right)\right]$

(B) $y = Ae^{-\alpha t}\cos(kx - \omega t)$

(C) $y = A \sin[(kx)^2 - (\omega t)^2]$

(D) $y = A \cos[(kx - \omega t)^2]$

Solution · Q16 **Answer: (C)**

A travelling wave depends on x and t through a single combination such as kx – ωt; damping may reduce only its amplitude.

So (A), (B) and (D) travel, (B) being a damped wave.

In (C), the argument is

$$(kx)^2 - (\omega t)^2 = (kx - \omega t)(kx + \omega t)$$

It mixes both combinations, so (C) is not a travelling wave.

IAPT answer: (C) | **Zigyan answer:** (C)

17. Two Carnot heat engines are connected in series such that the sink of the first engine is heat source of the second. Efficiency of the engines are η_1 and η_2 respectively. Net efficiency η of the combination is given by

(A) $\eta = \eta_1 + \eta_2$

(B) $\eta = \frac{\eta_1\eta_2}{\eta_1 + \eta_2}$

(C) $\eta = \eta_1 + \eta_2(1 - \eta_1)$

(D) $\eta = \eta_1 - \eta_2(1 - \eta_1)$

Solution · Q17 **Answer: (C)**

Let the first engine absorb heat Q_1.

$$W_1 = \eta_1 Q_1$$

$$Q_2 = (1 - \eta_1)\, Q_1$$

For the second engine,

$$W_2 = \eta_2 Q_2$$

$$\eta = \frac{W_1 + W_2}{Q_1}$$

$$\therefore \eta = \eta_1 + \eta_2\,(1 - \eta_1)$$

IAPT answer: (C) | **Zigyan answer:** (C)

18. An air bubble of radius 2 mm at a depth 12 m below the surface of water at temperature of 8 °C, rises to the surface where the temperature is 16 °C. Neglecting the effect of Surface Tension, the radius of the bubble at the surface is estimated to be

(A) 2.56 mm (B) 2.61 mm (C) 2.86 mm (D) 4.45 mm

Solution · Q18 **Answer: (B)**

Taking atmospheric pressure 1.013×10^5 Pa, density of water 1000 kg m^{-3} and g as 9.8 m s^{-2}, the pressure at 12 m is

$$P_1 = (1.013 + 1.176) \times 10^5$$

$$\Rightarrow P_1 = 2.189 \times 10^5 \text{ Pa}$$

$$T_1 = 281 \text{ K and } T_2 = 289 \text{ K}$$

$$\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$$

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

$$\Rightarrow \frac{V_2}{V_1} \approx 2.222$$

$$r_2 = 2 \times (2.222)^{1/3} \text{ mm}$$

$$\therefore r_2 \approx 2.61 \text{ mm}$$

IAPT answer: (B) | **Zigyan answer:** (B)

19. Two soap bubbles of radii a and b coalesce to form a single bubble of radius c under isothermal conditions. If the external pressure is p_A, then the Surface Tension (T) of the soap solution is

(A) $\frac{P_A}{4}\frac{\left(c^3 - a^3 - b^3\right)}{\left(a^2 + b^2 - c^2\right)}$ (B) $\frac{P_A}{2}\frac{\left(a^3 + b^3 - c^3\right)}{\left(c^2 - a^2 - b^2\right)}$

(C) $\frac{P_A}{2}\frac{\left(a^2 + b^2 - c^2\right)}{\left(c^3 - a^3 - b^3\right)}$ (D) $\frac{P_A}{4}\frac{\left(c^2 - a^2 - b^2\right)}{(a + b - c)}$

Solution · Q19 **Answer: (A)**

Excess pressure inside a soap bubble of radius r:

$$\Delta P = \frac{4T}{r}$$

At constant temperature, the number of moles is conserved.

$$P_1V_1 + P_2V_2 = P_3V_3$$

$$\Rightarrow P_A(a^3 + b^3) + 4T\,(a^2 + b^2) = P_Ac^3 + 4Tc^2$$

$$\therefore T = \frac{P_A}{4}\frac{\left(c^3 - a^3 - b^3\right)}{\left(a^2 + b^2 - c^2\right)}$$

IAPT answer: (A) | **Zigyan answer:** (A)

20. An open-end organ pipe 30 cm in length and a closed-end organ pipe 23 cm in length, both of equal diameter, are each sounding their first overtone and both are in unison at 1100 Hz. The speed of sound in air, is estimated to be nearly

(A) 324 ms^{-1} (B) 332 ms^{-1} (C) 340 ms^{-1} (D) 352 ms^{-1}

Solution · Q20 **Answer: (D)**

Let e be the end correction, the same for both pipes. Working in cm, for the first overtone of the open pipe,

$$\lambda = 30 + 2e$$

For the first overtone of the closed pipe,

$$\frac{3\lambda}{4} = 23 + e$$

$$\Rightarrow \lambda = 32 \text{ cm}$$

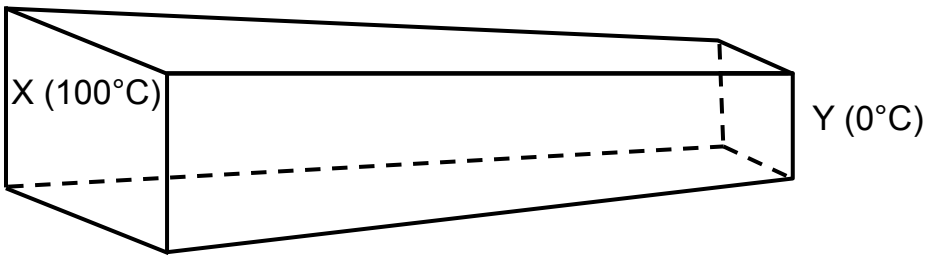
$$v = f\lambda$$

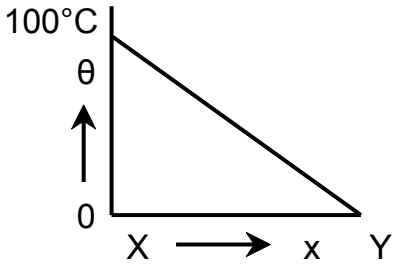
$$\Rightarrow v = 1100 \times 0.32$$

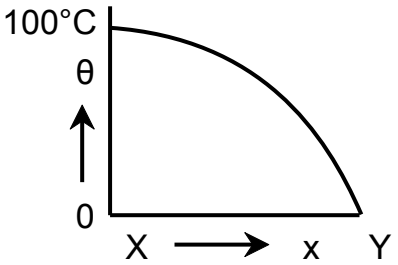
$$\therefore v = 352 \text{ m s}^{-1}$$

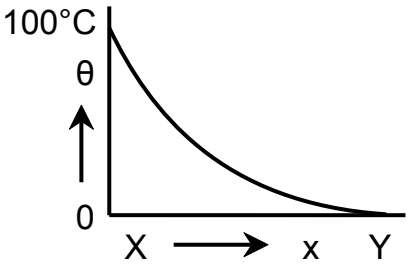
IAPT answer: (D) | **Zigyan answer:** (D)

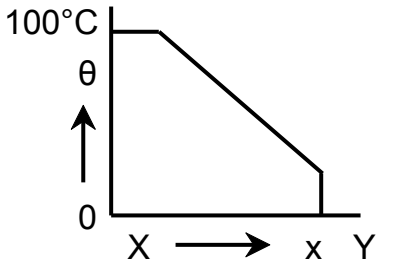
21. The figure shows a lagged bar XY of non-uniform cross section. One end X of the bar is maintained at 100 °C and the other end Y at 0 °C. The variation of temperature along its length from X to Y in steady state is best represented by the curve.



(A)


(B)


(C)


(D)


Solution · Q21 **Answer: (B)**

The bar is lagged, so in steady state the same heat current H crosses every section.

$$H = -kA\frac{d\theta}{dx}$$

$$\Rightarrow -\frac{d\theta}{dx} = \frac{H}{kA}$$

The area decreases from X to Y, so the graph becomes steadily steeper. This is curve (B).

IAPT answer: (B) | **Zigyan answer:** (B)

22. An ideal gas (n moles) is initially at pressure P and temperature T. It is cooled isochorically to a pressure $\frac{P}{4}$. The gas is then expanded at a constant pressure so as to attain back its initial temperature T. Work done by gas during the entire process is

(A) $\frac{5}{4}nRT$ (B) $\frac{3}{4}nRT$

(C) $\frac{1}{4}nRT$ (D) Zero

Solution · Q22 **Answer: (B)**

For isochoric cooling,

$$W_1 = 0$$

At one quarter of the pressure, the temperature is also one quarter of T. For the isobaric expansion back to T,

$$W_2 = nR\left(T - \frac{T}{4}\right)$$

$$\Rightarrow W_2 = \frac{3}{4}nRT$$

$$W = W_1 + W_2$$

$$\therefore W = \frac{3}{4}nRT$$

IAPT answer: (B) | **Zigyan answer:** (B)

23. Assuming the Sun to be a spherical body (radius R_S) of surface temperature T, the total radiation power received by Earth (radius R_E) at a distance r from Sun is

(A) $\frac{\sigma\pi R_E^2 R_S^2 T^4}{r^2}$ (B) $\frac{\sigma 4\pi R_E^2 R_S^2 T^4}{r^2}$

(C) $\frac{\sigma\pi R_E^2 R_S^2 T^4}{4r^2}$ (D) $\frac{\sigma R_E^2 R_S^2 T^4}{4\pi r^2}$

Solution · Q23 **Answer: (A)**

Power radiated by the Sun:

$$L = 4\pi R_S^2 \sigma T^4$$

Intensity at distance r:

$$I = \frac{L}{4\pi r^2}$$

$$\Rightarrow I = \frac{\sigma R_S^2 T^4}{r^2}$$

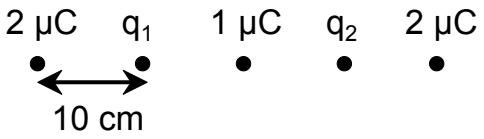
The Earth intercepts it over a disc of its own radius.

$$P = I \times \pi R_E^2$$

$$\therefore P = \frac{\sigma\pi R_E^2 R_S^2 T^4}{r^2}$$

IAPT answer: (A) | **Zigyan answer:** (A)

24. The figure shows five point-charges on a straight line. Separation between successive charges is 10 cm. For what values of q_1 and q_2 would the net force on each of the other three charges be zero?



(A) $q_1 = q_2 = -\frac{27}{80}\,\mu C$

(B) $q_1 = q_2 = \frac{27}{40}\,\mu C$

(C) $q_1 = \frac{27}{80}\,\mu C\; q_2 = -\frac{27}{80}\,\mu C$

(D) $q_1 = q_2 = -\frac{27}{40}\,\mu C$

Solution · Q24 **Answer: (A)**

For zero force on the 1 μC charge in the middle,

$$q_1 = q_2 = q$$

For the left 2 μC charge, with all charges in μC,

$$\frac{q}{1^2} + \frac{1}{2^2} + \frac{q}{3^2} + \frac{2}{4^2} = 0$$

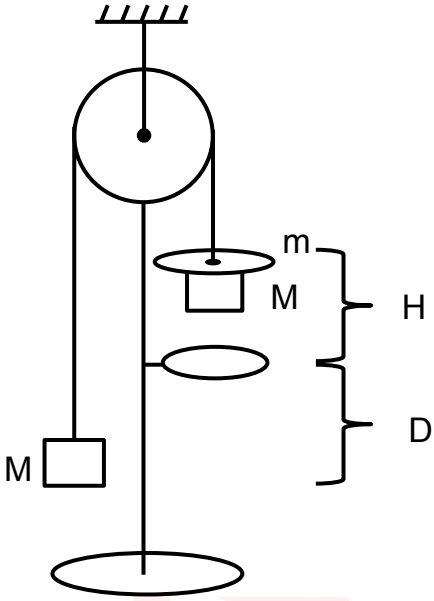
$$\Rightarrow \frac{10}{9}q = -\frac{3}{8}$$

$$\therefore q = -\frac{27}{80}\,\mu C$$

By symmetry, the right 2 μC charge is also in equilibrium.

IAPT answer: (A) | **Zigyan answer:** (A)

25. Two equal blocks, each of mass M, hang on either side of a frictionless light pulley with a light string. A rider of mass m is placed on one of the blocks (as shown). When the system is released, the block with rider descends a distance H till the rider is caught by a ring that allows the block to pass through. The system moves a further distance D taking time t. In such a situation, the acceleration due to gravity is



(A) $g = \dfrac{(2M + m)D^2}{2mHt^2}$

(B) $g = \dfrac{(M + m)D^2}{2mHt^2}$

(C) $g = \dfrac{(2M + m)D}{mHt^2}$

(D) $g = \dfrac{(M + 2m)D^2}{mHt^2}$

Solution · Q25 **Answer: (A)**

With the rider on, the acceleration is

$$a = \frac{mg}{2M + m}$$

Speed gained while descending H:

$$v^2 = 2aH$$

$$\Rightarrow v^2 = \frac{2mgH}{2M + m}$$

After the rider is caught, the speed stays constant.

$$v = \frac{D}{t}$$

$$\therefore g = \frac{(2M + m)D^2}{2mHt^2}$$

IAPT answer: (A) | **Zigyan answer:** (A)

26. A very small electric dipole of dipole moment $\vec{p}$ lies along the x axis (i.e $\vec{p} = p\hat{i}$) in a non-uniform electric field $\vec{E} = \frac{c}{x}\hat{i}$ (where c is a constant). The force on the dipole is

(A) $\frac{cp}{x^2}\hat{i}$

(B) $-\frac{c\vec{p}}{x^2}\hat{i}$

(C) $\frac{cp}{x}\hat{i}$

(D) zero

Solution · Q26 **Answer: (B)**

Force on a small dipole along a non-uniform field:

$$F = p\frac{dE}{dx}$$

$$E = \frac{c}{x}$$

$$\Rightarrow \frac{dE}{dx} = -\frac{c}{x^2}$$

$$\therefore \vec{F} = -\frac{cp}{x^2}\hat{i}$$

The arrow over p inside option (B) is a misprint; p there is the magnitude.

IAPT answer: (B) | **Zigyan answer:** (B)

27. A conducting thick spherical shell of radii a and b (b > a) has been charged with uniform surface charge density $-\sigma$ C/m^2 on the inner and $+\sigma$ C/m^2 on the outer surfaces. Then

(A) the net charge on the spherical shell is zero.

(B) the radial electric field outside the shell is $E = \frac{\sigma b^2}{\varepsilon_0 r^2}$

(C) a radial electric field $E = \frac{\sigma\left(b^2 - a^2\right)}{\varepsilon_0 r^2}$ exists outside the shell.

(D) there is a net electric charge in the cavity (i.e. in region r < a) equal to $4\pi\sigma(b^2 - a^2)$

Solution · Q27 **Answer: (B)**

The charges on the inner and outer surfaces are, in turn,

$-4\pi\sigma a^2$ and $+4\pi\sigma b^2$

Their sum is not zero, so (A) is false.

The field inside the metal is zero, so the cavity charge is

$$q = +4\pi\sigma a^2$$

So (D) is false. For r outside the shell, by Gauss's law,

$$E \times 4\pi r^2 = \frac{4\pi\sigma b^2}{\varepsilon_0}$$

$$\Rightarrow E = \frac{\sigma b^2}{\varepsilon_0 r^2}$$

So (B) is true and (C) is false.

IAPT answer: (B) | **Zigyan answer:** (B)

28. A spherical conductor is charged up to a potential of 450 V. The potential outside, at a distance 15 cm from the surface, is 300 V. Then

(A) the potential at 15 cm from the center is 900 V

(B) the charge on the conductor is 1.5 nC

(C) the electric field just outside the surface is 150 N/C

(D) the total electrical energy of the conductor is U = 3.375 μJ

Solution · Q28 **Answer: (D)**

$$\frac{kQ}{R} = 450\ V$$

$$\frac{kQ}{R+0.15} = 300\ V$$

$$\Rightarrow R = 0.30\ m$$

$$Q = \frac{450 \times 0.30}{9 \times 10^9}$$

$$\Rightarrow Q = 1.5 \times 10^{-8}\ C$$

This is 15 nC, so (B) is false.

At 15 cm from the centre, inside the sphere,

$$V = 450\ V$$

So (A) is false.

$$E = \frac{V}{R}$$

$$\Rightarrow E = \frac{450}{0.30}$$

$$\Rightarrow E = 1500\ N/C$$

So (C) is false.

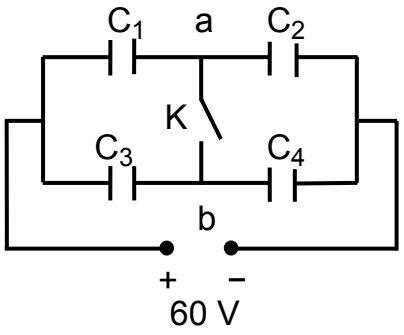
$$U = \frac{1}{2}QV$$

$$\Rightarrow U = 3.375\ \mu J$$

So (D) is true.

IAPT answer: (D) | **Zigyan answer:** (D)

29. Capacitors $C_1 = 3\ \mu F$, $C_2 = 6\ \mu F$, $C_3 = 4\ \mu F$ and $C_4 = 1\ \mu F$ are connected in a circuit as shown to a battery of 60 V. Now if key K is closed, the charge that will flow through K is



(A) 90 μC from b to a
(B) 60 μC from b to a
(C) 30 μC from a to b
(D) 150 μC from b to a

Solution · Q29 **Answer: (A)**

With the key open, the charges on the two series pairs are

$$q_1 = q_2 = 2 \times 60$$

$$\Rightarrow q_1 = q_2 = 120\ \mu C$$

$$q_3 = q_4 = 0.8 \times 60$$

$$\Rightarrow q_3 = q_4 = 48\ \mu C$$

The net plate charge at a is zero. With the key closed, two 7 μF groups are in series, each at 30 V. The new charges are

$$q_1 = 90\ \mu C,\ q_2 = 180\ \mu C$$

$$q_3 = 120\ \mu C,\ q_4 = 30\ \mu C$$

Net plate charge at a:

$$-90 + 180 = +90\ \mu C$$

So 90 μC flows through the key from b to a.

IAPT answer: (A) | **Zigyan answer:** (A)

30. The electrical conductivity of a sample of semiconductor is found to increase when the electromagnetic radiation of wave length just shorter than 2480 nm is incident normally on its surface. The band gap of the semiconductor is

(A) 1.96 eV (B) 1.12 eV (C) 0.50 eV (D) 0.29 eV

Solution · Q30 **Answer: (C)**

The threshold wavelength is 2480 nm.

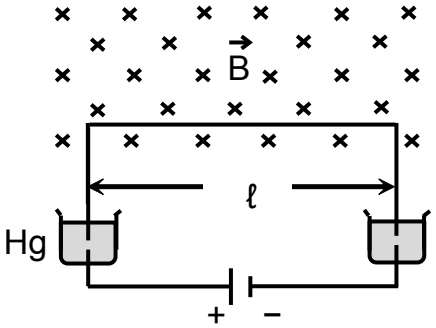
$$E_g = \frac{hc}{\lambda}$$

$$\Rightarrow E_g = \frac{1240}{2480}$$

$$\therefore E_g = 0.50\ eV$$

IAPT answer: (C) | **Zigyan answer:** (C)

31. A U-shaped conducting wire of mass m = 10 g, having length of its horizontal section as ℓ = 20 cm, is free to move vertically up and down. The two ends of the wire are immersed in mercury for proper electrical contact. The wire is in a homogeneous field of magnetic induction B = 0.1 T as shown. The wire jumps up to a height h = 3 m when a charge q, in the form of a current pulse, is sent through the wire. Considering that the duration of the current pulse is very small compared to the time of flight, the charge q passed through the wire is estimated to be nearly



(A) 6.85 μC (B) 9.80 μC (C) 2.84 C (D) 3.84 C

Solution · Q31 **Answer: (D)**

The pulse is very short, so the impulse of the weight is neglected.

$$\int BI\ell\, dt = mv$$

$$\Rightarrow B\ell q = mv$$

After the pulse,

$$v = \sqrt{2gh}$$

$$\Rightarrow v = \sqrt{2 \times 9.8 \times 3}$$

$$\Rightarrow v \approx 7.67 \text{ m/s}$$

$$q = \frac{mv}{B\ell}$$

$$\Rightarrow q = \frac{0.010 \times 7.67}{0.1 \times 0.20}$$

$$\Rightarrow q \approx 3.83 \text{ C}$$

The nearest option is 3.84 C.

IAPT answer: (D) | **Zigyan answer:** (D)

32. A target of ^{7}Li is bombarded with a proton beam of current 10^{-4} ampere for 1 hour to produce ^{7}Be of activity 1.8×10^{8} disintegrations per second. Assuming that bombarding of 1000 protons produces one ^{7}Be radioactive nucleus, the half-life of ^{7}Be is estimated to be approximately

(A) 6887 hour (B) 4332 hour (C) 2407 hour (D) 2195 hour

Solution · Q32 **Answer: (C)**

Number of protons in one hour:

$$n = \frac{10^{-4} \times 3600}{1.6 \times 10^{-19}}$$

$$\Rightarrow n = 2.25 \times 10^{18}$$

Neglecting decay during bombardment,

$$N = 2.25 \times 10^{15}$$

$$\lambda = \frac{A}{N}$$

$$\Rightarrow \lambda = \frac{1.8 \times 10^{8}}{2.25 \times 10^{15}}$$

$$\Rightarrow \lambda = 8.0 \times 10^{-8}\ s^{-1}$$

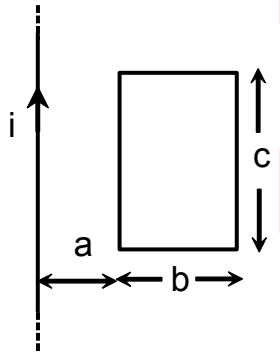
$$T = \frac{\ln 2}{\lambda}$$

$$\Rightarrow T \approx 8.66 \times 10^{6}\ s$$

$\therefore T \approx 2407$ hour

IAPT answer: (C) | **Zigyan answer:** (C)

33. A long straight wire carrying a current i = 10 A and a rectangular metallic loop of dimensions b × c lie in the same plane as shown in the figure. The parameters are a = 10 cm, b = 30 cm and c = 50 cm. The mutual inductance of the system is nearly



(A) 69 nH (B) 71 nH (C) 139 nH (D) 281 nH

Solution · Q33 **Answer: (C)**

Flux through the loop:

$$\Phi = \frac{\mu_0 ic}{2\pi}\int_a^{a+b}\frac{dx}{x}$$

$$M = \frac{\Phi}{i}$$

$$\Rightarrow M = \frac{\mu_0 c}{2\pi}\ln\left(1+\frac{b}{a}\right)$$

$$M = 2 \times 10^{-7} \times 0.50 \times \ln 4$$

$$\therefore M \approx 139\ nH$$

IAPT answer: (C) | **Zigyan answer:** (C)

34. Impedance of a given series LCR circuit, fed with alternating current, is the same for two frequencies f_1 and f_2. The resonance frequency f_R of the circuit is

(A) $\frac{f_1 + f_2}{2}$ (B) $\frac{2f_1 f_2}{f_1 + f_2}$

(C) $\sqrt{f_1 f_2}$ (D) $\sqrt{f_1^2 + f_2^2}$

Solution · Q34 **Answer: (C)**

$$Z = \sqrt{R^2 + X^2}$$

$$X = \omega L - \frac{1}{\omega C}$$

Equal impedance at two different frequencies needs

$$X_1 = -X_2$$

$$\Rightarrow \omega_1 \omega_2 = \frac{1}{LC}$$

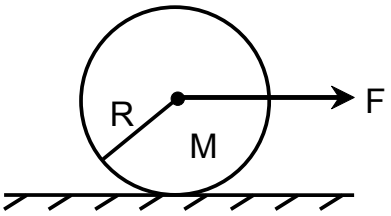
At resonance,

$$\omega_R^2 = \frac{1}{LC}$$

$$\therefore f_R = \sqrt{f_1 f_2}$$

IAPT answer: (C) | **Zigyan answer:** (C)

35. A lawn roller is a solid cylinder of mass M and radius R. As shown in the figure, it is pulled at its center by a horizontal force F and rolls without slipping on a horizontal surface. Then the



(A) acceleration of the cylinder is $\frac{2F}{M}$

(B) force of friction acting on the cylinder is $\frac{2F}{3M}$

(C) coefficient of friction needed to prevent slipping is at least $\frac{F}{3Mg}$

(D) minimum coefficient of friction to prevent slipping is $\frac{2F}{3Mg}$

Solution · Q35 **Answer: (C)**

Let f be the friction. For the centre of mass,

$$F - f = Ma$$

For rotation, with no slipping,

$$fR = \frac{1}{2}MR^2 \times \frac{a}{R}$$

$$\Rightarrow f = \frac{Ma}{2}$$

$$\Rightarrow a = \frac{2F}{3M}$$

$$\Rightarrow f = \frac{F}{3}$$

For no slipping,

$$\frac{F}{3} \le \mu Mg$$

$$\therefore \mu \ge \frac{F}{3Mg}$$

IAPT answer: (C) | **Zigyan answer:** (C)

36. A hydrogen atom ($M_H = 1.67 \times 10^{-27}$ kg), initially at rest, emits a photon and goes from the excited state n = 5 to the ground state. The recoil speed of the atom is nearly

(A) 4.2 ms^{-1} (B) 4×10^{-4} ms^{-1} (C) 2×10^{-2} ms^{-1} (D) 8×10^{2} ms^{-1}

Solution · Q36 **Answer: (A)**

Energy of the emitted photon:

$$\Delta E = 13.6\left(1 - \frac{1}{25}\right)$$

$$\Rightarrow \Delta E \approx 13.06 \text{ eV}$$

Momentum of the photon:

$$p = \frac{\Delta E}{c}$$

$$\Rightarrow p \approx 6.96 \times 10^{-27} \text{ kg m/s}$$

By momentum conservation,

$$v = \frac{p}{M_H}$$

$$\Rightarrow v = \frac{6.96 \times 10^{-27}}{1.67 \times 10^{-27}}$$

$$\therefore v \approx 4.2 \text{ m s}^{-1}$$

IAPT answer: (A) | **Zigyan answer:** (A)

37. Two nuclides A and B are isotopes. The nuclides B and C are isobars. All the three nuclides A, B and C are radioactive. You may then conclude that

(A) the nuclides A, B and C must belong to the same element

(B) the nuclides A, B and C may belong to the same element

(C) it is possible that A may change to B through a radioactive decay process

(D) it is possible that B may change to C through a radioactive decay process

Solution · Q37 **Answer: (D)**

Isotopes have equal Z and isobars have equal mass number. So B and C are different elements, and (A) and (B) are wrong.

No single decay changes the mass number while keeping Z fixed, so A cannot change to B.

B can change to C by beta decay or electron capture, which keeps the mass number fixed.

IAPT answer: (D) | **Zigyan answer:** (D)

38. Numerical aperture of an optical fibre is a measure of

(A) the attenuation of light through it
(B) its resolving power
(C) the pulse dispersion through it
(D) its light gathering power

Solution · Q38 **Answer: (D)**

For a fibre with core index n_1 and cladding index n_2, used in air,

$$\sin\theta_m = \sqrt{n_1^2 - n_2^2}$$

This is the numerical aperture. A larger value means a wider cone of light is accepted and guided, so it measures the light gathering power.

IAPT answer: (D) | **Zigyan answer:** (D)

39. Heavy stable nuclei have more neutrons than protons. This is because of the fact that

(A) neutrons are heavier than protons
(B) the electrostatic forces between protons are repulsive
(C) neutrons decay into protons through beta decay
(D) the nuclear forces between neutrons are weaker than those between protons

Solution · Q39 **Answer: (B)**

The nuclear force is short ranged and nearly independent of charge, while the electrostatic repulsion between protons is long ranged and grows rapidly with Z.

Extra neutrons add nuclear attraction without adding any repulsion.

IAPT answer: (B) | **Zigyan answer:** (B)

40. An equi-concave lens of radii of curvature of the two surfaces numerically equal to 7 cm and refractive index μ = 1.5 has a small silver dot on the rear surface. As a result of this, a ray of light incident parallel to the principal axis gets reflected from its rear surface and then reflected also from the inner front surface. The ray after the second reflection emerges out of the thin lens and appears to focus at a point P on the principal axis. The point P lies

(A) 1 cm before the lens
(B) 2 cm before the lens
(C) 1 cm beyond the lens
(D) at none of these

Solution · Q40 **Answer: (A)**

Taking distances positive along the incident light, for refraction at the front surface,

$$\frac{1.5}{v_1} = \frac{1.5 - 1}{-7}$$

$$\Rightarrow v_1 = -21 \text{ cm}$$

For reflection at the rear surface,

$$\frac{1}{v_2} = \frac{2}{7} + \frac{1}{21}$$

$$\Rightarrow v_2 = +3 \text{ cm}$$

For reflection at the front surface from inside,

$$\frac{1}{v_3} = -\frac{2}{7} - \frac{1}{3}$$

$$\Rightarrow v_3 = -\frac{21}{13}\text{ cm}$$

For refraction out through the rear surface,

$$\frac{1}{v_4} - \frac{1.5}{v_3} = \frac{1-1.5}{7}$$

$$\Rightarrow v_4 = -1\text{ cm}$$

So P is 1 cm before the lens.

Check: for a thin lens the powers of all four surfaces simply add: about −7.14, −42.86, −42.86 and −7.14 dioptres, a total of −100 dioptres. So the final rays spread out as if from a point 1 cm in front of the lens.

IAPT answer: (A) | **Zigyan answer:** (A)

41. Light emerges out uniformly from a point source placed at the focus of a concave mirror to give out a spherical wave front. As a result of reflection of the paraxial rays from the concave mirror, according to Huygen's theory the reflected light is in the form of a

(A) spherical wave front with centre at the focus, and radius equal to the radius of curvature of the mirror

(B) spherical wave front with centre at the focus, and radius equal to the focal length of the mirror

(C) cylindrical wave front with its axis coinciding with the principal axis of the mirror.

(D) plane wave front perpendicular to the reflected beam

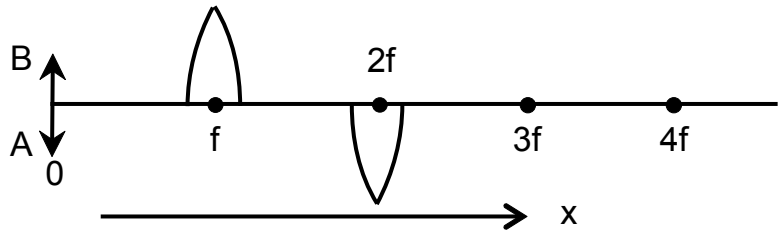
Solution · Q41 **Answer: (D)**

The source is at the focus, so the paraxial rays are reflected parallel to the principal axis.

A wave front is perpendicular to the rays, so the reflected wave front is plane and perpendicular to the reflected beam.

IAPT answer: (D) | **Zigyan answer:** (D)

42. An equi-convex lens of focal length 'f ' is cut along a diameter, in two halves (pieces). The two identical pieces of the lens are now arranged as shown in the figure on a common axis at a separation f between the two. The image of an object AB placed at x = 0 **cannot** be formed at the distance x = ξ from the object along the axis, for the value of ξ as



(A) ξ = 2f (B) ξ = 3f (C) ξ = 4f (D) ξ = ∞

Solution · Q42 **Answer: (A)**

In the figure, one half lens is at distance f from the object, and the other at 2f from it.

Through the first half alone, the object is at the focus, so the image is at infinity.

Through both halves, the parallel beams are focused by the second half, giving

$$\xi = 3f$$

Through the second half alone,

$$u = -2f$$

$$\Rightarrow v = 2f$$

$$\Rightarrow \xi = 4f$$

At the plane of the second half itself no image is formed.

So the value which is not possible is 2f.

IAPT answer: (A) | **Zigyan answer:** (A)

43. During the processes of annihilation of a stationary electron of mass m_0 with a stationary positron of equal mass, a radiation is emitted. The wavelength of the resulting radiation is

(A) $\frac{h}{m_0 c}$ (B) $\frac{2h}{m_0 c}$

(C) $\frac{m_0}{hc}$ (D) $\frac{m_0 c}{h}$

Solution · Q43 **Answer: (A)**

Both particles are at rest, so two photons of equal wavelength move in opposite directions. By energy conservation,

$$2 \times \frac{hc}{\lambda} = 2m_0 c^2$$

$$\therefore \lambda = \frac{h}{m_0 c}$$

IAPT answer: (A) | **Zigyan answer:** (A)

44. The convex surface of a concavo-convex lens of refractive index 1.5 and radii of curvature R_1 = 20 cm and R_2 = 40 cm has been silvered so as to make it reflecting. The distance of a luminous object from the reflecting system when placed in front of it on its principal axis, so that the image coincides with the object is

(A) 40 cm (B) 32 cm (C) 16 cm (D) 8 cm

Solution · Q44 **Answer: (C)**

The silvered convex face is taken to have radius 20 cm and the other face 40 cm (interchanging them gives 80 cm, which is not offered).

The ray must meet the silvered face normally. So the front surface must form a virtual image at its centre of curvature.

$$u = -d,\ v = -20 \text{ cm}$$

$$R = -40 \text{ cm}$$

$$\frac{\mu}{v} - \frac{1}{u} = \frac{\mu - 1}{R}$$

$$\frac{1.5}{-20} + \frac{1}{d} = \frac{0.5}{-40}$$

$$\Rightarrow d = 16 \text{ cm}$$

IAPT answer: (C) | **Zigyan answer:** (C)

45. A direct vision spectroscope has been designed to obtain dispersion without deviation by arranging alternate inverted thin prisms of crown glass (refractive index $\mu_1 = \sqrt{2}$) and flint glass ($\mu_2 = \sqrt{3}$) with refracting angle $\theta_{flint} = 3°$. The refracting angle θ_{crown} of the crown glass prism is

(A) 3.0° (B) 4.5° (C) 5.3° (D) 6.0°

Solution · Q45 **Answer: (C)**

For no deviation of the mean ray,

$$(\mu_1 - 1)\,\theta_{crown} = (\mu_2 - 1)\,\theta_{flint}$$

$$\theta_{crown} = 3° \times \frac{\sqrt{3} - 1}{\sqrt{2} - 1}$$

$$\therefore \theta_{crown} \approx 5.3°$$

IAPT answer: (C) | **Zigyan answer:** (C)

46. Continuous and Characteristic X – rays are produced when electron beam accelerated by a high potential difference of V volt (say) is made to hit the metallic target such as Molybdenum in a modern Coolidge tube. Let λ_{min} be the smallest possible wavelength of continuous X – rays and $\lambda_{L\alpha}$ be the maximum wavelength of the characteristic X- rays. Then

(A) $\lambda_{L\alpha}$ increases with increase in V (B) $\lambda_{L\alpha}$ decreases with increase in V

(C) λ_{min} increases with increase in V (D) λ_{min} decreases with increase in V

Solution · Q46 **Answer: (D)**

The shortest wavelength of the continuous spectrum is given by

$$\lambda_{min} = \frac{hc}{eV}$$

So it decreases as V increases.

The characteristic wavelength depends only on the energy levels of the target atom, not on V.

IAPT answer: (D) | **Zigyan answer:** (D)

47. While performing an experiment for determining the focal length of a concave mirror by u-v method, a student recorded the given sets of the positions (in cm) of the object and the corresponding image on the bench as (12, 51), (18, 54), (30, 50), (48, 34), (42, 42) and (78, 98). She used an optical bench of length 1.5 m and the mirror is fixed at the 90 cm mark on the bench. The maximum acceptable error in the location of the image is 0.2 cm. The reading (observation) that cannot be obtained from experimental measurement and has been incorrectly recorded, for a mirror of focal length = 24 cm, is

(A) (18, 54) (B) (30, 50) (C) (48, 34) (D) (78, 98)

Solution · Q47 **As per Zigyan: (D)**

The mirror is at the 90 cm mark, so u and v are found by subtracting each mark from 90.

$$v = \frac{24u}{u - 24}$$

For (18, 54), (30, 50) and (48, 34),

$$u = 72, 60, 42 \text{ cm}$$

$$\Rightarrow v = 36, 40, 56 \text{ cm}$$

All three agree with the readings.

For (78, 98),

$$u = 12 \text{ cm}$$

$$\Rightarrow v = -24 \text{ cm}$$

This virtual image would be at the 114 cm mark and cannot be obtained on a screen. So this reading is wrong.

For (12, 51),

$$u = 78 \text{ cm}$$

$$\Rightarrow v \approx 34.7 \text{ cm}$$

This gives an image mark near 55.3 cm, not 51 cm.

$\therefore$ The wrong reading among the options is (78, 98).

Check: by Newton's formula, the distances of a correct pair from the focus (the 66 cm mark), taken with sign, multiply to 576 cm^2. This is so for (18, 54), (30, 50), (48, 34) and (42, 42), but the product is 384 cm^2 for (78, 98) and 810 cm^2 for (12, 51).

IAPT answer: (D) | **Zigyan answer:** (D)

48. A parallel beam, of 6.0 mW radiation of wavelength 200 nm and of area of cross-section 1.0 mm^2, falls normally on a plane metallic surface. If the radiations are completely reflected, the pressure exerted by the radiations on the metallic surface is estimated to be

(A) 1×10^5 Pa (B) 2×10^5 Pa (C) 2×10^{-5} Pa (D) 4×10^{-5} Pa

Solution · Q48 **Answer: (D)**

For complete reflection of a beam of power W,

$$F = \frac{2W}{c}$$

$$\Rightarrow F = \frac{2 \times 6.0 \times 10^{-3}}{3 \times 10^8}$$

$$\Rightarrow F = 4.0 \times 10^{-11} \text{ N}$$

$$p = \frac{F}{A}$$

$$\Rightarrow p = \frac{4.0 \times 10^{-11}}{1.0 \times 10^{-6}}$$

$$\therefore p = 4 \times 10^{-5} \text{ Pa}$$

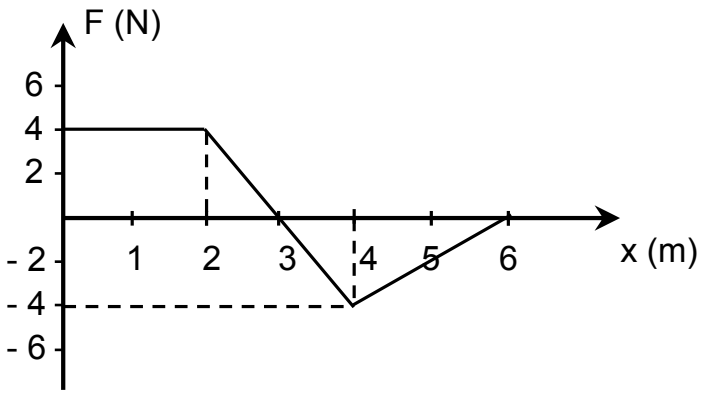
IAPT answer: (D) | **Zigyan answer:** (D)

PART A-2 · ONE OR MORE CORRECT OPTIONS

Q. 49 – 60 · 6 marks only if all correct options are marked · no negative marking

49. The force F(x) acting on a body of mass m changes with position x (in meter) as shown. It is given that the potential energy U(x) = 0 at x = 0

Choose correct option(s).



(A) U(x) = 0 at x = 0, x = 3 and x = 6

(B) $U(x) = 2x^2 - 12x$ for $2 \le x \le 4$

(C) $U(x) = -x^2 + 12x - 40$ for $4 \le x \le 6$

(D) At x = 3, U(x) = −10 J

Solution · Q49 **Answer: (C), (D)**

$$U = -\int_0^x F\,dx$$

From 0 to 2 m,

$$U = -4x$$

From 2 m to 4 m,

$$F = 12 - 4x$$

$$\Rightarrow U = 2x^2 - 12x + 8$$

From 4 m to 6 m,

$$F = 2x - 12$$

$$\Rightarrow U = -x^2 + 12x - 40$$

So (C) is true.

From the middle part,

$$U(3) = -10\ \text{J}$$

So (D) is true and (A) is false.

(B) misses the constant term, so it is false.

Check: U is minus the signed area under the graph. The area from 0 to 3 m is 10 J, so U(3) is −10 J. The net area from 0 to 6 m is 4 J, so U(6) is −4 J, which the expression in (C) also gives.

IAPT answer: (C), (D) | **Zigyan answer:** (C), (D)

50. A deuteron of mass M moving at speed v collides elastically with an α - particle of mass 2M, initially at rest. The deuteron is scattered through 90° from initial direction of its motion with speed V_d while the α - particle is scattered with speed V_α at an angle θ from the initial direction of motion of deuteron. Then

(A) $\theta = 30°$

(B) $V_\alpha = \frac{v}{\sqrt{3}}$

(C) $V_d = \frac{v}{\sqrt{3}}$

(D) a fraction $\frac{2}{3}$ of energy of deuteron is transferred to α particle

Solution · Q50 **Answer: (A), (B), (C), (D)**

Take x along the initial and y along the final direction of the deuteron.

$$Mv = 2MV_\alpha \cos\theta$$

$$MV_d = 2MV_\alpha \sin\theta$$

For the elastic collision,

$$v^2 = V_d^2 + 2V_\alpha^2$$

Solving these,

$$\Rightarrow V_d = \frac{v}{\sqrt{3}}$$

$$\Rightarrow V_\alpha = \frac{v}{\sqrt{3}}$$

$$\tan\theta = \frac{V_d}{v}$$

$$\Rightarrow \tan\theta = \frac{1}{\sqrt{3}}$$

$$\Rightarrow \theta = 30°$$

Fraction of energy transferred:

$$\frac{MV_\alpha^2}{\frac{1}{2}Mv^2} = \frac{2}{3}$$

So all four options are true.

IAPT answer: (A), (B), (C), (D) | **Zigyan answer:** (A), (B), (C), (D)

51. Two plane progressive waves travelling on a string as

$y_1 = 2.5 \times 10^{-3} \sin(30x - 420t)$

$y_2 = 2.5 \times 10^{-3} \sin(30x + 420t)$

superimpose to produce a standing wave. The variables x and y are in meter and t is in second. Then

(A) the equation of resultant standing wave is $y = 5 \times 10^{-3} \cos(30x) \sin(420t)$

(B) the equation of resultant standing wave is $y = 2.5 \times 10^{-3} \sin(30x) \cos(420t)$

(C) the antinode closest to x = 0.25 m is at x = 0.262 m

(D) the amplitude of oscillation of particle at x = 0.17 m is 4.63 mm

Solution · Q51 **Answer: (C), (D)**

$$y = y_1 + y_2$$

$$\Rightarrow y = 5 \times 10^{-3} \sin 30x \cos 420t$$

So (A) and (B) are false.

Antinodes occur where

$$|\sin 30x| = 1$$

$$\Rightarrow x = \frac{(2n+1)\pi}{60}$$

The one nearest to the given point is at 0.262 m, so (C) is true.

For the particle at 0.17 m, the amplitude in mm is

$$5\,|\sin 5.1| = 5 \times 0.926$$

$$\Rightarrow 5\,|\sin 5.1| = 4.63 \text{ mm}$$

So (D) is true.

IAPT answer: (C), (D) | **Zigyan answer:** (C), (D)

52. Two moles of nitrogen in a container, of negligible thermal capacity, are initially at 17 °C. The gas is compressed adiabatically from an initial volume of 120 liter to 80 liter. The correct option(s) is/are

(A) Initial pressure of the gas is nearly 40.2 kPa

(B) Final temperature of the gas is nearly 68 °C

(C) Work done by the gas is 2.12 kJ

(D) The internal energy of the gas increases by 2.12 kJ

Solution · Q52 **Answer: (A), (B), (D)**

$$P_1 = \frac{nRT_1}{V_1}$$

$$\Rightarrow P_1 = \frac{2 \times 8.314 \times 290}{0.120}$$

$$\Rightarrow P_1 \approx 40.2 \text{ kPa}$$

So (A) is true.

$$T_2 = 290 \times (1.5)^{0.4}$$

$$\Rightarrow T_2 \approx 341 \text{ K}$$

This is about 68 °C, so (B) is true.

$$\Delta U = nC_V\Delta T$$

$$\Rightarrow \Delta U = 2 \times 2.5 \times 8.314 \times 51.06$$

$$\Rightarrow \Delta U \approx +2.12 \text{ kJ}$$

So (D) is true. For an adiabatic process,

$$W = -\Delta U$$

$$\Rightarrow W = -2.12 \text{ kJ}$$

So (C) is false.

IAPT answer: (A), (B), (D) | **Zigyan answer:** (A), (B), (D)

53. A small dipole is placed at the origin with its dipole moment $\vec{P} = p\hat{i}$ oriented along x axis. E and V, are respectively, the Electric field and potential at point A(x, y). The observations at the Point A(x, y) which is at a large distance r from the origin, show that

(A) $E_x = \frac{1}{4\pi\varepsilon_0}\frac{p(2x^2 - y^2)}{r^5}$

(B) $E_x = \frac{1}{4\pi\varepsilon_0}\frac{p(x^2 - 2y^2)}{r^5}$

(C) $E_y = \frac{1}{4\pi\varepsilon_0}\frac{3pxy}{r^5}$

(D) $V = \frac{1}{4\pi\varepsilon_0}\frac{\vec{P}\cdot\vec{r}}{r^3}$

Solution · Q53 **Answer: (A), (C), (D)**

$$k = \frac{1}{4\pi\varepsilon_0}$$

$$V = \frac{k\vec{P}\cdot\vec{r}}{r^3}$$

$$\Rightarrow V = \frac{kpx}{r^3}$$

So (D) is true.

$$E_x = -\frac{\partial V}{\partial x}$$

$$\Rightarrow E_x = \frac{kp(2x^2 - y^2)}{r^5}$$

So (A) is true and (B) is false.

$$E_y = -\frac{\partial V}{\partial y}$$

$$\Rightarrow E_y = \frac{3kpxy}{r^5}$$

So (C) is true.

IAPT answer: (A), (C), (D) | **Zigyan answer:** (A), (C), (D)

54. Two equal positive charges +Q each lie on y axis at (0, a) and (0, – a). The electric field strength E at a point (x, 0) satisfies:

(A) $E = \frac{1}{4\pi\varepsilon_0}\frac{2Qa}{(x^2 + a^2)^{3/2}}$

(B) for large values of x (i.e x >> a), the electric field $E \propto \frac{1}{x^2}$

(C) for $x \geq 0$, E is maximum at $x = \frac{a}{\sqrt{2}}$

(D) for $x \geq 0$, E is maximum at x = 0 and is equal to $\frac{1}{4\pi\varepsilon_0}\frac{2Q}{a^2}$

Solution · Q54 **Answer: (B), (C)**

The y components cancel.

$$E = \frac{1}{4\pi\varepsilon_0}\frac{2Qx}{(x^2 + a^2)^{3/2}}$$

So (A) is false. For x much larger than a,

$$E \approx \frac{2Q}{4\pi\varepsilon_0 x^2}$$

So (B) is true. For maximum E,

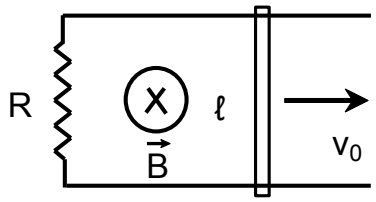
$$\frac{dE}{dx} = 0$$

$$\Rightarrow x = \frac{a}{\sqrt{2}}$$

So (C) is true. At the origin the two fields cancel, so (D) is false.

IAPT answer: (B), (C) | **Zigyan answer:** (B), (C)

55. A metal rod of mass m and length ℓ slides on frictionless parallel metal rails of negligible resistance, A resistance R is connected between the rails at their ends as shown in the figure. A uniform magnetic field B is directed into the plane of paper perpendicular to the plane of rails throughout the space. The rod is given an initial velocity v_0 (towards right). No other force acts on the rod. Then



(A) $v(t) = v_0 e^{-B\ell t/mR}$

(B) the rod stops after traveling a distance $x = \frac{mv_0R}{B^2\ell^2}$

(C) the total energy dissipated in resistance is $\frac{1}{4}mv_0^2$ i.e. half of the initial kinetic energy

(D) the total charge that flows in the circuit is $q = \frac{mv_0}{B\ell}$

Solution · Q55 **Answer: (B), (D)**

$$m\frac{dv}{dt} = -\frac{B^2\ell^2 v}{R}$$

$$\Rightarrow v = v_0 e^{-B^2\ell^2 t/mR}$$

So (A) is false.

$$x = \int_0^{\infty} v\,dt$$

$$\Rightarrow x = \frac{mv_0R}{B^2\ell^2}$$

So (B) is true.

The whole initial kinetic energy becomes heat in R, so (C) is false.

$$B\ell q = mv_0$$

$$\Rightarrow q = \frac{mv_0}{B\ell}$$

So (D) is true.

IAPT answer: (B), (D) | **Zigyan answer:** (B), (D)

56. The magnetic field $\vec{B} = 2\times10^{-5}\sin\left\{\pi\left(0.5\times10^3x + 1.5\times10^{11}t\right)\right\}\hat{j}$ T represents a plane electromagnetic wave travelling in space with x in meter and t in second. The correct statement(s) are

(A) The wave length of the wave is 4.0 mm and its frequency is 75 GHz

(B) The energy density associated with the wave is nearly = 316 μJ / m^3

(C) The electric field vector is $\vec{E} = -6000\sin\left[\pi\left(0.5\times10^3x - 1.5\times10^{11}t\right)\right]\hat{k}$ Vm^{-1}

(D) The electric field vector is $\vec{E} = 6000\sin\left[\pi\left(0.5\times10^3x + 1.5\times10^{11}t\right)\right]\hat{k}$ Vm^{-1}

Solution · Q56 **Answer: (A), (D)**

$$\lambda = \frac{2\pi}{500\pi}$$

$$\Rightarrow \lambda = 4.0\times10^{-3}\text{ m}$$

$$f = \frac{1.5\pi\times10^{11}}{2\pi}$$

$$\Rightarrow f = 7.5\times10^{10}\text{ Hz}$$

So (A) is true.

Average energy density:

$$u = \frac{B_0^2}{2\mu_0}$$

$$\Rightarrow u = 159\ \mu J/m^3$$

Its peak value is about 318 μJ/m^3, so (B) is false.

(C) has a different phase, so it is false.

$$E_0 = cB_0$$

$$\Rightarrow E_0 = 6000\text{ V/m}$$

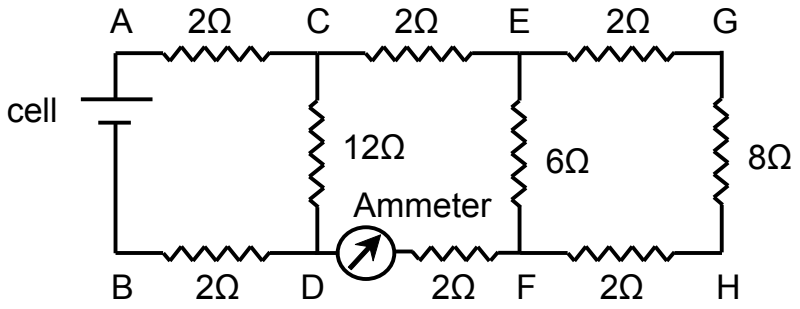
For travel along negative x,

$$\hat{k}\times\hat{j} = -\hat{i}$$

So (D) is true.

IAPT answer: (A), (D) | **Zigyan answer:** (A), (D)

57. In the circuit shown, the current in the 8Ω resistance across G and H is i = 0.5 ampere. The ammeter is ideal. The internal resistance of the cell is 0.8 Ω. Choose correct option(s).



(A) Reading of the ammeter is 1.5 ampere

(B) Potential difference across A and H is 13 V

(C) Potential difference across C and F is 9 V

(D) The emf of the cell is 24 V

Solution · Q57 **Answer: (A), (B), (C), (D)**

$$V_{EF} = 0.5 \times (2 + 8 + 2)$$

$$\Rightarrow V_{EF} = 6 \text{ V}$$

So the 6 Ω resistor carries 1.0 A. Ammeter current:

$$I = 1.0 + 0.5$$

$$\Rightarrow I = 1.5 \text{ A}$$

So (A) is true.

$$V_{CD} = 1.5 \times 2 + 6 + 1.5 \times 2$$

$$\Rightarrow V_{CD} = 12 \text{ V}$$

The 12 Ω resistor carries 1.0 A, so the current in AC is 2.5 A.

$$V_{AH} = 5 + 3 + 1 + 4$$

$$\Rightarrow V_{AH} = 13 \text{ V}$$

So (B) is true.

$$V_{CF} = 3 + 6$$

$$\Rightarrow V_{CF} = 9 \text{ V}$$

So (C) is true.

The terminal voltage of the cell is 22 V.

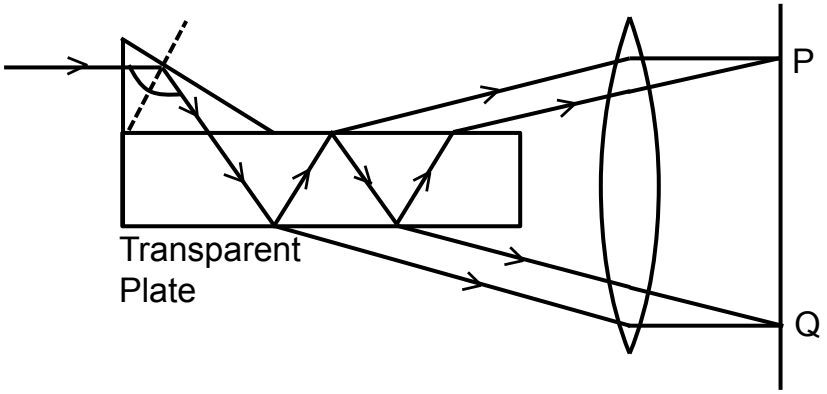
$$\text{emf} = 22 + 2.5 \times 0.8$$

$$\Rightarrow \text{emf} = 24 \text{ V}$$

So (D) is true.

IAPT answer: (A), (B), (C), (D) | **Zigyan answer:** (A), (B), (C), (D)

58. In an experiment with Lummer Gehrecke plate, the two coherent beams of light, caused by multiple reflections inside the transparent plate of refractive index μ = 1.54, reach the points P and Q on the screen. The net path difference between the two beams reaching either at P or Q is Δx = 5000 nm. Which of the wavelengths in the visible range (λ = 390 nm to λ = 780 nm) is/are most likely to produce a constructive interference (a maximum) at the point P as well as at Q on the screen?



(A) 416.67 nm (B) 555.56 nm (C) 625.00 nm (D) 666.70 nm

Solution · Q58 **Answer: (A), (B), (C)**

5000 nm is the net path difference, so the refractive index is not needed. For a maximum,

$$\lambda = \frac{5000}{n}\ \text{nm}$$

For the visible range,

$$7 \le n \le 12$$

These give wavelengths in nm:

$$\lambda = 714.29,\ 625.00,\ 555.56,\ 500.00,\ 454.55,\ 416.67$$

So (A), (B) and (C) are true.

For (D),

$$\frac{5000}{666.70} = 7.50$$

This gives a minimum, so (D) is false.

IAPT answer: (A), (B), (C) | **Zigyan answer:** (A), (B), (C)

59. Two identical transparent solid cylinders, each of radius 10 cm and refractive index $\mu = \sqrt{3}$, lie horizontally parallel to each other on a horizontal plane mirror with a separation x between their horizontal axes. A ray of light is incident horizontally on the cylinder A at a height h above the plane mirror so as to emerge from this cylinder at a height h_1 = 0.1 m above the plane mirror. The ray emerging out from the first cylinder A is reflected from the horizontal plane mirror to enter the second parallel cylinder B at a height h_2 and then this ray emerges out of the second cylinder, parallel and in-line with the original incident ray. The correct statement(s) is/are:

(A) the height h above the plane mirror is h = 18.7 cm

(B) the ray enters the second cylinder B at a height h_2 = 0.1 m

(C) the separation between the axes of the two cylinders A and B is x = 31.54 cm

(D) the angle of incidence on the plane mirror midway between the two cylinders is θ = 30°

Solution · Q59 **Answer: (A), (B), (C), (D)**

The exit height equals the radius, so the ray leaves A at the end of its horizontal diameter. For angles i and r at entry,

$$i = 2r$$

$$\sin 2r = \sqrt{3} \sin r$$

$$\Rightarrow r = 30°$$

$$\Rightarrow i = 60°$$

$$h = 10 + 10 \sin 60°$$

$$\Rightarrow h = 18.66 \text{ cm}$$

So (A) is true.

The emerging ray is at 60° to the horizontal, so it meets the mirror at 30° to the normal; (D) is true.

By symmetry and reversibility, it enters B at the end of the horizontal diameter, at height 0.1 m; (B) is true.

$$x = 10 + 2 \times 10 \cot 60° + 10$$

$$\Rightarrow x \approx 31.55 \text{ cm}$$

So (C) is true (the printed value differs only by rounding).

IAPT answer: (A), (B), (C), (D) | **Zigyan answer:** (A), (B), (C), (D)

60. In the working of a p – n junction

(A) diffusion current dominates when the junction is forward biased

(B) drift current dominates when the junction is reverse biased

(C) depletion region width decreases with increase in forward bias voltage.

(D) the electric field in the depletion region depends on the number of ionized dopants rather than the dopant density.

Solution · Q60 **As per Zigyan: (A), (B), (C)**

(A) Forward bias lowers the barrier, so diffusion current dominates.

(B) Reverse bias raises the barrier, leaving mainly the drift of minority carriers.

(C) With forward voltage V and barrier V_0, the depletion width W follows

$$W \propto \sqrt{V_0 - V}$$

So the width decreases.

(D) In size, the slope of the field depends on the dopant density N_D:

$$\left|\frac{dE}{dx}\right| = \frac{qN_D}{\varepsilon}$$

So (D) is not correct as a general statement.

Reference: NCERT Physics Class XII (Part II), Chapter 14 'Semiconductor Electronics: Materials, Devices and Simple Circuits', sections 14.6.1 and 14.6.2: forward bias narrows the depletion layer and drives a diffusion current; reverse bias cuts diffusion sharply and leaves a small drift current. This covers (A), (B) and (C).

Check: for (D), take a one-sided junction. The field graph is a triangle whose area is the junction voltage V, so the square of the peak field is $2qN_DV$ divided by ε. At a given V it therefore depends on the dopant density.

IAPT answer: (A), (B), (C) or (A), (B), (C), (D) | **Zigyan answer:** (A), (B), (C)

ANSWER KEY

NSEP 2023 · PAPER CODE 61

60
QUESTIONS · 216 MARKS

IAPT final answer key for paper code 61. ★ marks an answer given as per Zigyan.

1	(C)	2	(B)	3	(C)	4	(D)	5	(A)
6	(C)	7	(B)	8	(D)	9	(A)	10	(A)
11	(B)	12	(B)	13	(A)	14	(B)	15	(B)
16	(C)	17	(C)	18	(B)	19	(A)	20	(D)
21	(B)	22	(B)	23	(A)	24	(A)	25	(A)
26	(B)	27	(B)	28	(D)	29	(A)	30	(C)
31	(D)	32	(C)	33	(C)	34	(C)	35	(C)
36	(A)	37	(D)	38	(D)	39	(B)	40	(A)
41	(D)	42	(A)	43	(A)	44	(C)	45	(C)
46	(D)	47	(D)★	48	(D)	49	(C), (D)	50	(A), (B), (C), (D)
51	(C), (D)	52	(A), (B), (D)	53	(A), (C), (D)	54	(B), (C)	55	(B), (D)
56	(A), (D)	57	(A), (B), (C), (D)	58	(A), (B), (C)	59	(A), (B), (C), (D)	60	(A), (B), (C)★

★ Answers as per Zigyan

- **Q47** — As per Zigyan: (D); IAPT key (D).
- **Q60** — As per Zigyan: (A), (B), (C); IAPT key (A), (B), (C) or (A), (B), (C), (D).

zigyan

OLYMPIADS · 2026

Olympiad results



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Qualified the Chemistry Olympiad twice, and selected for the HBCSE camp.

Saksham Bishnoi reached the national stage of the Chemistry Olympiad in two consecutive years and was selected for the Orientation-cum-Selection Camp at HBCSE, Mumbai. 4 Years Classroom - the same student who took AIR 168 in JEE Advanced 2026.

Qualified twice | HBCSE selection camp | Only student from Faridabad

Above MAS means above the **Minimum Admissible Score**: clearing it puts a student in the national band for their subject. It is a real threshold, not a participation marker.

CHEMISTRY · ABOVE MAS



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Class XII
3 Years Classroom
Above MAS



Anay Gupta
Class XI
3 Years Classroom
Above MAS



Akshat Khator
Class XI
3 Years Classroom
Above MAS



Harshit Goyal
Class XII
4 Years Classroom
Above MAS



Hardik Sharma
Class XI
3 Years Classroom
Above MAS



Aarush Kumar
Class XII
1 Year Classroom
Above MAS

PHYSICS · ASTRONOMY · MATHEMATICS

PHYSICS



Sulokya Bibhuty
Class XII
3 Years Classroom
Above MAS

PHYSICS



Saksham Bishnoi
Class XII
4 Years Classroom
Above MAS

ASTRONOMY



Sulokya Bibhuty
Class XI
3 Years Classroom
Above MAS

MATHEMATICS · IOQM



Priyanshi
Class XI
4 Years Classroom
IOQM Qualifier

OLYMPIADS WE PREPARE STUDENTS FOR

NSEP	NSEC	NSEB	NSEA	IOQM	NSEJS
Physics	Chemistry	Biology	Astronomy	Mathematics	Class X and below

The olympiad pathway starts in Class 8.

NSEJS is open to Class 10 and below - the habit of staying with one hard problem is the one JEE Advanced rewards.

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RESULTS · 2021 – 2026

Our toppers, year by year

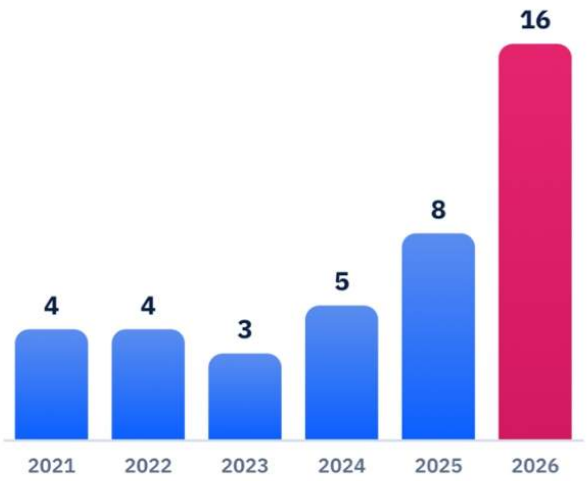
40
JEE Advanced selections in 6 years

AIR 168
best rank — Saksham Bishnoi, 2026

16 of 35
students selected, JEE Advanced 2026

14 of 35
above 98 percentile, JEE Main 2026

JEE ADVANCED SELECTIONS PER YEAR



BEST RANK EACH YEAR

YEAR	JEE ADVANCED	JEE MAIN
2026	**Saksham Bishnoi** AIR 168 · 4 Years Classroom	**Saksham Bishnoi** AIR 811 · 99.95 %ile
2025	**Chakshu** AIR 4,233 · 2 Years Classroom	**Chakshu** AIR 8,538 · 99.44 %ile
2024	**Harshit** AIR 777 · 2 Years Classroom	**Harshit** AIR 1,473 · 99.91 %ile
2023	**Aditya Jain** AIR 2,373 · 2 Years Classroom	**Aditya Jain** AIR 2,503 · 99.79 %ile
2022	**Rachit Sharma** AIR 698 · 1 Year Classroom	**Rachit Sharma** AIR 1,016 · 99.90 %ile
2021	**Sparsh Mittal** AIR 2,237 · 1 Year Classroom	**Sparsh Mittal** AIR 1,562

JEE ADVANCED 2026 — THIRTEEN NAMED SELECTIONS



Saksham Bishnoi
AIR 168
4 Years Classroom



Sulokya Bibhuty
AIR 1,315
3 Years Classroom



Aarush
AIR 2,699
1 Year Classroom



Manishka
AIR 2,869
4 Years Classroom



Oojit Kumar
AIR 5,765
4 Years Classroom



Harshit Goyal
AIR 6,407
4 Years Classroom



Pranab Sharma
AIR 6,750
3 Years Classroom



Aditya Dhar
AIR 15,183
3 Years Classroom



Arpit Anshuman
AIR 19,308
4 Years Classroom



Lokesh
AIR 22,857
3 Years Classroom



Arjun
AIR 24,674
3 Years Classroom



Sanyam Gulyani
AIR 25,123
1 Year Classroom



Saket
AIR 27,628
3 Years Classroom

Sixteen students of the 2026 batch were selected in JEE Advanced; the thirteen above are named with their All India Rank.

JEE MAIN 2026 — TOP SIX, WITH PERCENTILE



Saksham Bishnoi
AIR 811
99.95 %ile
4 Years Classroom



Sulokya Bibhuty
AIR 1,095
99.94 %ile
3 Years Classroom



Harshit Goyal
AIR 2,662
99.83 %ile
4 Years Classroom



Manishka
AIR 4,817
99.70 %ile
4 Years Classroom



Oojit Kumar
AIR 5,040
99.69 %ile
4 Years Classroom



Aarush
AIR 5,276
99.67 %ile
1 Year Classroom

14 of the 35 students in the 2026 batch scored above the 98th percentile in JEE Main.

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