JEE Main Physics
Sample Paper – 5

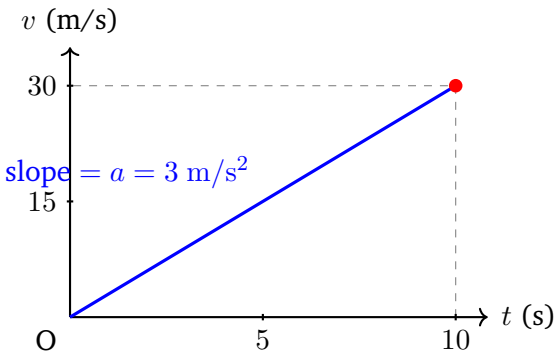
Duration: 60 Minutes | Maximum Marks: 100

Instructions

- **Section A** contains 20 Multiple Choice Questions (Q1–Q20). Each question has four options with only one correct answer. Correct answer: **+4** marks; Wrong answer: **−1** mark; Unattempted: **0** marks.
- **Section B** contains 10 Numerical Value Questions (Q21–Q30). Attempt **any 5** questions. Correct answer: **+4** marks; Wrong or unattempted: **0** marks (no negative marking).
- The syllabus is based on Class 11 & 12 NCERT Physics as per the JEE Main official syllabus.
- Use of personal calculators, log tables, and electronic devices is strictly prohibited.
- A simple on-screen virtual calculator is provided in the CBT interface.
- Rough work may be done in the space provided within the question paper. Do not write anything on the Answer Sheet that is not required.

SECTION A (Single Correct MCQ) Q1 – Q20 [+4 / −1]

Q1. A car starts from rest and moves with a uniform acceleration of $a = 3\ \text{m/s}^2$. Using the kinematic relation $v = u + at$, the velocity of the car after $t = 10\ \text{s}$ is:



(A) $30\ \text{m/s}$

(B) $15\ \mathrm{m/s}$

(C) $3\ \mathrm{m/s}$

(D) $300\ \mathrm{m/s}$

Q2. In an Atwood machine, two masses $M_1 = 3\ \mathrm{kg}$ and $M_2 = 7\ \mathrm{kg}$ are connected by a light inextensible string over a frictionless, massless pulley ($g = 10\ \mathrm{m/s^2}$). The magnitude of the acceleration of the system is:

(A) $2\ \mathrm{m/s^2}$

(B) $4\ \mathrm{m/s^2}$

(C) $5\ \mathrm{m/s^2}$

(D) $7\ \mathrm{m/s^2}$

Q3. A block of mass $M = 4\ \mathrm{kg}$ slides on a rough horizontal surface with coefficient of kinetic friction $\mu_k = 0.2$ for a distance $d = 5\ \mathrm{m}$ ($g = 10\ \mathrm{m/s^2}$). The work done *by the friction force* on the block is:

(A) $+40\ \mathrm{J}$

(B) $+20\ \mathrm{J}$

(C) $-40\ \mathrm{J}$

(D) $-20\ \mathrm{J}$

Q4. A disc of mass $M = 2\ \mathrm{kg}$ and radius $R = 0.5\ \mathrm{m}$ has moment of inertia $I = \frac{1}{2}MR^2$. A net torque of $\tau = 1\ \mathrm{N \cdot m}$ is applied to the disc. The angular acceleration α of the disc is:

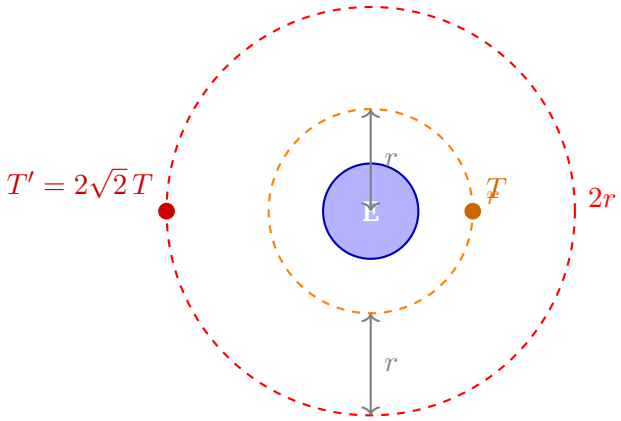
(A) $1\ \mathrm{rad/s^2}$

(B) $2\ \mathrm{rad/s^2}$

(C) $8\ \mathrm{rad/s^2}$

(D) $4\ \mathrm{rad/s^2}$

Q5. A satellite orbits the Earth in a circular orbit of radius r with time period T. If the orbital radius is doubled to $2r$, the new time period T' (using Kepler's third law $T^2 \propto r^3$) is:



(A) $2\sqrt{2}\,T$

(B) $2\,T$

(C) $4\,T$

(D) $\sqrt{2}\,T$

Q6. According to Stokes' law, the viscous drag force F on a sphere of radius r moving with velocity v through a fluid of viscosity η is $F = 6\pi\eta r v$. The drag force is proportional to:

(A) $r^2 v$

(B) rv

(C) $r\,v^2$

(D) $r^2 v^2$

Q7. An ideal gas undergoes isothermal expansion at constant temperature T. Its volume doubles from V to $2V$. By Boyle's law ($PV = \text{const}$), the new pressure P_2 (in terms of the initial pressure P) is:

(A) $2P$

(B) P

(C) $P/2$

(D) $P/4$

Q8. A mass $m = 1\ \text{kg}$ is attached to a spring of spring constant $k = \pi^2\ \text{N/m}$. The time period of the resulting simple harmonic motion is:

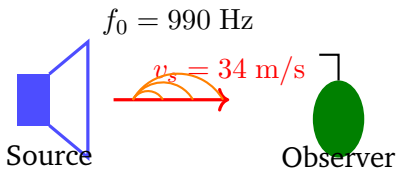
(A) π s

(B) 1 s

(C) 4 s

(D) 2 s

Q9. A sound source emitting frequency $f_0 = 990$ Hz moves towards a stationary observer at speed $v_s = 34$ m/s. Speed of sound $v = 340$ m/s. The frequency heard by the observer is:



(A) 1100 Hz

(B) 990 Hz

(C) 900 Hz

(D) 1050 Hz

Q10. A uniformly charged ring carries total charge Q and has radius R. The electric field at the *centre* of the ring is:

(A) $\dfrac{kQ}{R^2}$

(B) Zero

(C) $\dfrac{kQ}{2R^2}$

(D) $\dfrac{2kQ}{R^2}$

Q11. A capacitor of capacitance C_0 is connected to a battery of voltage V (battery remains connected). A dielectric slab with dielectric constant $\kappa = 3$ is then inserted between the plates. The charge on the capacitor becomes:

(A) Q_0

(B) $\dfrac{Q_0}{3}$

(C) $3Q_0$

(D) $9Q_0$

Q12. The magnetic field inside a solenoid is $B = \mu_0 n I$, where n is the number of turns per unit length and I is the current. If both n and I are doubled simultaneously, the new magnetic field B' is:

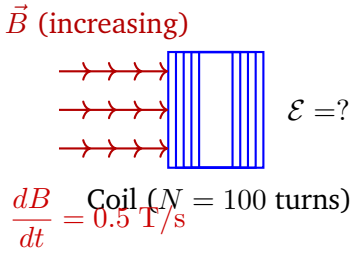
(A) B

(B) $2B$

(C) $3B$

(D) $4B$

Q13. A coil of $N = 100$ turns and cross-sectional area $A = 0.02\ \text{m}^2$ is placed in a magnetic field that changes at the rate $\dfrac{dB}{dt} = 0.5\ \text{T/s}$. The magnitude of the induced EMF in the coil is:



(A) $1\ \text{V}$

(B) $0.5\ \text{V}$

(C) $10\ \text{V}$

(D) $100\ \text{V}$

Q14. A series LCR circuit has resistance $R = 6\ \Omega$, inductive reactance $X_L = 10\ \Omega$, and capacitive reactance $X_C = 2\ \Omega$. The impedance Z of the circuit is:

(A) $6\ \Omega$

(B) $10\ \Omega$

(C) $18\ \Omega$

(D) $8\ \Omega$

Q15. An electromagnetic wave of intensity I is incident normally on a perfectly absorbing surface. The radiation pressure (force per unit area) exerted on the surface is: (speed of light $= c$)

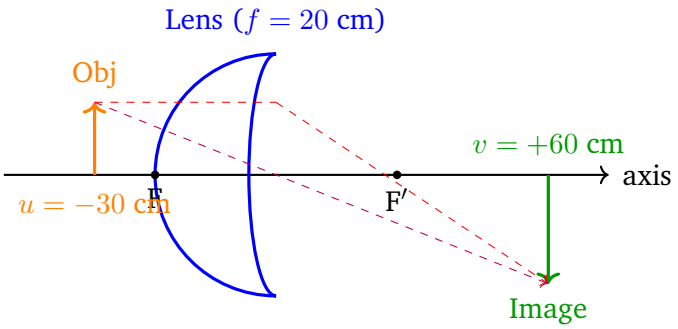
(A) Ic

(B) $2I/c$

(C) I/c

(D) I/c^2

Q16. An object is placed $30\ \text{cm}$ in front of a convex lens of focal length $f = 20\ \text{cm}$. Using the lens formula $\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$ (with sign convention $u = -30\ \text{cm}$), the image distance v is:



(A) $-60\ \text{cm}$

(B) $30\ \text{cm}$

(C) $20\ \text{cm}$

(D) $60\ \text{cm}$

Q17. The work function of a metal surface is $\phi = 2.5\ \text{eV}$. The threshold wavelength λ_0 below which the photoelectric effect occurs is: (use $hc = 1240\ \text{eV} \cdot \text{nm}$)

(A) $496\ \text{nm}$

(B) $248\ \text{nm}$

(C) $620\ \text{nm}$

(D) $310\ \text{nm}$

Q18. In the hydrogen atom, the electron undergoes a transition from $n = 2$ to $n = 1$ (the first line of the Lyman series). Using $E_n = -13.6/n^2\ \text{eV}$ and $hc = 1240\ \text{eV} \cdot \text{nm}$, the wavelength of the emitted photon is approximately:

(A) $656\ \text{nm}$

(B) $122\ \text{nm}$

(C) $486\ \text{nm}$

(D) $91\ \text{nm}$

Q19. The nucleus ${}^{222}_{86}\text{Rn}$ undergoes alpha decay (α particle $= {}^{4}_{2}\text{He}$). The daughter nucleus produced is:

(A) ${}^{218}_{88}\text{Ra}$

(B) ${}^{220}_{84}\text{Po}$

(C) ${}^{218}_{84}\text{Po}$

(D) ${}^{222}_{84}\text{Po}$

Q20. In a common-emitter transistor circuit, the base current changes by $\Delta I_B = 40\ \mu\text{A}$ and the corresponding change in collector current is $\Delta I_C = 2\ \text{mA}$. The DC current gain β of the transistor is:

(A) 25

(B) 40

(C) 80

(D) 50

SECTION B (Numerical Value Questions)
Q21 – Q30 Attempt ANY 5 [+4 / 0]

Q21. A car travels $60\ \text{km}$ at a speed of $40\ \text{km/h}$ and then another $60\ \text{km}$ at a speed of $60\ \text{km/h}$. Calculate the average speed (in km/h) of the car for the entire journey.

(Enter the exact numerical value as your answer.)

Q22. A Carnot engine operates between a hot reservoir at $T_H = 600\ \text{K}$ and a cold reservoir at $T_L = 300\ \text{K}$. Calculate the efficiency of the engine (in %).

(Enter the exact numerical value as your answer.)

Q23. A capacitor of capacitance $C = 10\ \mu\text{F}$ is charged to a potential difference $V = 20\ \text{V}$. Calculate the charge stored on the capacitor (in μC).

(Enter the exact numerical value as your answer.)

Q24. Three resistors of $6\ \Omega$, $3\ \Omega$, and $2\ \Omega$ are connected in parallel. Calculate the equivalent resistance (in Ω) of the combination.

(Enter the exact numerical value as your answer.)

Q25. A conducting rod of length $l = 0.4\ \text{m}$ moves with velocity $v = 6\ \text{m/s}$ perpendicular to a uniform magnetic field $B = 2.5\ \text{T}$. Calculate the induced motional EMF (in V) across the rod.

(Enter the exact numerical value as your answer.)

Q26. An object is placed at $u = -30\ \text{cm}$ from a convex lens of focal length $f = +15\ \text{cm}$. Using the lens formula, find the image distance v (in cm).

(Enter the exact numerical value as your answer.)

Q27. An electron has kinetic energy $KE = 1.5\ \text{eV}$. Using $\lambda = h/\sqrt{2m_e KE}$ with $h = 6.63 \times 10^{-34}\ \text{J}\cdot\text{s}$, $m_e = 9.1 \times 10^{-31}\ \text{kg}$, and $1\ \text{eV} = 1.6 \times 10^{-19}\ \text{J}$, calculate the de Broglie wavelength of the electron (in Å).

(Enter the exact numerical value as your answer.)

Q28. Two tuning forks have frequencies $340\ \text{Hz}$ and $345\ \text{Hz}$. Calculate the number of beats heard per second.

(Enter the exact numerical value as your answer.)

Q29. A ball is dropped from rest from a height $H = 20\ \text{m}$ ($g = 10\ \text{m/s}^2$). Using $H = \frac{1}{2}gt^2$, calculate the time (in s) taken by the ball to reach the ground.

(Enter the exact numerical value as your answer.)

Q30. Calculate the energy (in eV) of a photon of wavelength $\lambda = 248\ \text{nm}$. Use $E = hc/\lambda$ with $hc = 1240\ \text{eV} \cdot \text{nm}$.

(Enter the exact numerical value as your answer.)

DETAILED SOLUTIONS

Sol. Q1.

Solution

Topic: Kinematics — Uniform Acceleration

Using the first equation of motion with initial velocity $u = 0$ (starts from rest):

$$v = u + at = 0 + 3 \times 10 = \mathbf{30}\ \text{m/s}$$

The v–t graph is a straight line through the origin with slope $a = 3\ \text{m/s}^2$, reaching $v = 30\ \text{m/s}$ at $t = 10\ \text{s}$.

Final Answer: $30\ \text{m/s} \Rightarrow$ option (A).

Answer: (A)

Sol. Q2.

Solution

Topic: Laws of Motion — Atwood Machine

For the Atwood machine with masses M_1 and M_2 ($M_2 > M_1$), the net downward force on the heavier side is $(M_2 - M_1)g$ and the total mass being accelerated is $(M_1 + M_2)$:

$$a = \frac{(M_2 - M_1)\, g}{M_1 + M_2} = \frac{(7-3) \times 10}{7+3} = \frac{4 \times 10}{10} = \mathbf{4}\ \text{m/s}^2$$

Final Answer: $4\ \text{m/s}^2 \Rightarrow$ option (B).

Answer: (B)

Sol. Q3.

Solution

Topic: Work-Energy Theorem — Work Done by Friction

The kinetic friction force acts opposite to the direction of motion, so:

$$f_k = \mu_k M g = 0.2 \times 4 \times 10 = 8\ \text{N}$$

Work done by friction (negative, since force opposes displacement):

$$W_f = -f_k \cdot d = -8 \times 5 = \mathbf{-40}\ \text{J}$$

Final Answer: $-40\ \text{J} \Rightarrow$ option (C).

Answer: (C)

Sol. Q4.

Solution

Topic: Rotational Motion — Angular Acceleration

The moment of inertia of the disc:

$$I = \frac{1}{2}MR^2 = \frac{1}{2} \times 2 \times (0.5)^2 = \frac{1}{2} \times 2 \times 0.25 = 0.25 \text{ kg} \cdot \text{m}^2$$

By Newton's second law for rotation ($\tau = I\alpha$):

$$\alpha = \frac{\tau}{I} = \frac{1}{0.25} = \mathbf{4} \text{ rad/s}^2$$

Final Answer: $4 \text{ rad/s}^2 \Rightarrow$ option (D).

Answer: (D)

Sol. Q5.

Solution

Topic: Gravitation — Kepler's Third Law

Kepler's third law: $T^2 \propto r^3$, so $T \propto r^{3/2}$.

When the radius changes from r to $2r$:

$$\frac{T'}{T} = \left(\frac{2r}{r}\right)^{3/2} = 2^{3/2} = 2 \times \sqrt{2} = 2\sqrt{2}$$

$$\therefore \quad T' = 2\sqrt{2}\,T$$

Final Answer: $2\sqrt{2}\,T \Rightarrow$ option (A).

Answer: (A)

Sol. Q6.

Solution

Topic: Fluid Mechanics — Stokes' Law

Stokes' law gives the viscous drag force as:

$$F = 6\pi\eta r v$$

Here $6\pi\eta$ is a constant (for a given fluid at constant viscosity). Therefore

$F \propto rv$, i.e., the drag force is proportional to the product $r \cdot v$.

Final Answer: $rv \Rightarrow$ option (B).

Answer: (B)

Sol. Q7.

Solution

Topic: Thermodynamics — Isothermal Process (Boyle's Law)

For an isothermal process, $PV =$ constant:

$$P_1V_1 = P_2V_2 \implies P \cdot V = P_2 \cdot 2V$$

$$P_2 = \frac{PV}{2V} = \frac{\mathbf{P}}{\mathbf{2}}$$

When volume doubles at constant temperature, pressure halves.

Final Answer: $P/2 \Rightarrow$ option (C).

Answer: (C)

Sol. Q8.

Solution

Topic: Simple Harmonic Motion — Spring-Mass System

The time period of a spring-mass system is:

$$T = 2\pi\sqrt{\frac{m}{k}} = 2\pi\sqrt{\frac{1}{\pi^2}} = 2\pi \times \frac{1}{\pi} = \mathbf{2}\ \text{s}$$

Final Answer: 2 s $\Rightarrow$ option (D).

Answer: (D)

Sol. Q9.

Solution

Topic: Waves — Doppler Effect (Source Approaching Observer)

The Doppler formula when source moves towards a stationary observer:

$$f' = f_0 \times \frac{v}{v - v_s} = 990 \times \frac{340}{340 - 34} = 990 \times \frac{340}{306}$$

$$= 990 \times \frac{10}{9} = \frac{9900}{9} = \mathbf{1100}\ \text{Hz}$$

Final Answer: 1100 Hz $\Rightarrow$ option (A).

Answer: (A)

Sol. Q10.

Solution

Topic: Electrostatics — Electric Field at the Centre of a Charged Ring

For a uniformly charged ring, every small charge element dq at the rim produces a radial electric field contribution at the centre. By symmetry, for every element on one side of the ring there is an equal element on the diametrically opposite side whose field exactly cancels the first. The vector sum of all contributions is therefore zero:

$$\vec{E}_{\text{centre}} = \mathbf{0}$$

Final Answer: Zero $\Rightarrow$ option (B).

Answer: (B)

Sol. Q11.

Solution

Topic: Capacitors — Dielectric Insertion with Battery Connected

Initial charge: $Q_0 = C_0 V$.

When the battery remains connected, the voltage across the capacitor stays at V. Inserting a dielectric of constant $\kappa = 3$ increases the capacitance to $C = \kappa C_0 = 3C_0$.

New charge:

$$Q = C \cdot V = 3C_0 \cdot V = 3Q_0$$

Final Answer: $3Q_0 \Rightarrow$ option (C).

Answer: (C)

Sol. Q12.

Solution

Topic: Magnetic Effects of Current — Solenoid Field

The magnetic field inside a solenoid: $B = \mu_0 n I$.

If $n \to 2n$ and $I \to 2I$:

$$B' = \mu_0(2n)(2I) = 4\mu_0 nI = \mathbf{4B}$$

Final Answer: $4B \Rightarrow$ option (D).

Answer: (D)

Sol. Q13.

Solution

Topic: Electromagnetic Induction — Faraday's Law

By Faraday's law, the magnitude of the induced EMF in a coil is:

$$|\mathcal{E}| = N \cdot A \cdot \frac{dB}{dt} = 100 \times 0.02 \times 0.5 = \mathbf{1}\ \text{V}$$

Final Answer: $1\ \text{V} \Rightarrow$ option (A).

Answer: (A)

Sol. Q14.

Solution

Topic: AC Circuits — Series LCR Impedance

The impedance of a series LCR circuit:

$$Z = \sqrt{R^2 + (X_L - X_C)^2} = \sqrt{6^2 + (10-2)^2} = \sqrt{36+64} = \sqrt{100} = \mathbf{10\ \Omega}$$

Final Answer: $10\ \Omega \Rightarrow$ option (B).

Answer: (B)

Sol. Q15.

Solution

Topic: Electromagnetic Waves — Radiation Pressure

When an electromagnetic wave of intensity I is incident on a perfectly absorbing surface, all the momentum carried by the wave is transferred to the surface. The radiation pressure is:

$$P_{\text{rad}} = \frac{I}{c}$$

(For a perfectly reflecting surface it would be $2I/c$, but here the surface is

perfectly absorbing.)

Final Answer: $I/c \Rightarrow$ option (C).

Answer: (C)

Sol. Q16.

Solution

Topic: Ray Optics — Convex Lens Formula

Given: $u = -30$ cm, $f = +20$ cm (convex lens).

Applying the lens formula $\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$:

$$\frac{1}{v} = \frac{1}{f} + \frac{1}{u} = \frac{1}{20} + \frac{1}{-30} = \frac{3}{60} - \frac{2}{60} = \frac{1}{60}$$

$$\therefore \quad v = \mathbf{60}\ \text{cm}$$

The image is real (positive v), inverted, and magnified ($|v| > |u|$), formed at 60 cm on the other side of the lens.

Final Answer: 60 cm $\Rightarrow$ option (D).

Answer: (D)

Sol. Q17.

Solution

Topic: Dual Nature of Radiation — Threshold Wavelength

At the threshold wavelength, the photon energy exactly equals the work function:

$$\phi = \frac{hc}{\lambda_0} \implies \lambda_0 = \frac{hc}{\phi} = \frac{1240\ \text{eV} \cdot \text{nm}}{2.5\ \text{eV}} = \mathbf{496}\ \text{nm}$$

Photons of wavelength shorter than 496 nm can eject electrons from this metal.

Final Answer: 496 nm $\Rightarrow$ option (A).

Answer: (A)

Sol. Q18.

Solution

Topic: Atoms — Lyman Series First Line ($n = 2 \to 1$)

Energy of $n = 1$ level: $E_1 = -13.6$ eV

Energy of $n = 2$ level: $E_2 = -13.6/4 = -3.4$ eV

Energy of emitted photon:

$$\Delta E = E_2 - E_1 = -3.4 - (-13.6) = 10.2 \text{ eV}$$

Wavelength:

$$\lambda = \frac{hc}{\Delta E} = \frac{1240 \text{ eV} \cdot \text{nm}}{10.2 \text{ eV}} \approx \mathbf{122} \text{ nm}$$

This is in the UV region (Lyman series).

Final Answer: 122 nm $\Rightarrow$ option (B).

Answer: (B)

Sol. Q19.

Solution

Topic: Nuclei — Alpha Decay

In alpha decay, the nucleus emits an α particle (^4_2He). Using conservation of mass number and atomic number:

$$^{222}_{86}\text{Rn} \longrightarrow ^{218}_{84}\text{X} + ^4_2\text{He}$$

$$A_{\text{daughter}} = 222 - 4 = 218, \quad Z_{\text{daughter}} = 86 - 2 = 84$$

Element with $Z = 84$ is Polonium (Po). The daughter nucleus is $^{\mathbf{218}}_{\mathbf{84}}\text{Po}$.

Final Answer: ^{218}Po $\Rightarrow$ option (C).

Answer: (C)

Sol. Q20.

Solution

Topic: Semiconductors — Transistor Current Gain

The DC current gain (common-emitter configuration):

$$\beta = \frac{\Delta I_C}{\Delta I_B} = \frac{2 \text{ mA}}{40\ \mu\text{A}} = \frac{2 \times 10^{-3}}{40 \times 10^{-6}} = \frac{2000}{40} = \mathbf{50}$$

Final Answer: 50 $\Rightarrow$ option (D).

Answer: (D)

Sol. Q21.

Solution

Topic: Kinematics — Average Speed

Time for first leg: $t_1 = 60/40 = 1.5$ h

Time for second leg: $t_2 = 60/60 = 1.0$ h

Total distance $= 60 + 60 = 120$ km; Total time $= 1.5 + 1.0 = 2.5$ h

$$v_{\text{avg}} = \frac{120}{2.5} = \mathbf{48}\ \text{km/h}$$

Answer: (48)

Sol. Q22.

Solution

Topic: Thermodynamics — Carnot Efficiency

$$\eta = \left(1 - \frac{T_L}{T_H}\right) \times 100\% = \left(1 - \frac{300}{600}\right) \times 100\% = (1 - 0.5) \times 100\% = \mathbf{50}\%$$

Answer: (50)

Sol. Q23.

Solution

Topic: Capacitors — Charge Stored

$$Q = CV = 10\ \mu\text{F} \times 20\ \text{V} = \mathbf{200}\ \mu\text{C}$$

Answer: (200)

Sol. Q24.

Solution

Topic: Current Electricity — Parallel Resistors

For three resistors in parallel:

$$\frac{1}{R} = \frac{1}{6} + \frac{1}{3} + \frac{1}{2} = \frac{1}{6} + \frac{2}{6} + \frac{3}{6} = \frac{6}{6} = 1$$

$$R = \mathbf{1}\ \boldsymbol{\Omega}$$

Answer: (1)

Sol. Q25.

Solution

Topic: Electromagnetic Induction — Motional EMF

The motional EMF induced in the rod:

$$\mathcal{E} = Bvl = 2.5 \times 6 \times 0.4 = \mathbf{6}\ \text{V}$$

Answer: (6)

Sol. Q26.

Solution

Topic: Ray Optics — Convex Lens (Numerical)

Given: $u = -30$ cm, $f = +15$ cm.

Lens formula:

$$\frac{1}{v} = \frac{1}{f} + \frac{1}{u} = \frac{1}{15} + \frac{1}{-30} = \frac{2}{30} - \frac{1}{30} = \frac{1}{30}$$

$$v = \mathbf{30}\ \text{cm}$$

Answer: (30)

Sol. Q27.

Solution

Topic: Dual Nature — de Broglie Wavelength from KE

Convert KE to Joules: $KE = 1.5 \times 1.6 \times 10^{-19} = 2.4 \times 10^{-19}$ J

$$\lambda = \frac{h}{\sqrt{2m_e KE}} = \frac{6.63 \times 10^{-34}}{\sqrt{2 \times 9.1 \times 10^{-31} \times 2.4 \times 10^{-19}}}$$

$$= \frac{6.63 \times 10^{-34}}{\sqrt{4.368 \times 10^{-49}}} = \frac{6.63 \times 10^{-34}}{6.61 \times 10^{-25}} \approx 1.003 \times 10^{-9}\ \text{m} \approx \mathbf{10}\ \text{Å}$$

Answer: (10)

Sol. Q28.

Solution

Topic: Waves — Beats

The beat frequency equals the absolute difference in frequencies of the two sources:

$$f_{\text{beats}} = |f_2 - f_1| = |345 - 340| = \mathbf{5}\ \text{Hz}$$

Answer: (5)

Sol. Q29.

Solution

Topic: Kinematics — Free Fall

Using $H = \frac{1}{2}gt^2$ with the ball dropped from rest:

$$t = \sqrt{\frac{2H}{g}} = \sqrt{\frac{2 \times 20}{10}} = \sqrt{4} = \mathbf{2}\ \text{s}$$

Answer: (2)

Sol. Q30.

Solution

Topic: Dual Nature — Photon Energy

$$E = \frac{hc}{\lambda} = \frac{1240\ \text{eV} \cdot \text{nm}}{248\ \text{nm}} = \mathbf{5}\ \text{eV}$$

Answer: (5)

ANSWER KEY

Section A — MCQ Answer Key

Q	Ans	Q	Ans	Q	Ans	Q	Ans	Q	Ans
1	A	2	B	3	C	4	D	5	A
6	B	7	C	8	D	9	A	10	B
11	C	12	D	13	A	14	B	15	C
16	D	17	A	18	B	19	C	20	D

Section B — Numerical Answer Key

Q	Ans	Q	Ans
21	48	22	50
23	200	24	1
25	6	26	30
27	10	28	5
29	2	30	5