

NEET 2021 — Physics Question Paper with Solutions

35 Physics questions as set in the paper · answers checked by RankUp

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1. A convex lens 'A' of focal length 20 cm and a concave lens 'B' of focal length 5 cm are kept along the same axis with a distance 'd' between them. If a parallel beam of light falling on 'A' leaves 'B' as a parallel beam, then the distance 'd' in cm will be :

- (A) 25
- (B) 15
- (C) 50
- (D) 30

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2. If force [F], acceleration [A] and time [T] are chosen as the fundamental physical quantities. Find the dimensions of energy.

- (A) [F] [A] [T]
- (B) [F] [A] [T²]
- (C) [F] [A] [T⁻¹]
- (D) [F] [A⁻¹] [T]

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3. A cup of coffee cools from 90°C to 80°C in t minutes, when the room temperature is 20°C. The time taken by a similar cup of coffee to cool from 80°C to 60°C at a room temperature same at 20°C is :

- (A) (13/10) t
- (B) (13/5) t
- (C) (10/13) t
- (D) (5/13) t

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4. A particle is released from height S from the surface of the Earth. At a certain height its kinetic energy is three times its potential energy. The height from the surface of earth and the speed of the particle at that instant are respectively :

- (A) $S/4$, $3gS/2$
- (B) $S/4$, $\sqrt{3gS}/2$
- (C) $S/2$, $\sqrt{3gS}/2$
- (D) $S/4$, $\sqrt{3gS/2}$

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5. The velocity of a small ball of mass M and density d, when dropped in a container filled with glycerine becomes constant after some time. If the density of glycerine is $d/2$, then the viscous force acting on the ball will be :

- (A) $Mg/2$
- (B) Mg
- (C) $(3/2) Mg$
- (D) $2Mg$

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6. For a plane electromagnetic wave propagating in x-direction, which one of the following combination gives the correct possible directions for electric field (E) and magnetic field (B) respectively ?

- (A) $\hat{j} + \hat{k}$, $\hat{j} + \hat{k}$
- (B) $-\hat{j} + \hat{k}$, $-\hat{j} - \hat{k}$
- (C) $\hat{j} + \hat{k}$, $-\hat{j} - \hat{k}$
- (D) $-\hat{j} + \hat{k}$, $-\hat{j} + \hat{k}$

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7. Column - I gives certain physical terms associated with flow of current through a metallic conductor. Column - II gives some mathematical relations involving electrical quantities. Match Column - I and Column - II with appropriate relations.

Column - I | Column - II

(a) Drift Velocity | (P) $m/(ne^2\rho)$

(b) Electrical Resistivity | (Q) nev_d

(c) Relaxation Period | (R) $(eE/m)\tau$

(d) Current Density | (S) E/J

(A) (a)-(R), (b)-(S), (c)-(P), (d)-(Q)

(B) (a)-(R), (b)-(S), (c)-(Q), (d)-(P)

(C) (a)-(R), (b)-(P), (c)-(S), (d)-(Q)

(D) (a)-(R), (b)-(Q), (c)-(S), (d)-(P)

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8. A spring is stretched by 5 cm by a force 10 N. The time period of the oscillations when a mass of 2 kg is suspended by it is :

(A) 0.0628 s

(B) 6.28 s

(C) 3.14 s

(D) 0.628 s

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9. A parallel plate capacitor has a uniform electric field 'E' in the space between the plates. If the distance between the plates is 'd' and the area of each plate is 'A', the energy stored in the capacitor is : (ϵ_0 = permittivity of free space)

(A) $(1/2) \epsilon_0 E^2$

(B) $\epsilon_0 EAd$

(C) $(1/2) \epsilon_0 E^2 Ad$

(D) $E^2 Ad/\epsilon_0$

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10. A radioactive nucleus ${}^AZX$ undergoes spontaneous decay in the sequence ${}^AZX \rightarrow (Z-1)B \rightarrow (Z-3)C \rightarrow (Z-2)D$, where Z is the atomic number of element X. The possible decay particles in the sequence are :

(A) α , β^- , β^+

(B) α , β^+ , β^-

(C) β^+ , α , β^-

(D) β^- , α , β^+

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11. The escape velocity from the Earth's surface is v. The escape velocity from the surface of another planet having a radius, four times that of Earth and same mass density is :

(A) v

(B) 2v

(C) 3v

(D) 4v

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12. A screw gauge gives the following readings when used to measure the diameter of a wire

Main scale reading : 0 mm

Circular scale reading : 52 divisions

Given that 1 mm on main scale corresponds to 100 divisions on the circular scale.

The diameter of the wire from the above data is :

- (A) 0.52 cm
- (B) 0.026 cm
- (C) 0.26 cm
- (D) 0.052 cm

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13. Water falls from a height of 60 m at the rate of 15 kg/s to operate a turbine. The losses due to frictional force are 10% of the input energy. How much power is generated by the turbine ? ($g = 10 \text{ m/s}^2$)

- (A) 10.2 kW
- (B) 8.1 kW
- (C) 12.3 kW
- (D) 7.0 kW

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14. A small block slides down on a smooth inclined plane, starting from rest at time $t = 0$. Let S_n be the distance travelled by the block in the interval $t = n - 1$ to $t = n$.

Then, the ratio S_n/S_{n+1} is :

- (A) $(2n - 1)/(2n)$
- (B) $(2n - 1)/(2n + 1)$
- (C) $(2n + 1)/(2n - 1)$
- (D) $(2n)/(2n - 1)$

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15. Polar molecules are the molecules :

- (A) having zero dipole moment.
- (B) acquire a dipole moment only in the presence of electric field due to displacement of charges.
- (C) acquire a dipole moment only when magnetic field is absent.
- (D) having a permanent electric dipole moment.

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16. In a potentiometer circuit a cell of EMF 1.5 V gives balance point at 36 cm length of wire. If another cell of EMF 2.5 V replaces the first cell, then at what length of the wire, the balance point occurs ?

- (A) 60 cm
- (B) 21.6 cm
- (C) 64 cm
- (D) 62 cm

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17. Two charged spherical conductors of radius R_1 and R_2 are connected by a wire. Then the ratio of surface charge densities of the spheres (σ_1/σ_2) is :

- (A) R_1/R_2
- (B) R_2/R_1
- (C) $\sqrt{R_1/R_2}$
- (D) R_1^2/R_2^2

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18. An electromagnetic wave of wavelength ' λ ' is incident on a photosensitive surface of negligible work function. If ' m ' mass is of photoelectron emitted from the surface has de-Broglie wavelength λ_d , then :

- (A) $\lambda = (2m/hc) \lambda_d^2$
- (B) $\lambda_d = (2mc/h) \lambda^2$
- (C) $\lambda = (2mc/h) \lambda_d^2$
- (D) $\lambda = (2h/mc) \lambda_d^2$

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19. The electron concentration in an n-type semiconductor is the same as hole concentration in a p-type semiconductor. An external field (electric) is applied across each of them. Compare the currents in them.

- (A) current in n-type = current in p-type.
- (B) current in p-type > current in n-type.
- (C) current in n-type > current in p-type.
- (D) No current will flow in p-type, current will only flow in n-type.

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20. The number of photons per second on an average emitted by the source of monochromatic light of wavelength 600 nm, when it delivers the power of 3.3×10^{-3} watt will be : ($h = 6.6 \times 10^{-34}$ Js)

- (A) 10^{18}
- (B) 10^{17}
- (C) 10^{16}
- (D) 10^{15}

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21. If E and G respectively denote energy and gravitational constant, then E/G has the dimensions of :

- (A) $[M^2] [L^{-1}] [T^0]$
- (B) $[M] [L^{-1}] [T^{-1}]$
- (C) $[M] [L^0] [T^0]$
- (D) $[M^2] [L^{-2}] [T^{-1}]$

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22. The effective resistance of a parallel connection that consists of four wires of equal length, equal area of cross-section and same material is 0.25Ω . What will be the effective resistance if they are connected in series ?

- (A) 0.25Ω
- (B) 0.5Ω
- (C) 1Ω
- (D) 4Ω

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23. The half-life of a radioactive nuclide is 100 hours. The fraction of original activity that will remain after 150 hours would be :

- (A) $1/2$
- (B) $1/(2\sqrt{2})$
- (C) $2/3$
- (D) $2/(3\sqrt{2})$

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24. A nucleus with mass number 240 breaks into two fragments each of mass number 120, the binding energy per nucleon of unfragmented nuclei is 7.6 MeV while that of fragments is 8.5 MeV. The total gain in the Binding Energy in the process is :

- (A) 0.9 MeV
- (B) 9.4 MeV
- (C) 804 MeV
- (D) 216 MeV

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25. Two conducting circular loops of radii R_1 and R_2 are placed in the same plane with their centres coinciding. If $R_1 \gg R_2$, the mutual inductance M between them will be directly proportional to :

- (A) R_1/R_2
- (B) R_2/R_1
- (C) R_1^2/R_2
- (D) R_2^2/R_1

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26. In the product

$$\mathbf{F} = q(\vec{v} \times \mathbf{B})$$

$$= q \vec{v} \times (B \hat{i} + B \hat{j} + B_0 \hat{k})$$

$$\text{For } q = 1 \text{ and } \vec{v} = 2\hat{i} + 4\hat{j} + 6\hat{k} \text{ and } \mathbf{F} = 4\hat{i} - 20\hat{j} + 12\hat{k}$$

What will be the complete expression for $\mathbf{B}$?

- (A) $-8\hat{i} - 8\hat{j} - 6\hat{k}$
- (B) $-6\hat{i} - 6\hat{j} - 8\hat{k}$
- (C) $8\hat{i} + 8\hat{j} - 6\hat{k}$
- (D) $6\hat{i} + 6\hat{j} - 8\hat{k}$

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27. A series LCR circuit containing 5.0 H inductor, 80 μF capacitor and 40 Ω resistor is connected to 230 V variable frequency ac source. The angular frequencies of the source at which power transferred to the circuit is half the power at the resonant angular frequency are likely to be :

- (A) 25 rad/s and 75 rad/s
- (B) 50 rad/s and 25 rad/s
- (C) 46 rad/s and 54 rad/s
- (D) 42 rad/s and 58 rad/s

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28. A car starts from rest and accelerates at 5 m/s^2 . At $t = 4$ s, a ball is dropped out of a window by a person sitting in the car. What is the velocity and acceleration of the ball at $t = 6$ s ? (Take $g = 10 \text{ m/s}^2$)

- (A) 20 m/s, 5 m/s^2
- (B) 20 m/s, 0
- (C) $20\sqrt{2}$ m/s, 0
- (D) $20\sqrt{2}$ m/s, 10 m/s^2

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29. Twenty seven drops of same size are charged at 220 V each. They combine to form a bigger drop. Calculate the potential of the bigger drop.

- (A) 660 V
- (B) 1320 V
- (C) 1520 V
- (D) 1980 V

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30. A uniform conducting wire of length $12a$ and resistance ' R ' is wound up as a current carrying coil in the shape of,

(i) an equilateral triangle of side ' a '.

(ii) a square of side ' a '.

The magnetic dipole moments of the coil in each case respectively are :

- (A) $\sqrt{3} la^2$ and $3 la^2$
- (B) $3 la^2$ and la^2
- (C) $3 la^2$ and $4 la^2$
- (D) $4 la^2$ and $3 la^2$

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31. A ball of mass 0.15 kg is dropped from a height 10 m , strikes the ground and rebounds to the same height. The magnitude of impulse imparted to the ball is ($g = 10 \text{ m/s}^2$) nearly :

- (A) 0 kg m/s
- (B) 4.2 kg m/s
- (C) 2.1 kg m/s
- (D) 1.4 kg m/s

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32. A step down transformer connected to an ac mains supply of 220 V is made to operate at 11 V , 44 W lamp. Ignoring power losses in the transformer, what is the current in the primary circuit ?

- (A) 0.2 A
- (B) 0.4 A
- (C) 2 A
- (D) 4 A

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33. A particle moving in a circle of radius R with a uniform speed takes a time T to complete one revolution.

If this particle were projected with the same speed at an angle ' θ ' to the horizontal, the maximum height attained by it equals $4R$. The angle of projection, θ , is then given by :

- (A) $\theta = \cos^{-1} (gT^2/\pi^2 R)^{(1/2)}$
- (B) $\theta = \cos^{-1} (\pi^2 R/gT^2)^{(1/2)}$
- (C) $\theta = \sin^{-1} (\pi^2 R/gT^2)^{(1/2)}$
- (D) $\theta = \sin^{-1} (2gT^2/\pi^2 R)^{(1/2)}$

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34. A particle of mass ' m ' is projected with a velocity $v = kV_e$ ($k < 1$) from the surface of the earth. (V_e = escape velocity)

The maximum height above the surface reached by the particle is :

- (A) $R (k/(1 - k))^2$
- (B) $R (k/(1 + k))^2$
- (C) $R^2 k/(1 + k)$
- (D) $Rk^2/(1 - k^2)$

35. From a circular ring of mass 'M' and radius 'R' an arc corresponding to a 90° sector is removed. The moment of inertia of the remaining part of the ring about an axis passing through the centre of the ring and perpendicular to the plane of the ring is 'K' times ' MR^2 '. Then the value of 'K' is :

- (A) $3/4$
 (B) $7/8$
 (C) $1/4$
 (D) $1/8$

Answer key and explanations

1. Answer: (B) 15

For the beam to emerge parallel, the second focal point of the convex lens must coincide with the focal point of the concave lens on the far side. Since the concave lens's focus lies on the incoming side at 5 cm, $d = 20 - 5 = 15$ cm. Adding the focal lengths (25 cm) would be right only for two convex lenses.

2. Answer: (B) [F] [A] [T²]

Energy = force $\times$ displacement, and displacement has the dimensions of acceleration $\times$ time². Hence $[E] = [F][A][T^2]$. Writing $[F][A][T]$ forgets that distance needs time squared.

3. Answer: (B) (13/5) t

Using the average form of Newton's law of cooling: $10/t = k(85 - 20) = 65k$ and $20/t' = k(70 - 20) = 50k$. Dividing, $t' = (20 \times 65)/(10 \times 50)$ $t = 2.6t = (13/5)t$. The inverse ratio $(5/13)t$ would wrongly suggest the larger, cooler drop takes less time.

4. Answer: (D) $S/4$, $\sqrt{3gS/2}$

At height h , $PE = mgh$ and $KE = mg(S - h)$. $KE = 3PE$ gives $S - h = 3h$, so $h = S/4$. Then $v^2 = 2g(S - h) = 2g(3S/4) = 3gS/2$, so $v = \sqrt{3gS/2}$; the forms $\sqrt{(3gS)/2}$ or $3gS/2$ are dimensionally or numerically wrong.

5. Answer: (A) $Mg/2$

At terminal velocity the net force is zero: weight = buoyant force + viscous force. Ball volume = M/d , so buoyancy = $(M/d)(d/2)g = Mg/2$, giving viscous force = $Mg - Mg/2 = Mg/2$. Taking viscous force equal to the full weight Mg ignores buoyancy.

6. Answer: (B) $-\hat{j} + \hat{k}$, $-\hat{j} - \hat{k}$

E and B must be perpendicular and $E \times B$ must point along $+x$. For $E = -\hat{j} + \hat{k}$ and $B = -\hat{j} - \hat{k}$: $E \cdot B = 1 - 1 = 0$, and $E \times B = (-\hat{j}) \times (-\hat{k}) + \hat{k} \times (-\hat{j}) = \hat{i} + \hat{i} = 2\hat{i}$. The pairs with E and B along the same or opposite lines (such as $\hat{j} + \hat{k}$ with $-\hat{j} - \hat{k}$) give $E \times B = 0$.

7. Answer: (A) (a)-(R), (b)-(S), (c)-(P), (d)-(Q)

Drift velocity $v_d = (eE/m)\tau$; resistivity $\rho = E/J$; relaxation time $\tau = m/(ne^2\rho)$; current density $J = nev_d$. So drift velocity $-(eE/m)\tau$, resistivity $-E/J$, relaxation period $m/(ne^2\rho)$, current density $-nev_d$.

8. Answer: (D) 0.628 s

$k = F/x = 10/0.05 = 200$ N/m. $T = 2\pi\sqrt{m/k} = 2\pi\sqrt{2/200} = 2\pi \times 0.1 = 0.628$ s. 6.28 s would result from forgetting to convert 5 cm into metres.

9. Answer: (C) $(1/2) \epsilon_0 E^2 Ad$

Energy density in the field is $(1/2)\epsilon_0 E^2$, and the field fills a volume Ad between the plates. So $U = (1/2)\epsilon_0 E^2 Ad$. The expression $(1/2)\epsilon_0 E^2$ alone is only energy per unit volume.

10. Answer: (C) β^+ , α , β^-

$Z \rightarrow Z - 1$: atomic number falls by 1 with no other change, which is β^+ emission. $Z - 1 \rightarrow Z - 3$: falls by 2, which is α emission. $Z - 3 \rightarrow Z - 2$: rises by 1, which is β^- emission. So the sequence is β^+ , α , β^- .

11. Answer: (D) $4v$

$v_e = \sqrt{2GM/R}$ with $M = (4/3)\pi R^3 \rho$ gives $v_e = R\sqrt{(8\pi G\rho/3)}$, so $v_e \propto R$ at fixed density. Four times the radius gives $4v$. Answering $2v$ uses $v_e \propto \sqrt{R}$, which holds only at fixed mass, not fixed density.

12. Answer: (D) 0.052 cm

Least count = $1 \text{ mm}/100 = 0.01$ mm. Diameter = $0 + 52 \times 0.01 \text{ mm} = 0.52 \text{ mm} = 0.052$ cm. The trap 0.52 cm forgets the mm-to-cm conversion.

13. Answer: (B) 8.1 kW

Input power = (mass per second) $\times g \times h = 15 \times 10 \times 60 = 9000$ W. With 10% loss, output = $0.9 \times 9000 = 8100$ W = 8.1 kW.

14. Answer: (B) $(2n - 1)/(2n + 1)$

Starting from rest with constant acceleration a , distance in the n th second $S_n = (a/2)(2n - 1)$, and $S_{n+1} = (a/2)(2n + 1)$. So $S_n/S_{n+1} = (2n - 1)/(2n + 1)$; the reverse ratio is greater than 1, impossible for an accelerating block.

15. Answer: (D) having a permanent electric dipole moment.

In polar molecules such as H_2O and HCl the centres of positive and negative charge do not coincide, so they have a permanent dipole moment even without an external field. Acquiring a dipole only in an applied field describes non-polar molecules (induced dipoles).

16. Answer: (A) 60 cm

With the same driver circuit, the balancing length is proportional to the EMF: $l_2 = 36 \times (2.5/1.5) = 60$ cm. 21.6 cm results from inverting the ratio.

17. Answer: (B) R_2/R_1

Connected conductors reach a common potential: $kQ_1/R_1 = kQ_2/R_2$, so $Q \propto R$. Since $\sigma = Q/(4\pi R^2) \propto 1/R$, $\sigma_1/\sigma_2 = R_2/R_1$. Charge is proportional to R , but surface density is inversely proportional to R .

18. Answer: (C) $\lambda = (2mc/h) \lambda d^2$

With negligible work function, $hc/\lambda = K = p^2/2m$ and $p = h/\lambda d$. So $hc/\lambda = h^2/(2m\lambda d^2)$, giving $\lambda = (2mc/h)\lambda d^2$. Check dimensions: mc/h has units of $1/\text{length}$, so $(mc/h)\lambda d^2$ is a length.

19. Answer: (C) current in n-type > current in p-type.

Current density $J = ne\mu E$; with equal carrier concentration and the same field, the current depends on mobility. Electrons have higher mobility than holes, so the n-type sample carries more current. Holes do conduct, so p-type current is not zero.

20. Answer: (C) 10^{16}

Photon energy $E = hc/\lambda = (6.6 \times 10^{-34} \times 3 \times 10^8)/(600 \times 10^{-9}) = 3.3 \times 10^{-19}$ J. Number per second = $P/E = (3.3 \times 10^{-3})/(3.3 \times 10^{-19}) = 10^{16}$.

21. Answer: (A) $[M^2] [L^{-1}] [T^0]$

$[E] = ML^2T^{-2}$ and $[G] = M^{-1}L^3T^{-2}$. So $E/G = M^2L^{-1}T^0$. Forgetting that G carries M^{-1} would give a single power of mass.

22. Answer: (D) 4 Ω

Four identical wires of resistance R in parallel give $R/4 = 0.25 \Omega$, so $R = 1 \Omega$. In series the resistance is $4R = 4 \Omega$ (16 times the parallel value).

23. Answer: (B) $1/(2\sqrt{2})$

150 h is 1.5 half-lives, so the fraction of activity remaining is $(1/2)^{1.5} = 1/(2\sqrt{2}) \approx 0.354$. Linear interpolation between $1/2$ and $1/4$ is wrong because decay is exponential.

24. Answer: (D) 216 MeV

Initial binding energy = $240 \times 7.6 = 1824$ MeV; final = $2 \times 120 \times 8.5 = 2040$ MeV. Gain = $2040 - 1824 = 216$ MeV. 0.9 MeV is only the change per nucleon, not the total.

25. Answer: (D) R_2^2/R_1

A current I in the large loop gives $B = \mu_0 I/(2R_1)$ at its centre, nearly uniform over the small loop. Flux through the small loop = $(\mu_0 I/2R_1)\pi R_2^2$, so $M = \mu_0 \pi R_2^2/(2R_1) \propto R_2^2/R_1$.

26. Answer: (B) $-6\hat{i} - 6\hat{j} - 8\hat{k}$

With $B = B\hat{i} + B\hat{j} + B_0\hat{k}$ and $v = 2\hat{i} + 4\hat{j} + 6\hat{k}$: $v \times B = (4B_0 - 6B)\hat{i} + (6B - 2B_0)\hat{j} + (2B - 4B)\hat{k}$. Matching the $\hat{k}$ term, $-2B = 12$ so $B = -6$; matching $\hat{i}$, $4B_0 + 36 = 4$ so $B_0 = -8$. Check $\hat{j}$: $-36 + 16 = -20$, so $B = -6\hat{i} - 6\hat{j} - 8\hat{k}$.

27. Answer: (C) 46 rad/s and 54 rad/s

$\omega_0 = 1/\sqrt{LC} = 1/\sqrt{5 \times 80 \times 10^{-6}} = 1/0.02 = 50$ rad/s. Half-power frequencies are $\omega_0 \pm R/(2L) = 50 \pm 40/10 = 50 \pm 4$, i.e. 46 rad/s and 54 rad/s.

28. Answer: (D) $20\sqrt{2}$ m/s, 10 m/s²

At $t = 4$ s the car's speed is $5 \times 4 = 20$ m/s, which the ball keeps horizontally. After 2 s of free fall its vertical speed is $10 \times 2 = 20$ m/s, so $v = \sqrt{(20^2 + 20^2)} = 20\sqrt{2}$ m/s. Once released, only gravity acts, so its acceleration is $g = 10$ m/s², not the car's 5 m/s².

29. Answer: (D) 1980 V

Volume conservation: $R = 27^{1/3} r = 3r$; charge $Q = 27q$. $V = kQ/R = (27/3)kq/r = 9 \times 220 = 1980$ V. Multiplying by 3 (660 V) uses the radius ratio instead of $n^{2/3}$.

30. Answer: (A) $\sqrt{3} la^2$ and $3 la^2$

Triangle: each turn uses $3a$, so $12a$ gives 4 turns of area $(\sqrt{3}/4)a^2$, and $m = 4l(\sqrt{3}/4)a^2 = \sqrt{3} la^2$. Square: each turn uses $4a$, so 3 turns of area a^2 , and $m = 3la^2$.

31. Answer: (B) 4.2 kg m/s

Speed just before impact $v = \sqrt{2gh} = \sqrt{200} \approx 14.1$ m/s; it rebounds to the same height, so it leaves with 14.1 m/s upward. Impulse = change in momentum = $2mv = 2 \times 0.15 \times 14.1 \approx 4.2$ kg m/s. 2.1 kg m/s ignores the reversal of direction.

32. Answer: (A) 0.2 A

For an ideal transformer input power equals output power, 44 W. Primary current = $P/V = 44/220 = 0.2$ A. 4 A is the secondary (lamp) current, 44/11.

33. Answer: (D) $\theta = \sin^{-1} (2gT^2/\pi^2 R)^{1/2}$

Speed $v = 2\pi R/T$. Maximum height $H = v^2 \sin^2 \theta / (2g) = 4R$ gives $\sin^2 \theta = 8gR/v^2 = 8gR \cdot T^2 / (4\pi^2 R^2) = 2gT^2/(\pi^2 R)$. Hence $\theta = \sin^{-1} (2gT^2/\pi^2 R)^{1/2}$.

34. Answer: (D) $Rk^2/(1 - k^2)$

Energy conservation: $(1/2)mk^2(2GM/R) - GMm/R = -GMm/(R + h)$. This gives $1/(R + h) = (1 - k^2)/R$, so $R + h = R/(1 - k^2)$ and $h = Rk^2/(1 - k^2)$. Using the flat-earth formula $v^2/2g$ would wrongly give $h = k^2 R$.

35. Answer: (A) 3/4

Every element of a ring is at distance R from the central perpendicular axis, so $I = (\text{mass}) \times R^2$. Removing a 90° arc leaves $3/4$ of the mass, so $I = (3/4)MR^2$ and $K = 3/4$.

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