NEET 2025 — Physics Question Paper with Solutions

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

NEET 2025

1. A parallel plate capacitor made of circular plates is being charged such that the surface charge density on its plates is increasing at a constant rate with time. The magnetic field arising due to displacement current is:

(A) Non-zero everywhere with maximum at the imaginary cylindrical surface connecting peripheries of the plates
(B) Zero between the plates and non-zero outside
(C) Zero at all places
(D) Constant between the plates and zero outside the plates

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2. An electric dipole with dipole moment 5×10^{-6} C m is aligned with the direction of a uniform electric field of magnitude 4×10^{5} N/C. The dipole is then rotated through an angle of 60° with respect to the electric field. The change in the potential energy of the dipole is:

(A) 1.2 J
(B) 1.5 J
(C) 0.8 J
(D) 1.0 J

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3. A ball of mass 0.5 kg is dropped from a height of 40 m. The ball hits the ground and rises to a height of 10 m. The impulse imparted to the ball during its collision with the ground is (Take g = 9.8 m/s²)

(A) 0
(B) 84 N s
(C) 21 N s
(D) 7 N s

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4. The intensity of transmitted light when a polaroid sheet, placed between two crossed polaroids at 22.5° from the polarization axis of one of the polaroids, is (I_0 is the intensity of polarised light after passing through the first polaroid):

(A) $I_0/8$
(B) $I_0/16$
(C) $I_0/2$
(D) $I_0/4$

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5. The kinetic energies of two similar cars A and B are 100 J and 225 J respectively. On applying brakes, car A stops after 1000 m and car B stops after 1500 m. If F_A and F_B are the forces applied by the brakes on cars A and B respectively, then the ratio of F_A/F_B is

(A) 1/3
(B) 1/2
(C) 3/2
(D) 2/3

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6. A particle of mass m is moving around the origin with a constant force F pulling it towards the origin. If Bohr model is used to describe its motion, the radius of the nth orbit and the particle's speed v in the orbit depend on n as

(A) r ∝ n^(2/3); v ∝ n^(1/3)
(B) r ∝ n^(4/3); v ∝ n^(−1/3)
(C) r ∝ n^(1/3); v ∝ n^(1/3)
(D) r ∝ n^(1/3); v ∝ n^(2/3)

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7. In some appropriate units, time (t) and position (x) relation of a moving particle is given by $t = x^2 + x$. The acceleration of the particle is

(A) $+2/(x + 1)^3$
(B) $+2/(2x + 1)$
(C) $-2/(x + 2)^3$
(D) $-2/(2x + 1)^3$

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8. A model for quantized motion of an electron in a uniform magnetic field B states that the flux passing through the orbit of the electron is n(h/e) where n is an integer, h is Planck's constant and e is the magnitude of electron's charge. According to the model, the magnetic moment of an electron in its lowest energy state will be (m is the mass of the electron)

(A) heB/πm
(B) heB/2πm
(C) he/πm
(D) he/2πm

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9. A microscope has an objective of focal length 2 cm, eyepiece of focal length 4 cm and the tube length of 40 cm. If the distance of distinct vision of eye is 25 cm, the magnification in the microscope is

(A) 150
(B) 250
(C) 100
(D) 125

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10. There are two inclined surfaces of equal length (L) and same angle of inclination 45° with the horizontal. One of them is rough and the other is perfectly smooth. A given body takes 2 times as much time to slide down on rough surface than on the smooth surface. The coefficient of kinetic friction (μk) between the object and the rough surface is close to

(A) 0.5
(B) 0.75
(C) 0.25
(D) 0.40

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11. A uniform rod of mass 20 kg and length 5 m leans against a smooth vertical wall making an angle of 60° with it. The other end rests on a rough horizontal floor. The friction force that the floor exerts on the rod is (Take $g = 10\ m/s^2$)

(A) 200 N
(B) 200√3 N
(C) 100 N
(D) 100√3 N

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12. Two identical charged conducting spheres A and B have their centres separated by a certain distance. Charge on each sphere is q and the force of repulsion between them is F. A third identical uncharged conducting sphere is brought in contact with sphere A first and then with B and finally removed from both. New force of repulsion between spheres A and B (Radii of A and B are negligible compared to the distance of separation so that for calculating force between them they can be considered as point charges) is best given as:

(A) F/2
(B) 3F/8
(C) 3F/5
(D) 2F/3

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13. Two cities X and Y are connected by a regular bus service with a bus leaving in either direction every T min. A girl is driving scooty with a speed of 60 km/h in the direction X to Y notices that a bus goes past her every 30 minutes in the direction of her motion, and every 10 minutes in the opposite direction. Choose the correct option for the period T of the bus service and the speed (assumed constant) of the buses.

(A) 10 min, 90 km/h
(B) 15 min, 120 km/h
(C) 9 min, 40 km/h
(D) 25 min, 100 km/h

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14. De-Broglie wavelength of an electron orbiting in the n = 2 state of hydrogen atom is close to (Given Bohr radius = 0.052 nm)

(A) 1.67 nm
(B) 2.67 nm
(C) 0.067 nm
(D) 0.67 nm

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15. To an ac power supply of 220 V at 50 Hz, a resistor of 20 Ω, a capacitor of reactance 25 Ω and an inductor of reactance 45 Ω are connected in series. The corresponding current in the circuit and the phase angle between the current and the voltage is, respectively

(A) 15.6 A and 30°
(B) 15.6 A and 45°
(C) 7.8 A and 30°
(D) 7.8 A and 45°

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16. A pipe open at both ends has a fundamental frequency f in air. The pipe is now dipped vertically in a water drum to half of its length. The fundamental frequency of the air column is now equal to:

(A) 3f/2
(B) 2f
(C) f/2
(D) f

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17. Two identical point masses P and Q, suspended from two separate massless springs of spring constants k_1 and k_2, respectively, oscillate vertically. If their maximum speeds are the same, the ratio (A_Q/A_P) of the amplitude A_Q of mass Q to the amplitude A_P of mass P is

(A) $\sqrt{(k_2/k_1)}$
(B) $\sqrt{(k_1/k_2)}$
(C) k_2/k_1
(D) k_1/k_2

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18. Two gases A and B are filled at the same pressure in separate cylinders with movable pistons of radius r_A and r_B, respectively. On supplying an equal amount of heat to both the systems reversibly under constant pressure, the pistons of gas A and B are displaced by 16 cm and 9 cm, respectively. If the change in their internal energy is the same, then the ratio r_A/r_B is equal to

(A) 2/√3
(B) √3/2
(C) 4/3
(D) 3/4

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19. A balloon is made of a material of surface tension S and its inflation outlet (from where gas is filled in it) has small area A. It is filled with a gas of density ρ and takes a spherical shape of radius R. When the gas is allowed to flow freely out of it, its radius r changes from R to 0 (zero) in time T. If the speed v(r) of gas coming out of the balloon depends on r as r^a and T ∝ S^α A^β ρ^γ R^δ then

(A) $a = -1/2, \alpha = -1/2, \beta = -1, \gamma = 1/2, \delta = 7/2$
(B) $a = 1/2, \alpha = 1/2, \beta = -1/2, \gamma = 1/2, \delta = 7/2$
(C) $a = 1/2, \alpha = 1/2, \beta = -1, \gamma = +1, \delta = 3/2$
(D) $a = -1/2, \alpha = -1/2, \beta = -1, \gamma = -1/2, \delta = 5/2$

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20. A physical quantity P is related to four observations a, b, c and d as follows:
$P = a^3b^2/(c\sqrt{d})$
The percentage errors of measurement in a, b, c and d are 1%, 3%, 2%, and 4% respectively. The percentage error in the quantity P is

(A) 13%
(B) 15%
(C) 10%
(D) 2%

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21. The Sun rotates around its centre once in 27 days. What will be the period of revolution if the Sun were to expand to twice its present radius without any external influence? Assume the Sun to be a sphere of uniform density.

(A) 115 days
(B) 108 days
(C) 100 days
(D) 105 days

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22. The radius of Martian orbit around the Sun is about 4 times the radius of the orbit of Mercury. The Martian year is 687 Earth days. Then which of the following is the length of 1 year on Mercury?

(A) 172 earth days
(B) 124 earth days
(C) 88 earth days
(D) 225 earth days

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23. A wire of resistance R is cut into 8 equal pieces. From these pieces two equivalent resistances are made by adding four of these together in parallel. Then these two sets are added in series. The net effective resistance of the combination is:

(A) R/16
(B) R/8
(C) R/64
(D) R/32

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24. A photon and an electron (mass m) have the same energy E. The ratio ($\lambda_{photon}/\lambda_{electron}$) of their de Broglie wavelengths is: (c is the speed of light)

(A) $c\sqrt{(2m/E)}$
(B) $(1/c)\sqrt{(E/2m)}$
(C) $\sqrt{(E/2m)}$
(D) $c\sqrt{(2mE)}$

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25. An electron (mass 9×10^{-31} kg and charge 1.6×10^{-19} C) moving with speed c/100 (c = speed of light) is injected into a magnetic field $\vec{B}$ of magnitude 9×10^{-4} T perpendicular to its direction of motion. We wish to apply a uniform electric field E together with the magnetic field so that the electron does not deflect from its path. Then (speed of light $c = 3 \times 10^8$ m s^{-1})

(A) $\vec{E}$ is parallel to $\vec{B}$ and its magnitude is 27×10^2 V m^{-1}
(B) $\vec{E}$ is parallel to $\vec{B}$ and its magnitude is 27×10^4 V m^{-1}
(C) $\vec{E}$ is perpendicular to $\vec{B}$ and its magnitude is 27×10^4 V m^{-1}
(D) $\vec{E}$ is perpendicular to $\vec{B}$ and its magnitude is 27×10^2 V m^{-1}

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26. The electric field in a plane electromagnetic wave is given by $E_z = 60 \cos(5x + 1.5 \times 10^9 t)$ V/m. Then expression for the corresponding magnetic field is (here subscripts denote the direction of the field) :

(A) $B_z = 60 \cos(5x + 1.5 \times 10^9 t)$ T
(B) $B_y = 60 \sin(5x + 1.5 \times 10^9 t)$ T
(C) $B_y = 2 \times 10^{-7} \cos(5x + 1.5 \times 10^9 t)$ T
(D) $B_x = 2 \times 10^{-7} \cos(5x + 1.5 \times 10^9 t)$ T

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27. A body weighs 48 N on the surface of the earth. The gravitational force experienced by the body due to the earth at a height equal to one-third the radius of the earth from its surface is:

(A) 32 N
(B) 36 N
(C) 16 N
(D) 27 N

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28. An unpolarized light beam travelling in air is incident on a medium of refractive index 1.73 at Brewster's angle. Then

(A) Both reflected and transmitted light are perfectly polarized with angles of reflection and refraction close to 60° and 30°, respectively
(B) Transmitted light is completely polarized with angle of refraction close to 30°
(C) Reflected light is completely polarized and the angle of reflection is close to 60°
(D) Reflected light is partially polarized and the angle of reflection is close to 30°

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29. The plates of a parallel plate capacitor are separated by d. Two slabs of different dielectric constant K_1 and K_2 with thickness (3/8)d and d/2, respectively are inserted in the capacitor. Due to this, the capacitance becomes two times larger than when there is nothing between the plates. If $K_1 = 1.25K_2$, the value of K_1 is:

(A) 1.60
(B) 1.33
(C) 2.66
(D) 2.33

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30. Consider the diameter of a spherical object being measured with the help of a Vernier callipers. Suppose its 10 Vernier Scale Divisions (V.S.D.) are equal to its 9 Main Scale Divisions (M.S.D.). The least division in the M.S. is 0.1 cm and the zero of V.S. is at x = 0.1 cm when the jaws of Vernier callipers are closed. If the main scale reading for the diameter is M = 5 cm and the number of coinciding vernier division is 8, the measured diameter after zero error correction, is

(A) 4.98 cm
(B) 5.00 cm
(C) 5.18 cm
(D) 5.08 cm

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31. A 2 amp current is flowing through two different small circular copper coils having radii ratio 1 : 2. The ratio of their respective magnetic moments will be

(A) 2 : 1
(B) 4 : 1
(C) 1 : 4
(D) 1 : 2

Answer key and explanations

1. Answer: (A) Non-zero everywhere with maximum at the imaginary cylindrical surface connecting peripheries of the plates

A steady rate of change of σ gives a uniform displacement current density between the plates. By the Ampere–Maxwell law, $B = \mu_0\varepsilon_0(dE/dt)r/2$ inside ($r \le R$), growing linearly with r, and $B \propto 1/r$ outside, so the field is largest at $r = R$, the cylindrical surface joining the plate edges. It is neither zero between the plates nor constant there.

2. Answer: (D) 1.0 J

$U = -pE\cos\theta$, so $\Delta U = pE(\cos 0° - \cos 60°) = 5 \times 10^{-6} \times 4 \times 10^5 \times (1 - 0.5) = 2 \times 0.5 = 1.0$ J. Using sin 60° or forgetting the $(1 - \cos\theta)$ factor gives the other values.

3. Answer: (C) 21 N s

Speed on impact = $\sqrt{(2 \times 9.8 \times 40)} = 28$ m/s downward; speed on rebound = $\sqrt{(2 \times 9.8 \times 10)} = 14$ m/s upward. Impulse = change in momentum = $0.5 \times (14 + 28) = 21$ N s upward. Subtracting the speeds (ignoring the reversal of direction) gives 7 N s.

4. Answer: (A) $I_0/8$

By Malus's law, the middle sheet passes $I_0\cos^2 22.5°$ and the last polaroid, at $90° - 22.5° = 67.5°$ from the middle sheet, passes a further $\cos^2 67.5° = \sin^2 22.5°$. $I = I_0(\sin 22.5° \cos 22.5°)^2 = I_0(\sin 45°/2)^2 = I_0/8$.

5. Answer: (D) 2/3

By the work–energy theorem F × d = KE. F_A = 100/1000 = 0.1 N and F_B = 225/1500 = 0.15 N, so F_A/F_B = 0.1/0.15 = 2/3. Inverting the ratio gives 3/2.

6. Answer: (A) r ∝ n^(2/3); v ∝ n^(1/3)

Centripetal condition: $mv^2/r = F$, so $v \propto r^{(1/2)}$. Bohr quantisation $mvr = nh/2\pi$ gives $r^{(3/2)} \propto n$, so $r \propto n^{(2/3)}$ and $v \propto r^{(1/2)} \propto n^{(1/3)}$.

7. Answer: (D) $-2/(2x + 1)^3$

$dt/dx = 2x + 1$, so $v = 1/(2x + 1)$. Then $a = v\, dv/dx = [1/(2x + 1)] \times [-2/(2x + 1)^2] = -2/(2x + 1)^3$. The particle decelerates, so the positive options are wrong.

8. Answer: (D) $he/2\pi m$

For circular motion $r = mv/eB$, so $v = eBr/m$. Magnetic moment $\mu = (e/2)vr = e^2Br^2/2m$. The quantisation $B\pi r^2 = nh/e$ gives $Br^2 = nh/(\pi e)$, so $\mu = e^2/(2m) \times nh/(\pi e) = nhe/(2\pi m)$; for $n = 1$, $\mu = he/2\pi m$, independent of B.

9. Answer: (D) 125

For final image at infinity, $m = (L/f_0)(D/f_e) = (40/2) \times (25/4) = 20 \times 6.25 = 125$. Using $(1 + D/f_e)$ for the near-point setting would give 145, which is not offered.

10. Answer: (B) 0.75

From $L = \frac{1}{2}at^2$, $t \propto 1/\sqrt{a}$, so doubling the time means $a(\text{rough}) = a(\text{smooth})/4$. $g(\sin 45° - \mu \cos 45°) = g \sin 45°/4$ gives $1 - \mu = 1/4$, so $\mu = 0.75$. Halving instead of quartering the acceleration gives 0.5.

11. Answer: (D) 100√3 N

Friction balances the horizontal wall reaction N. Torques about the foot: $N \times L \cos 60° = mg \times (L/2) \sin 60°$, so $N = (mg/2) \tan 60° = (200/2) \times \sqrt{3} = 100\sqrt{3}$ N. Using the angle with the floor instead of the wall gives $100/\sqrt{3}$ type values.

12. Answer: (B) 3F/8

Touching A shares q equally: A and the third sphere each have q/2. Touching B then shares $q + q/2$, leaving B with 3q/4. New force $\propto (q/2)(3q/4) = 3q^2/8$, so $F' = 3F/8$.

13. Answer: (B) 15 min, 120 km/h

Buses in each direction are spaced vT apart. Same direction: $vT/(v - 60) = 30$; opposite: $vT/(v + 60) = 10$. Dividing, $(v + 60)/(v - 60) = 3$, so $v = 120$ km/h, and then $120T/60 = 30$ gives $T = 15$ min.

14. Answer: (D) 0.67 nm

Bohr's condition $2\pi r = n\lambda$ gives $\lambda = 2\pi r/n$ with $r = n^2a_0 = 4 \times 0.052 = 0.208$ nm. $\lambda = 2\pi \times 0.208/2 = \pi \times 0.208 \approx 0.65$ nm, closest to 0.67 nm (0.665 nm with $a_0 = 0.0529$ nm).

15. Answer: (D) 7.8 A and 45°

Net reactance $= 45 - 25 = 20\ \Omega$, so $Z = \sqrt{(20^2 + 20^2)} = 20\sqrt{2} \approx 28.3\ \Omega$ and $I = 220/28.3 \approx 7.8$ A. $\tan \varphi = 20/20 = 1$, so $\varphi = 45°$. 15.6 A comes from using R alone in place of Z after halving.

16. Answer: (D) f

Open pipe: $f = v/2L$. Dipping half of it in water leaves a closed pipe of length L/2, whose fundamental is $v/(4 \times L/2) = v/2L = f$. Halving the length without noting the change to a closed pipe gives 2f.

17. Answer: (B) $\sqrt{(k_1/k_2)}$

$v_{max} = A\omega$ with $\omega = \sqrt{(k/m)}$. Equal v_{max} gives $A_Q\sqrt{k_2} = A_P\sqrt{k_1}$, so $A_Q/A_P = \sqrt{(k_1/k_2)}$. The inverse ratio comes from matching amplitudes to ω the wrong way.

18. Answer: (D) 3/4

Equal Q and equal ΔU mean equal work $W = p\Delta V$, and the pressures are equal, so ΔV is equal: $\pi r_A^2 \times 16 = \pi r_B^2 \times 9$. Hence $r_A/r_B = \sqrt{(9/16)} = 3/4$. Inverting gives 4/3.

19. Answer: (A) a = −1/2, α = −1/2, β = −1, γ = 1/2, δ = 7/2

Excess pressure $\propto S/r$ drives the flow, so by Bernoulli $\frac{1}{2}\rho v^2 \propto S/r$ and $v \propto (S/\rho)^{(1/2)}\, r^{(-1/2)}$, i.e. $a = -1/2$. Volume outflow: $4\pi r^2\, dr/dt = -Av \propto -A(S/\rho)^{(1/2)}\, r^{(-1/2)}$, so $r^{(5/2)}\, dr \propto dt$ and $T \propto R^{(7/2)}\, \rho^{(1/2)}\, S^{(-1/2)}\, A^{(-1)}$. Hence $\alpha = -1/2$, $\beta = -1$, $\gamma = 1/2$, $\delta = 7/2$.

20. Answer: (A) 13%

Maximum relative error adds with powers as weights: $3(1\%) + 2(3\%) + 1(2\%) + \frac{1}{2}(4\%) = 3 + 6 + 2 + 2 = 13\%$. Subtracting the errors of the quantities in the denominator is the usual mistake.

21. Answer: (B) 108 days

With no external torque, angular momentum Iω is conserved and $I = (2/5)MR^2$. Doubling R makes I four times larger, so ω falls to a quarter and the period becomes $4 \times 27 = 108$ days.

22. Answer: (C) 88 earth days

Kepler's third law: T ∝ r^(3/2), so T_Mars/T_Mercury = 4^(3/2) = 8. T_Mercury = 687/8 ≈ 86 days, closest to 88 earth days. Using T ∝ r gives 172 days.

23. Answer: (A) R/16

Each piece is R/8. Four in parallel give (R/8)/4 = R/32, and two such groups in series give 2 × R/32 = R/16. R/32 is the value of only one group.

24. Answer: (A) c√(2m/E)

Photon: λ = hc/E. Electron: p = √(2mE), so λ = h/√(2mE). Ratio = (hc/E) × √(2mE)/h = c√(2m/E). The inverted expression is the trap.

25. Answer: (D) E is perpendicular to B and its magnitude is 27 × 10² V m⁻¹

For no deflection the electric force must cancel the magnetic force, so E must be perpendicular to both v and B with eE = evB. E = vB = (3 × 10⁸/100) × 9 × 10⁻⁴ = 3 × 10⁶ × 9 × 10⁻⁴ = 2700 = 27 × 10² V m⁻¹. A field parallel to B could not cancel the magnetic force.

26. Answer: (C) $B_y = 2 \times 10^{-7} \cos(5x + 1.5 \times 10^9 t)$ T

The wave travels along the x-axis (ω/k = 1.5 × 10⁹/5 = 3 × 10⁸ m/s) with E along z, so B must be along y, in phase with E. $B_0 = E_0/c = 60/(3 \times 10^8) = 2 \times 10^{-7}$ T. B along x would be along the direction of propagation, which is impossible for an EM wave.

27. Answer: (D) 27 N

g' = g R²/(R + R/3)² = g/(4/3)² = 9g/16. Weight = 48 × 9/16 = 27 N. Using the approximation g(1 − 2h/R) gives 16 N, which is invalid for such a large height.

28. Answer: (C) Reflected light is completely polarized and the angle of reflection is close to 60°

Brewster's law tan $i_B = \mu = 1.73 = \sqrt{3}$ gives $i_B = 60°$, which is also the angle of reflection. At this angle the reflected light is completely plane polarised, while the refracted light (at 30°) is only partially polarised.

29. Answer: (C) 2.66

$C = \varepsilon_0 A/[d - t_1 - t_2 + t_1/K_1 + t_2/K_2] = 2\varepsilon_0 A/d$, so the bracket equals d/2. With 1 − 3/8 − 1/2 = 1/8: 1/8 + 3/(8K₁) + 1/(2K₂) = 1/2. Using $K_2 = 0.8K_1$, 1/(2K₂) = 0.625/K₁, so (0.375 + 0.625)/K₁ = 3/8 and K₁ = 8/3 ≈ 2.66.

30. Answer: (A) 4.98 cm

Least count = 1 MSD − 1 VSD = 0.1 − 0.09 = 0.01 cm. Observed reading = 5 + 8 × 0.01 = 5.08 cm. The vernier zero lies 0.1 cm to the right of the main-scale zero, a positive zero error of 0.1 cm, so the corrected diameter is 5.08 − 0.10 = 4.98 cm. 5.08 cm is the uncorrected reading.

31. Answer: (C) 1 : 4

Magnetic moment of a loop m = I × πr². With the same current, $m_1 : m_2 = r_1^2 : r_2^2 = 1 : 4$. Taking m ∝ r gives 1 : 2.

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