

NEET 2020 — Physics Question Paper with Solutions

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

NEET 2020 · Q136

1. For which one of the following, Bohr model is not valid ?

- (A) Hydrogen atom
- (B) Singly ionised helium atom (He^+)
- (C) Deuteron atom
- (D) Singly ionised neon atom (Ne^+)

NEET 2020 · Q137

2. The ratio of contributions made by the electric field and magnetic field components to the intensity of an electromagnetic wave is : (c = speed of electromagnetic waves)

- (A) $c : 1$
- (B) $1 : 1$
- (C) $1 : c$
- (D) $1 : c^2$

NEET 2020 · Q138

3. The Brewsters angle i_b for an interface should be :

- (A) $0^\circ < i_b < 30^\circ$
- (B) $30^\circ < i_b < 45^\circ$
- (C) $45^\circ < i_b < 90^\circ$
- (D) $i_b = 90^\circ$

NEET 2020 · Q139

4. A cylinder contains hydrogen gas at pressure of 249 kPa and temperature 27°C . Its density is : ($R = 8.3 \text{ J mol}^{-1} \text{ K}^{-1}$)

- (A) 0.5 kg/m^3
- (B) 0.2 kg/m^3
- (C) 0.1 kg/m^3
- (D) 0.02 kg/m^3

NEET 2020 · Q140

5. A ray is incident at an angle of incidence i on one surface of a small angle prism (with angle of prism A) and emerges normally from the opposite surface. If the refractive index of the material of the prism is μ , then the angle of incidence is nearly equal to :

- (A) $A/2\mu$
- (B) $2A/\mu$
- (C) μA
- (D) $\mu A/2$

NEET 2020 · Q142

6. The energy equivalent of 0.5 g of a substance is :

- (A) $4.5 \times 10^{16} \text{ J}$
- (B) $4.5 \times 10^{13} \text{ J}$
- (C) $1.5 \times 10^{13} \text{ J}$
- (D) $0.5 \times 10^{13} \text{ J}$

NEET 2020 · Q143

7. A body weighs 72 N on the surface of the earth. What is the gravitational force on it, at a height equal to half the radius of the earth ?

- (A) 48 N
- (B) 32 N
- (C) 30 N
- (D) 24 N

NEET 2020 · Q144

8. The solids which have the negative temperature coefficient of resistance are :

- (A) metals
- (B) insulators only
- (C) semiconductors only
- (D) insulators and semiconductors

NEET 2020 · Q145

9. The phase difference between displacement and acceleration of a particle in a simple harmonic motion is :

- (A) π rad
- (B) $3\pi/2$ rad
- (C) $\pi/2$ rad
- (D) zero

NEET 2020 · Q146

10. A screw gauge has least count of 0.01 mm and there are 50 divisions in its circular scale. The pitch of the screw gauge is :

- (A) 0.01 mm
- (B) 0.25 mm
- (C) 0.5 mm
- (D) 1.0 mm

NEET 2020 · Q147

11. In a guitar, two strings A and B made of same material are slightly out of tune and produce beats of frequency 6 Hz. When tension in B is slightly decreased, the beat frequency increases to 7 Hz. If the frequency of A is 530 Hz, the original frequency of B will be :

- (A) 523 Hz
- (B) 524 Hz
- (C) 536 Hz
- (D) 537 Hz

NEET 2020 · Q148

12. Two particles of mass 5 kg and 10 kg respectively are attached to the two ends of a rigid rod of length 1 m with negligible mass. The centre of mass of the system from the 5 kg particle is nearly at a distance of :

- (A) 33 cm
- (B) 50 cm
- (C) 67 cm
- (D) 80 cm

NEET 2020 · Q149

13. Find the torque about the origin when a force of $3\hat{j}$ N acts on a particle whose position vector is $2\hat{k}$ m.

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

NEET 2020 · Q150

14. Light with an average flux of 20 W/cm² falls on a non-reflecting surface at normal incidence having surface area 20 cm². The energy received by the surface during time span of 1 minute is :

- (A) 10×10^3 J
- (B) 12×10^3 J
- (C) 24×10^3 J
- (D) 48×10^3 J

NEET 2020 · Q151

15. A spherical conductor of radius 10 cm has a charge of 3.2×10^{-7} C distributed uniformly. What is the magnitude of electric field at a point 15 cm from the centre of the sphere ? ($1/4\pi\epsilon_0 = 9 \times 10^9 \text{ N m}^2/\text{C}^2$)

- (A) $1.28 \times 10^4 \text{ N/C}$
- (B) $1.28 \times 10^5 \text{ N/C}$
- (C) $1.28 \times 10^6 \text{ N/C}$
- (D) $1.28 \times 10^7 \text{ N/C}$

NEET 2020 · Q152

16. In a certain region of space with volume 0.2 m^3 , the electric potential is found to be 5 V throughout. The magnitude of electric field in this region is :

- (A) zero
- (B) 0.5 N/C
- (C) 1 N/C
- (D) 5 N/C

NEET 2020 · Q153

17. The increase in the width of the depletion region in a p-n junction diode is due to :

- (A) forward bias only
- (B) reverse bias only
- (C) both forward bias and reverse bias
- (D) increase in forward current

NEET 2020 · Q154

18. A $40 \mu\text{F}$ capacitor is connected to a 200 V, 50 Hz ac supply. The rms value of the current in the circuit is, nearly :

- (A) 1.7 A
- (B) 2.05 A
- (C) 2.5 A
- (D) 25.1 A

NEET 2020 · Q155

19. The mean free path for a gas, with molecular diameter d and number density n can be expressed as :

- (A) $1/(\sqrt{2} n \pi d)$
- (B) $1/(\sqrt{2} n \pi d^2)$
- (C) $1/(\sqrt{2} n^2 \pi d^2)$
- (D) $1/(\sqrt{2} n^2 \pi^2 d^2)$

NEET 2020 · Q156

20. For transistor action, which of the following statements is correct ?

- (A) Base, emitter and collector regions should have same doping concentrations.
- (B) Base, emitter and collector regions should have same size.
- (C) Both emitter junction as well as the collector junction are forward biased.
- (D) The base region must be very thin and lightly doped.

NEET 2020 · Q157

21. Light of frequency 1.5 times the threshold frequency is incident on a photosensitive material. What will be the photoelectric current if the frequency is halved and intensity is doubled ?

- (A) doubled
- (B) four times
- (C) one-fourth
- (D) zero

NEET 2020 · Q158

22. When a uranium isotope $^{235}_{92}\text{U}$ is bombarded with a neutron, it generates $^{89}_{36}\text{Kr}$, three neutrons and :

- (A) $^{144}_{56}\text{Ba}$
- (B) $^{91}_{40}\text{Zr}$
- (C) $^{101}_{36}\text{Kr}$
- (D) $^{103}_{36}\text{Kr}$

NEET 2020 · Q159

23. The energy required to break one bond in DNA is 10^{-20} J. This value in eV is nearly :

- (A) 6
- (B) 0.6
- (C) 0.06
- (D) 0.006

NEET 2020 · Q160

24. Two bodies of mass 4 kg and 6 kg are tied to the ends of a massless string. The string passes over a pulley which is frictionless (see figure). The acceleration of the system in terms of acceleration due to gravity (g) is :

- (A) g
- (B) g/2
- (C) g/5
- (D) g/10

NEET 2020 · Q161

25. A wire of length L, area of cross section A is hanging from a fixed support. The length of the wire changes to L_1 when mass M is suspended from its free end. The expression for Young's modulus is :

- (A) $MgL_1/(AL)$
- (B) $Mg(L_1 - L)/(AL)$
- (C) $MgL/(AL_1)$
- (D) $MgL/(A(L_1 - L))$

NEET 2020 · Q162

26. The average thermal energy for a mono-atomic gas is : (k_B is Boltzmann constant and T, absolute temperature)

- (A) $(1/2) k_B T$
- (B) $(3/2) k_B T$
- (C) $(5/2) k_B T$
- (D) $(7/2) k_B T$

NEET 2020 · Q164

27. The color code of a resistance is given below : bands Yellow, Violet, Brown, Gold. The values of resistance and tolerance, respectively, are :

- (A) 470 k Ω , 5%
- (B) 47 k Ω , 10%
- (C) 4.7 k Ω , 5%
- (D) 470 Ω , 5%

NEET 2020 · Q165

28. In Young's double slit experiment, if the separation between coherent sources is halved and the distance of the screen from the coherent sources is doubled, then the fringe width becomes :

- (A) double
- (B) half
- (C) four times
- (D) one-fourth

NEET 2020 · Q166

29. The capacitance of a parallel plate capacitor with air as medium is 6 μF . With the introduction of a dielectric medium, the capacitance becomes 30 μF . The permittivity of the medium is : ($\epsilon_0 = 8.85 \times 10^{-12} \text{ C}^2 \text{ N}^{-1} \text{ m}^{-2}$)

- (A) $0.44 \times 10^{-13} \text{ C}^2 \text{ N}^{-1} \text{ m}^{-2}$
- (B) $1.77 \times 10^{-12} \text{ C}^2 \text{ N}^{-1} \text{ m}^{-2}$
- (C) $0.44 \times 10^{-10} \text{ C}^2 \text{ N}^{-1} \text{ m}^{-2}$
- (D) $5.00 \text{ C}^2 \text{ N}^{-1} \text{ m}^{-2}$

NEET 2020 · Q167

30. Dimensions of stress are :

- (A) $[\text{MLT}^{-2}]$
- (B) $[\text{ML}^2\text{T}^{-2}]$
- (C) $[\text{ML}^0\text{T}^{-2}]$
- (D) $[\text{ML}^{-1}\text{T}^{-2}]$

NEET 2020 · Q168

31. Assume that light of wavelength 600 nm is coming from a star. The limit of resolution of telescope whose objective has a diameter of 2 m is :

- (A) $3.66 \times 10^{-7} \text{ rad}$
- (B) $1.83 \times 10^{-7} \text{ rad}$
- (C) $7.32 \times 10^{-7} \text{ rad}$
- (D) $6.00 \times 10^{-7} \text{ rad}$

NEET 2020 · Q169

32. A series LCR circuit is connected to an ac voltage source. When L is removed from the circuit, the phase difference between current and voltage is $\pi/3$. If instead C is removed from the circuit, the phase difference is again $\pi/3$ between current and voltage. The power factor of the circuit is :

- (A) zero
- (B) 0.5
- (C) 1.0
- (D) -1.0

NEET 2020 · Q170

33. A short electric dipole has a dipole moment of $16 \times 10^{-9} \text{ C m}$. The electric potential due to the dipole at a point at a distance of 0.6 m from the centre of the dipole, situated on a line making an angle of 60° with the dipole axis is : ($1/4\pi\epsilon_0 = 9 \times 10^9 \text{ N m}^2/\text{C}^2$)

- (A) 50 V
- (B) 200 V
- (C) 400 V
- (D) zero

NEET 2020 · Q171

34. An iron rod of susceptibility 599 is subjected to a magnetising field of 1200 A m^{-1} . The permeability of the material of the rod is : ($\mu_0 = 4\pi \times 10^{-7} \text{ T m A}^{-1}$)

- (A) $2.4\pi \times 10^{-4} \text{ T m A}^{-1}$
- (B) $8.0 \times 10^{-5} \text{ T m A}^{-1}$
- (C) $2.4\pi \times 10^{-5} \text{ T m A}^{-1}$
- (D) $2.4\pi \times 10^{-7} \text{ T m A}^{-1}$

NEET 2020 · Q172

35. A long solenoid of 50 cm length having 100 turns carries a current of 2.5 A. The magnetic field at the centre of the solenoid is : ($\mu_0 = 4\pi \times 10^{-7} \text{ T m A}^{-1}$)

- (A) $6.28 \times 10^{-4} \text{ T}$
- (B) $3.14 \times 10^{-4} \text{ T}$
- (C) $6.28 \times 10^{-5} \text{ T}$
- (D) $3.14 \times 10^{-5} \text{ T}$

NEET 2020 · Q173

36. A charged particle having drift velocity of $7.5 \times 10^{-4} \text{ m s}^{-1}$ in an electric field of $3 \times 10^{-10} \text{ V m}^{-1}$, has a mobility in $\text{m}^2 \text{ V}^{-1} \text{ s}^{-1}$ of :

- (A) 2.25×10^{15}
- (B) 2.5×10^6
- (C) 2.5×10^{-6}
- (D) 2.25×10^{-15}

NEET 2020 · Q174

37. The quantities of heat required to raise the temperature of two solid copper spheres of radii r_1 and r_2 ($r_1 = 1.5 r_2$) through 1 K are in the ratio :

- (A) 27/8
- (B) 9/4
- (C) 3/2
- (D) 5/3

NEET 2020 · Q175

38. An electron is accelerated from rest through a potential difference of V volt. If the de Broglie wavelength of the electron is $1.227 \times 10^{-2} \text{ nm}$, the potential difference is :

- (A) 10 V
- (B) 10^2 V
- (C) 10^3 V
- (D) 10^4 V

NEET 2020 · Q176

39. Taking into account of the significant figures, what is the value of $9.99 \text{ m} - 0.0099 \text{ m}$?

- (A) 9.9801 m
- (B) 9.98 m
- (C) 9.980 m
- (D) 9.9 m

NEET 2020 · Q177

40. A ball is thrown vertically downward with a velocity of 20 m/s from the top of a tower. It hits the ground after some time with a velocity of 80 m/s. The height of the tower is : ($g = 10 \text{ m/s}^2$)

- (A) 360 m
- (B) 340 m
- (C) 320 m
- (D) 300 m

NEET 2020 · Q178

41. A capillary tube of radius r is immersed in water and water rises in it to a height h. The mass of the water in the capillary is 5 g. Another capillary tube of radius 2r is immersed in water. The mass of water that will rise in this tube is :

- (A) 2.5 g
- (B) 5.0 g
- (C) 10.0 g
- (D) 20.0 g

42. A resistance wire connected in the left gap of a metre bridge balances a $10\ \Omega$ resistance in the right gap at a point which divides the bridge wire in the ratio 3 : 2. If the length of the resistance wire is 1.5 m, then the length of $1\ \Omega$ of the resistance wire is :

- (A) 1.0×10^{-2} m
- (B) 1.0×10^{-1} m
- (C) 1.5×10^{-1} m
- (D) 1.5×10^{-2} m

Answer key and explanations

1. Answer: (D) Singly ionised neon atom (Ne^+)

Bohr's model applies only to one-electron (hydrogen-like) systems. Hydrogen, deuterium and He^+ each have a single electron, but Ne^+ still has 9 electrons, so electron-electron interactions make the model invalid.

2. Answer: (B) 1 : 1

The electric energy density $\frac{1}{2}\epsilon_0 E^2$ equals the magnetic energy density $B^2/2\mu_0$ because $E = cB$ and $c^2 = 1/\mu_0\epsilon_0$, so both fields contribute equally to intensity. The ratio $E/B = c$ is about field amplitudes, not about energy.

3. Answer: (C) $45^\circ < i_b < 90^\circ$

Brewster's law gives $\tan i_b = \mu$. For light going from a rarer to a denser medium $\mu > 1$, so $\tan i_b > 1$ and i_b lies between 45° and 90° . $i_b = 90^\circ$ would need an infinite refractive index.

4. Answer: (B) $0.2\ \text{kg/m}^3$

$\rho = PM/RT = (249 \times 10^3 \times 2 \times 10^{-3}) / (8.3 \times 300) = 498/2490 = 0.2\ \text{kg/m}^3$. Using $M = 1\ \text{g/mol}$ (atomic H) instead of $2\ \text{g/mol}$ for H_2 would give the $0.1\ \text{kg/m}^3$ trap.

5. Answer: (C) μA

Emerging normally means $r_2 = 0$, so $r_1 = A - r_2 = A$. For small angles Snell's law $\sin i = \mu \sin r_1$ becomes $i \approx \mu A$. Dividing by μ instead of multiplying confuses the direction of refraction.

6. Answer: (B) $4.5 \times 10^{13}\ \text{J}$

$E = mc^2 = 0.5 \times 10^{-3}\ \text{kg} \times (3 \times 10^8\ \text{m/s})^2 = 0.5 \times 10^{-3} \times 9 \times 10^{16} = 4.5 \times 10^{13}\ \text{J}$. Forgetting to convert grams to kilograms gives the $4.5 \times 10^{16}\ \text{J}$ trap.

7. Answer: (B) 32 N

Gravitational force varies as $1/r^2$, so at $r = R + R/2 = 1.5R$ the force is $72 \times (1/1.5)^2 = 72 \times 4/9 = 32\ \text{N}$. The approximation $g(1 - 2h/R)$ is only valid for $h \ll R$ and would wrongly give zero here.

8. Answer: (D) insulators and semiconductors

In semiconductors and insulators, heating frees more charge carriers across the band gap, so resistance falls with temperature (negative coefficient). In metals the carrier number is fixed and increased lattice scattering raises resistance, giving a positive coefficient.

9. Answer: (A) π rad

In SHM $a = -\omega^2 x$, so acceleration is always opposite to displacement, a phase difference of π rad. The $\pi/2$ difference is between displacement and velocity.

10. Answer: (C) 0.5 mm

Least count = pitch / number of circular scale divisions, so pitch = $0.01\ \text{mm} \times 50 = 0.5\ \text{mm}$. The least count itself is not the pitch.

11. Answer: (B) 524 Hz

With 6 Hz beats, B is 524 Hz or 536 Hz. Lowering tension lowers B's frequency ($f \propto \sqrt{T}$); the beat frequency rises only if B moves further from 530 Hz, so B must start below A at 524 Hz. Had B been 536 Hz, lowering it would bring it closer to 530 Hz and reduce the beats.

12. Answer: (C) 67 cm

Taking the 5 kg particle at the origin, $x_{\text{cm}} = (5 \times 0 + 10 \times 1) / 15 = 0.667\ \text{m} \approx 67\ \text{cm}$. 33 cm is the distance from the heavier particle, since the centre of mass lies closer to the larger mass.

13. Answer: (C) $-6\hat{i}\ \text{N m}$

$\tau = r \times F = 2\hat{k} \times 3\hat{j} = 6(\hat{k} \times \hat{j}) = -6\hat{i}\ \text{N m}$, because $\hat{k} \times \hat{j} = -\hat{i}$. Reversing the order ($F \times r$) gives the sign error $+6\hat{i}\ \text{N m}$.

14. Answer: (C) 24×10^3 J

Power received = $20 \text{ W/cm}^2 \times 20 \text{ cm}^2 = 400 \text{ W}$, and in 60 s the energy is $400 \times 60 = 24 \times 10^3 \text{ J}$.

Doubling for reflection is not needed because the surface is non-reflecting; that only affects momentum transfer anyway.

15. Answer: (B) 1.28×10^5 N/C

Outside the sphere it acts like a point charge: $E = kq/r^2 = 9 \times 10^9 \times 3.2 \times 10^{-7} / (0.15)^2 = 2880/0.0225 = 1.28 \times 10^5 \text{ N/C}$. Using 10 cm (the radius) instead of 15 cm, or forgetting to convert cm to m, gives the other powers of ten.

16. Answer: (A) zero

$E = -dV/dr$, and a potential that is the same everywhere in the region has zero gradient, so the field is zero. Dividing the potential by the volume or any length has no physical meaning here.

17. Answer: (B) reverse bias only

A reverse bias adds to the barrier potential and pulls majority carriers away from the junction, so the depletion region widens. Forward bias opposes the barrier and narrows the depletion layer, which is also why forward current rises.

18. Answer: (C) 2.5 A

$X_C = 1/(2\pi fC) = 1/(2\pi \times 50 \times 40 \times 10^{-6}) \approx 79.6 \Omega$, so $I_{\text{rms}} = V_{\text{rms}}/X_C = 200/79.6 \approx 2.5 \text{ A}$. Taking 200 V as a peak value and dividing by $\sqrt{2}$ gives about 1.8 A, which is not what the rms supply rating means.

19. Answer: (B) $1/(\sqrt{2} n\pi d^2)$

A molecule sweeps a collision cross-section πd^2 , and allowing for the relative motion of molecules the mean free path is $\lambda = 1/(\sqrt{2} n\pi d^2)$. The number density appears only to the first power, and the cross-section must be an area (d^2) for λ to have units of length.

20. Answer: (D) The base region must be very thin and lightly doped.

For transistor action most carriers injected from the heavily doped emitter must cross the base without recombining, so the base is made very thin and lightly doped. The emitter-base junction is forward biased but the collector-base junction is reverse biased, and the three regions differ in doping and size.

21. Answer: (D) zero

Halving $1.5\nu_0$ gives $0.75\nu_0$, which is below the threshold frequency, so no photoelectrons are emitted whatever the intensity and the current is zero. Intensity controls the current only when ν exceeds ν_0 .

22. Answer: (A) $^{144}_{56}\text{Ba}$

Conserving mass number: $235 + 1 = 89 + 3 + A$, so $A = 144$; conserving charge: $92 = 36 + Z$, so $Z = 56$, which is barium-144. The krypton options keep $Z = 36$ and so violate charge conservation.

23. Answer: (C) 0.06

$1 \text{ eV} = 1.6 \times 10^{-19} \text{ J}$, so $10^{-20} \text{ J} = 10^{-20}/1.6 \times 10^{-19} \approx 0.0625 \text{ eV} \approx 0.06 \text{ eV}$. Multiplying instead of dividing by the conversion factor gives meaningless magnitudes.

24. Answer: (C) $g/5$

For two masses hanging over a frictionless pulley, $a = (m_2 - m_1)g/(m_1 + m_2) = (6 - 4)g/10 = g/5$. Using only the heavier mass in the denominator, or forgetting the difference of weights, gives the other values.

25. Answer: (D) $MgL/(A(L_1 - L))$

$Y = \text{stress/strain} = (Mg/A)/((L_1 - L)/L) = MgL/(A(L_1 - L))$. The strain uses the extension $L_1 - L$, not the new length L_1 , and the extension goes in the denominator.

26. Answer: (B) $(3/2) k_{\text{BT}}$

A monatomic molecule has 3 translational degrees of freedom, each carrying $\frac{1}{2}k_{\text{BT}}$ by equipartition, so the average energy is $(3/2)k_{\text{BT}}$. $(5/2)k_{\text{BT}}$ applies to a diatomic molecule with two rotational degrees added.

27. Answer: (D) 470 Ω , 5%

Yellow = 4 and violet = 7 give the digits 47, brown is the multiplier 10^1 , so $R = 470 \Omega$; a gold band means $\pm 5\%$ tolerance. The $k\Omega$ values use the wrong multiplier, and 10% tolerance would need a silver band.

28. Answer: (C) four times

Fringe width $\beta = \lambda D/d$. Doubling D and halving d multiplies β by $2 \times 2 = 4$. The two changes reinforce each other rather than cancelling.

29. Answer: (C) $0.44 \times 10^{-10} \text{ C}^2 \text{ N}^{-1} \text{ m}^{-2}$

The dielectric constant is $K = 30/6 = 5$, so $\epsilon = K\epsilon_0 = 5 \times 8.85 \times 10^{-12} = 4.425 \times 10^{-11} \approx 0.44 \times 10^{-10} \text{ C}^2 \text{ N}^{-1} \text{ m}^{-2}$. The value 5.00 is the dimensionless K , not the permittivity, and dividing ϵ_0 by 5 gives 1.77×10^{-12} .

30. Answer: (D) $[\text{ML}^{-1}\text{T}^{-2}]$

Stress is force per area: $[\text{MLT}^{-2}]/[\text{L}^2] = [\text{ML}^{-1}\text{T}^{-2}]$, the same as pressure. $[\text{MLT}^{-2}]$ is force itself and $[\text{ML}^2\text{T}^{-2}]$ is energy.

31. Answer: (A) $3.66 \times 10^{-7} \text{ rad}$

The angular limit of resolution is $\Delta\theta = 1.22\lambda/D = 1.22 \times 600 \times 10^{-9} / 2 = 3.66 \times 10^{-7} \text{ rad}$. Leaving out the factor 1.22 gives 3.0×10^{-7} , and using the radius instead of the diameter doubles the answer to 7.32×10^{-7} .

32. Answer: (C) 1.0

With L removed, $\tan(\pi/3) = X_C/R$; with C removed, $\tan(\pi/3) = X_L/R$. So $X_L = X_C$, the full LCR circuit is at resonance, $Z = R$ and the power factor $\cos \phi = R/Z = 1$. 0.5 is $\cos(\pi/3)$, the power factor of the reduced circuits, not of the full one.

33. Answer: (B) 200 V

$V = kp \cos \theta / r^2 = 9 \times 10^9 \times 16 \times 10^{-9} \times \cos 60^\circ / (0.6)^2 = 144 \times 0.5 / 0.36 = 200 \text{ V}$. Leaving out $\cos 60^\circ$ gives 400 V, and zero applies only on the equatorial line ($\theta = 90^\circ$).

34. Answer: (A) $2.4\pi \times 10^{-4} \text{ T m A}^{-1}$

$\mu = \mu_0(1 + \chi) = 4\pi \times 10^{-7} \times 600 = 2400\pi \times 10^{-7} = 2.4\pi \times 10^{-4} \text{ T m A}^{-1}$. The magnetising field of 1200 A m^{-1} is not needed for permeability.

35. Answer: (A) $6.28 \times 10^{-4} \text{ T}$

Turns per metre $n = 100/0.5 = 200$, so $B = \mu_0 n I = 4\pi \times 10^{-7} \times 200 \times 2.5 = 2\pi \times 10^{-4} \approx 6.28 \times 10^{-4} \text{ T}$. Using the total turns per 1 m (100) instead of per 0.5 m halves the answer to $3.14 \times 10^{-4} \text{ T}$.

36. Answer: (B) 2.5×10^6

Mobility $\mu = v_d/E = 7.5 \times 10^{-4} / 3 \times 10^{-10} = 2.5 \times 10^6 \text{ m}^2 \text{ V}^{-1} \text{ s}^{-1}$. The 2.25 values come from multiplying the two quantities, which is dimensionally wrong.

37. Answer: (A) 27/8

$Q = mc\Delta T$ with the same c and ΔT , and $m \propto \text{volume} \propto r^3$, so $Q_1/Q_2 = (1.5)^3 = 27/8$. Using surface area (r^2) instead of volume would give 9/4.

38. Answer: (D) 10^4 V

For an electron $\lambda = 1.227/\sqrt{V} \text{ nm}$, so $\sqrt{V} = 1.227/(1.227 \times 10^{-2}) = 100$ and $V = 10^4 \text{ V}$. Forgetting to square $\sqrt{V}$ gives 10^2 V .

39. Answer: (B) 9.98 m

$9.99 - 0.0099 = 9.9801 \text{ m}$, but in subtraction the result keeps as many decimal places as the least precise term; 9.99 has two decimal places, so the answer is 9.98 m. 9.9801 m reports more precision than the data justify.

40. Answer: (D) 300 m

$v^2 = u^2 + 2gh$ gives $80^2 = 20^2 + 2 \times 10 \times h$, so $6400 - 400 = 20h$ and $h = 300 \text{ m}$. Ignoring the initial downward speed would give 320 m.

41. Answer: (C) 10.0 g

Jurin's law gives $h \propto 1/r$, and the mass of the raised column $m = \rho \pi r^2 h \propto r^2/r = r$. Doubling the radius doubles the mass, from 5 g to 10 g. Assuming the height stays the same would give 20 g.

42. Answer: (B) $1.0 \times 10^{-1} \text{ m}$

At balance $R/10 = 3/2$, so $R = 15 \Omega$. The wire is 1.5 m long, so 1Ω corresponds to $1.5/15 = 0.1 \text{ m} = 1.0 \times 10^{-1} \text{ m}$. Taking R as 10Ω (forgetting the balance ratio) gives $1.5 \times 10^{-1} \text{ m}$.

Questions as set in the AIPMT/NEET papers conducted by CBSE and NTA. Answers checked and explanations written by the RankUp team. RankUp is not affiliated with CBSE or NTA.