NEET 2024 Re-exam — Physics Question Paper with Solutions

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

NEET 2024 Re-exam

1. The magnetic potential energy, when a magnetic bar of magnetic moment $\vec{m}$ is placed perpendicular to the magnetic field $\vec{B}$ is

(A) $-mB/2$
(B) Zero
(C) $-mB$
(D) mB

NEET 2024 Re-exam

2. A bob is whirled in a horizontal circle by means of a string at an initial speed of 10 rpm. If the tension in the string is quadrupled while keeping the radius constant, the new speed is:

(A) 20 rpm
(B) 40 rpm
(C) 5 rpm
(D) 10 rpm

NEET 2024 Re-exam

3. A metal cube of side 5 cm is charged with 6 μC. The surface charge density on the cube is

(A) 0.125×10^{-3} C m^{-2}
(B) 0.25×10^{-3} C m^{-2}
(C) 4×10^{-3} C m^{-2}
(D) 0.4×10^{-3} C m^{-2}

NEET 2024 Re-exam

4. The incorrect relation for a diamagnetic material (all the symbols carry their usual meaning and ε is a small positive number) is

(A) $\mu < \mu_0$
(B) $0 \le \mu_r < 1$
(C) $-1 \le \chi < 0$
(D) $1 < \mu_r < 1 + \varepsilon$

NEET 2024 Re-exam

5. The escape velocity for earth is v. A planet having 9 times mass that of earth and radius, 16 times that of earth, has the escape velocity of:

(A) v/3
(B) 2v/3
(C) 3v/4
(D) 9v/4

NEET 2024 Re-exam

6. An electron and an alpha particle are accelerated by the same potential difference. Let λ_e and $\lambda\alpha$ denote the de-Broglie wavelengths of the electron and the alpha particle, respectively, then:

(A) $\lambda_e > \lambda\alpha$
(B) $\lambda_e = 4\lambda\alpha$
(C) $\lambda_e = \lambda\alpha$
(D) $\lambda_e < \lambda\alpha$

NEET 2024 Re-exam

7. An object moving along horizontal x-direction with kinetic energy 10 J is displaced through x = (3î) m by the force F = (−2î + 3ĵ) N. The kinetic energy of the object at the end of the displacement x is

(A) 10 J
(B) 16 J
(C) 4 J
(D) 6 J

NEET 2024 Re-exam

8. An object falls from a height of 10 m above the ground. After striking the ground it loses 50% of its kinetic energy. The height upto which the object can rebound from the ground is:

(A) 7.5 m
(B) 10 m
(C) 2.5 m
(D) 5 m

NEET 2024 Re-exam

9. A 12 pF capacitor is connected to a 50 V battery, the electrostatic energy stored in the capacitor in nJ is

(A) 15
(B) 7.5
(C) 0.3
(D) 150

NEET 2024 Re-exam

10. A uniform wire of diameter d carries a current of 100 mA when the mean drift velocity of electrons in the wire is v. For a wire of diameter d/2 of the same material to carry a current of 200 mA, the mean drift velocity of electrons in the wire is

(A) 4v
(B) 8v
(C) v
(D) 2v

NEET 2024 Re-exam

11. In an electrical circuit, the voltage is measured as V = (200 ± 4) volt and the current is measured as I = (20 ± 0.2) A. The value of the resistance is:

(A) (10 ± 4.2) Ω
(B) (10 ± 0.3) Ω
(C) (10 ± 0.1) Ω
(D) (10 ± 0.8) Ω

NEET 2024 Re-exam

12. A step up transformer is connected to an ac mains supply of 220 V to operate at 11000 V, 88 watt. The current in the secondary circuit, ignoring the power loss in the transformer, is

(A) 8 mA
(B) 4 mA
(C) 0.4 A
(D) 4 A

NEET 2024 Re-exam

13. A particle is moving along x-axis with its position (x) varying with time (t) as $x = \alpha t^4 + \beta t^2 + \gamma t + \delta$. The ratio of its initial velocity to its initial acceleration, respectively, is:

(A) $2\alpha : \delta$
(B) $\gamma : 2\delta$
(C) $4\alpha : \beta$
(D) $\gamma : 2\beta$

NEET 2024 Re-exam

14. The capacitance of a capacitor with charge q and a potential difference V depends on

(A) both q and V
(B) the geometry of the capacitor
(C) q only
(D) V only

NEET 2024 Re-exam

15. Given below are two statements:
Statement I : Image formation needs regular reflection and/or refraction.
Statement II : The variety in colour of objects we see around us is due to the constituent colours of the light incident on them.
In the light of the above statements, choose the most appropriate answer from the options given below :

(A) Statement I is correct but statement II is incorrect
(B) Statement I is incorrect but Statement II is correct
(C) Both Statement I and Statement II are correct
(D) Both Statement I and Statement II are incorrect

NEET 2024 Re-exam

16. A uniform metal wire of length l has 10 Ω resistance. Now this wire is stretched to a length 2l and then bent to form a perfect circle. The equivalent resistance across any arbitrary diameter of that circle is

(A) 10 Ω
(B) 5 Ω
(C) 40 Ω
(D) 20 Ω

NEET 2024 Re-exam

17. The spectral series which corresponds to the electronic transition from the levels $n_2 = 5, 6, \ldots$ to the level $n_1 = 4$ is

(A) Pfund series
(B) Brackett series
(C) Lyman series
(D) Balmer series

NEET 2024 Re-exam

18. Given below are two statements: One is labelled as Assertion A and the other is labelled as Reason R.
Assertion A: Houses made of concrete roofs overlaid with foam keep the room hotter during summer.
Reason R: The layer of foam insulation prohibits heat transfer, as it contains air pockets.
In the light of the above statements, choose the correct answer from the options given below.

(A) A is true but R is false.
(B) A is false but R is true.
(C) Both A and R are true and R is the correct explanation of A.
(D) Both A and R are true but R is NOT the correct explanation of A.

NEET 2024 Re-exam

19. A particle executing simple harmonic motion with amplitude A has the same potential and kinetic energies at the displacement

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

NEET 2024 Re-exam

20. Two slits in Young's double slit experiment are 1.5 mm apart and the screen is placed at a distance of 1 m from the slits. If the wavelength of light used is 600×10^{-9} m then the fringe separation is

(A) 4×10^{-5} m
(B) 9×10^{-8} m
(C) 4×10^{-7} m
(D) 4×10^{-4} m

NEET 2024 Re-exam

21. Water is used as a coolant in a nuclear reactor because of its

(A) high thermal expansion coefficient
(B) high specific heat capacity
(C) low density
(D) low boiling point

NEET 2024 Re-exam

22. The pitch of an error free screw gauge is 1 mm and there are 100 divisions on the circular scale. While measuring the diameter of a thick wire, the pitch scale reads 1 mm and 63rd division on the circular scale coincides with the reference line. The diameter of the wire is:

(A) 1.63 cm
(B) 0.163 cm
(C) 0.163 m
(D) 1.63 m

NEET 2024 Re-exam

23. Let us consider two solenoids A and B, made from same magnetic material of relative permeability μ_r and equal area of cross-section. Length of A is twice that of B and the number of turns per unit length in A is half that of B. The ratio of self inductances of the two solenoids, L_A : L_B is

(A) 1 : 2
(B) 2 : 1
(C) 8 : 1
(D) 1 : 8

NEET 2024 Re-exam

24. When the output of an OR gate is applied as input to a NOT gate, then the combination acts as a

(A) NAND gate
(B) NOR gate
(C) AND gate
(D) OR gate

NEET 2024 Re-exam

25. Interference pattern can be observed due to superposition of the following waves:

A. $y = a \sin \omega t$
B. $y = a \sin 2\omega t$
C. $y = a \sin(\omega t - \varphi)$
D. $y = a \sin 3\omega t$
Choose the correct answer from the options given below.

(A) B and C
(B) B and D
(C) A and C
(D) A and B

NEET 2024 Re-exam

26. The electromagnetic radiation which has the smallest wavelength are

(A) X-rays
(B) Gamma rays
(C) Ultraviolet rays
(D) Microwaves

NEET 2024 Re-exam

27. The equilibrium state of a thermodynamic system is described by

A. Pressure
B. Total heat
C. Temperature
D. Volume
E. Work done
Choose the most appropriate answer from the options given below.

(A) A, B and E only
(B) B, C and D only
(C) A, B and C only
(D) A, C and D only

NEET 2024 Re-exam

28. A box of mass 5 kg is pulled by a cord, up along a frictionless plane inclined at 30° with the horizontal. The tension in the cord is 30 N. The acceleration of the box is (Take $g = 10\ m\ s^{-2}$)

(A) 2 $m\ s^{-2}$
(B) Zero
(C) 0.1 $m\ s^{-2}$
(D) 1 $m\ s^{-2}$

NEET 2024 Re-exam

29. If the ratio of relative permeability and relative permittivity of a uniform medium is 1 : 4. The ratio of the magnitudes of electric field intensity (E) to the magnetic field intensity (H) of an EM wave propagating in that medium is (Given that $\sqrt{(\mu_0/\varepsilon_0)} = 120\pi$):

(A) $30\pi : 1$
(B) $1 : 120\pi$
(C) $60\pi : 1$
(D) $120\pi : 1$

NEET 2024 Re-exam

30. The value of electric potential at a distance of 9 cm from the point charge 4×10^{-7} C is [Given $1/(4\pi\varepsilon_0) = 9 \times 10^9$ N m^2 C^{-2}] :

(A) 4×10^2 V
(B) 44.4 V
(C) 4.4×10^5 V
(D) 4×10^4 V

NEET 2024 Re-exam

31. The displacement of a travelling wave $y = C \sin (2\pi/\lambda)(at - x)$ where t is time, x is distance and λ is the wavelength, all in S.I. units. Then the frequency of the wave is

(A) $2\pi\lambda/a$
(B) $2\pi a/\lambda$
(C) λ/a
(D) a/λ

NEET 2024 Re-exam

32. The potential energy of a particle moving along x-direction varies as $V = Ax^2/(\sqrt{x} + B)$. The dimensions of A^2/B are:

(A) [M^(3/2) L^(1/2) T^{-3}]
(B) [M^(1/2) L T^{-3}]
(C) [M^2 L^(1/2) T^{-4}]
(D) [M L^2 T^{-4}]

NEET 2024 Re-exam

33. The two-dimensional motion of a particle, described by $\vec{r} = (\hat{i} + 2\hat{j})A \cos \omega t$ is a/an:

A. parabolic path
B. elliptical path
C. periodic motion
D. simple harmonic motion
Choose the correct answer from the options given below:

(A) B, C and D only
(B) A, B and C only
(C) A, C and D only
(D) C and D only

NEET 2024 Re-exam

34. Select the correct statements among the following :

A. Slow neutrons can cause fission in $^{235}_{92}U$ than fast neutrons.

B. α-rays are Helium nuclei.

C. β-rays are fast moving electrons or positrons.

D. γ-rays are electromagnetic radiations of wavelengths larger than X-rays.

Choose the most appropriate answer from the options given below :

(A) A, B and C only
(B) A, B and D only
(C) A and B only
(D) C and D only

NEET 2024 Re-exam

35. Let ω_1, ω_2 and ω_3 be the angular speed of the second hand, minute hand and hour hand of a smoothly running analog clock, respectively. If x_1, x_2 and x_3 are their respective angular distances in 1 minute then the factor which remains constant (k) is

(A) $\omega_1/x_1 = \omega_2/x_2 = \omega_3/x_3 = k$
(B) $\omega_1 x_1 = \omega_2 x_2 = \omega_3 x_3 = k$
(C) $\omega_1 x_1^2 = \omega_2 x_2^2 = \omega_3 x_3^2 = k$
(D) $\omega_1^2 x_1 = \omega_2^2 x_2 = \omega_3^2 x_3 = k$

NEET 2024 Re-exam

36. The magnetic moment of an iron bar is M. It is now bent in such a way that it forms an arc section of a circle subtending an angle of 60° at the centre. The magnetic moment of this arc section is

(A) 3M/π
(B) 4M/π
(C) M/π
(D) 2M/π

NEET 2024 Re-exam

37. According to the law of equipartition of energy, the number of vibrational modes of a polyatomic gas of constant γ = C_P/C_V is (C_P and C_V are the specific heat capacities of the gas at constant pressure and constant volume, respectively):

(A) $(4 + 3\gamma)/(\gamma - 1)$
(B) $(3 + 4\gamma)/(\gamma - 1)$
(C) $(4 - 3\gamma)/(\gamma - 1)$
(D) $(3 - 4\gamma)/(\gamma - 1)$

NEET 2024 Re-exam

38. The amplitude of the charge oscillating in a circuit decreases exponentially as Q = Q₀e^(−Rt/2L), where Q_0 is the charge at t = 0 s. The time at which charge amplitude decreases to 0.50Q_0 is nearly:
[Given that R = 1.5 Ω, L = 12 mH, ln(2) = 0.693]

(A) 19.01 ms
(B) 11.09 ms
(C) 19.01 s
(D) 11.09 s

Answer key and explanations

1. Answer: (B) Zero

The potential energy of a magnetic dipole is $U = -\vec{m}\cdot\vec{B} = -mB\cos\theta$. For $\theta = 90°$, $\cos\theta = 0$, so $U = 0$. The value $-mB$ belongs to the aligned position ($\theta = 0°$), the minimum-energy orientation.

2. Answer: (A) 20 rpm

The tension supplies the centripetal force, $T = m\omega^2 r$, so at fixed r, $\omega \propto \sqrt{T}$. Quadrupling T doubles ω: 10 rpm × √4 = 20 rpm. Taking ω proportional to T itself would give 40 rpm.

3. Answer: (D) 0.4×10^{-3} C m^{-2}

Charge on a conductor spreads over its whole outer surface, here six faces: $A = 6 \times (0.05\ \text{m})^2 = 0.015\ \text{m}^2$. $\sigma = q/A = 6 \times 10^{-6} / 0.015 = 4 \times 10^{-4} = 0.4 \times 10^{-3}$ C m^{-2}. Using one face only (0.0025 m^2) would give a value six times larger.

4. Answer: (D) $1 < \mu_r < 1 + \varepsilon$

For a diamagnetic material the susceptibility is negative, $-1 \le \chi < 0$, so $\mu_r = 1 + \chi$ lies in $0 \le \mu_r < 1$ and $\mu < \mu_0$ (a superconductor is the limit $\chi = -1$). A relative permeability slightly greater than 1, $1 < \mu_r < 1 + \varepsilon$, describes a paramagnetic material, so that relation is the incorrect one.

5. Answer: (C) 3v/4

$v_e = \sqrt{(2GM/R)} \propto \sqrt{(M/R)}$. For the planet, $v' = v\sqrt{(9/16)} = 3v/4$. Forgetting the square root gives 9v/16, which is not offered; 9v/4 would come from using the masses' ratio over the radius' square root.

6. Answer: (A) $\lambda_e > \lambda\alpha$

After acceleration through V, $p = \sqrt{(2mqV)}$, so $\lambda = h/\sqrt{(2mqV)} \propto 1/\sqrt{(mq)}$. The alpha particle has about 7300 times the electron mass and twice its charge, so mq is far larger and its wavelength far shorter; hence $\lambda_e > \lambda\alpha$ (by a factor of about $\sqrt{14\ 600} \approx 120$, not 4).

7. Answer: (C) 4 J

Work done $W = \vec{F}\cdot\vec{x} = (-2)(3) + (3)(0) = -6$ J; the y-component of force does no work along x. By the work-energy theorem, $K_{final} = 10 - 6 = 4$ J. Adding $|W|$ instead gives 16 J.

8. Answer: (D) 5 m

Just before impact KE = mg(10 m). After losing half, KE = mg(5 m), and all of it turns back into potential energy on the way up, so the rebound height is 5 m. Halving the speed instead of the energy would give 2.5 m.

9. Answer: (A) 15

$U = \tfrac{1}{2}CV^2 = \tfrac{1}{2} \times 12 \times 10^{-12} \times (50)^2 = 6 \times 10^{-12} \times 2500 = 1.5 \times 10^{-8}$ J = 15 nJ. Omitting the ½ would give 30 nJ, and using V instead of V^2 gives 0.3 nJ.

10. Answer: (B) 8v

$I = neAv_d$ with $A = \pi d^2/4$, so $v_d \propto I/d^2$ for the same material (same n). Doubling I multiplies v_d by 2, and halving d multiplies it by 4, giving $v_d = 8v$. Treating the area as proportional to d instead of d^2 would give 4v.

11. Answer: (B) (10 ± 0.3) Ω

$R = V/I = 200/20 = 10\ \Omega$. For a quotient the relative errors add: $\Delta R/R = 4/200 + 0.2/20 = 0.02 + 0.01 = 0.03$, so $\Delta R = 0.03 \times 10 = 0.3\ \Omega$. Adding the absolute errors (4 + 0.2) gives the wrong 4.2 Ω, and subtracting relative errors gives 0.1 Ω.

12. Answer: (A) 8 mA

For an ideal transformer the secondary delivers the stated power at its own voltage: $I_s = P/V_s = 88/11000 = 0.008$ A = 8 mA. Using the primary voltage, 88/220 = 0.4 A, gives the primary current instead.

13. Answer: (D) γ : 2β

$v = dx/dt = 4\alpha t^3 + 2\beta t + \gamma$, so $v(0) = \gamma$. $a = dv/dt = 12\alpha t^2 + 2\beta$, so $a(0) = 2\beta$. The ratio is γ : 2β. The constant δ is the initial position and does not appear in either derivative.

14. Answer: (B) the geometry of the capacitor

$C = q/V$, but q and V change in the same proportion, so the ratio is fixed by the size, shape and separation of the conductors and by the dielectric between them, for example $C = \varepsilon_0 A/d$ for parallel plates. The formula $C = q/V$ defines capacitance; it does not make C depend on q or V.

15. Answer: (C) Both Statement I and Statement II are correct

A sharp image needs light from each point of the object to be brought together in an orderly way, which is done by regular (specular) reflection or refraction; diffuse scattering cannot form an image. Objects look coloured because they reflect or transmit some of the colours in the light falling on them, so the colours we see depend on the constituent colours of the incident light. Both statements are correct, as stated in NCERT.

16. Answer: (A) 10 Ω

Stretching at constant volume to twice the length halves the area, so $R' = 2^2 \times 10 = 40\ \Omega$. Across a diameter the circle splits into two 20 Ω halves in parallel: $(20 \times 20)/(20 + 20) = 10\ \Omega$. Forgetting that the area also shrinks gives $R' = 20\ \Omega$ and an answer of 5 Ω.

17. Answer: (B) Brackett series

Transitions ending on n = 4 form the Brackett series. Lyman ends on n = 1, Balmer on n = 2, Paschen on n = 3 and Pfund on n = 5.

18. Answer: (B) A is false but R is true.

Trapped air is a poor conductor, so a foam layer cuts heat flow through the roof (the reason is true). In summer this keeps the outside heat out, so the room stays cooler, not hotter; the assertion is false.

19. Answer: (C) A/√2

PE = ½kx² and KE = ½k(A² − x²). Setting them equal: x² = A² − x², so x² = A²/2 and x = A/√2. At x = A/2 the potential energy is only a quarter of the total.

20. Answer: (D) 4 × 10⁻⁴ m

Fringe width β = λD/d = (600 × 10⁻⁹ m × 1 m)/(1.5 × 10⁻³ m) = 4 × 10⁻⁴ m (0.4 mm). Leaving d in mm or mixing units gives the wrong powers of ten in the other options.

21. Answer: (B) high specific heat capacity

A coolant must carry away a lot of heat for a small rise in its own temperature. Water's high specific heat capacity (about 4200 J kg⁻¹ K⁻¹) lets it absorb large amounts of heat. A low boiling point would be a drawback, since the coolant would boil off easily.

22. Answer: (B) 0.163 cm

Least count = pitch/number of divisions = 1 mm/100 = 0.01 mm. Reading = main scale + (circular division × LC) = 1 mm + 63 × 0.01 mm = 1.63 mm = 0.163 cm. The value 1.63 cm makes the mm-to-cm conversion wrong by a factor of 10.

23. Answer: (A) 1 : 2

For a long solenoid L = $\mu_0\mu_r n^2 Al$. With the same μ_r and A, L_A/L_B = (n_A/n_B)² × (l_A/l_B) = (1/2)² × 2 = 1/2, so L_A : L_B = 1 : 2. Using n instead of n² would give 1 : 1, and inverting the ratio gives 2 : 1.

24. Answer: (B) NOR gate

The OR gate gives A + B and the NOT gate inverts it to $\overline{(A + B)}$, which is the NOR function. A NAND gate is AND followed by NOT, $\overline{(A \cdot B)}$.

25. Answer: (C) A and C

A steady interference pattern needs coherent waves: the same frequency and a constant phase difference. Waves A and C both have angular frequency ω and differ by a fixed phase φ. Waves of frequency ω, 2ω and 3ω differ in frequency, so their phase difference changes with time and no steady pattern forms.

26. Answer: (B) Gamma rays

In the electromagnetic spectrum wavelength increases from gamma rays (below about 10⁻¹² m) through X-rays, ultraviolet, visible, infrared and microwaves to radio waves. So gamma rays have the smallest wavelength; X-rays come next.

27. Answer: (D) A, C and D only

An equilibrium state is specified by state variables such as pressure, volume and temperature, which have definite values in that state. Heat and work are not properties of a state; they depend on the process (path) by which the system moves between states. So only pressure, temperature and volume describe the state.

28. Answer: (D) 1 m s⁻²

Along the incline (cord parallel to it): T − mg sin 30° = ma, so 30 − 5 × 10 × 0.5 = 5a, giving 30 − 25 = 5a and a = 1 m s⁻² up the plane. Ignoring the gravity component would give 6 m s⁻², and using mg instead of mg sin 30° would make the box slide down.

29. Answer: (C) 60π : 1

In a medium E/H = $\sqrt{(\mu/\varepsilon)} = \sqrt{(\mu_r\mu_0/\varepsilon_r\varepsilon_0)} = \sqrt{(\mu_r/\varepsilon_r)} \times \sqrt{(\mu_0/\varepsilon_0)} = \sqrt{(1/4)} \times 120\pi = 60\pi$. So E : H = 60π : 1. The value 120π : 1 is for free space, and 30π comes from using 1/4 without the square root.

30. Answer: (D) 4 × 10⁴ V

V = kq/r = (9 × 10⁹ × 4 × 10⁻⁷)/0.09 = 3600/0.09 = 4 × 10⁴ V. Using r = 9 (cm left unconverted) gives 400 V, and dividing by r² mixes up potential with field.

31. Answer: (D) a/λ

Writing y = C sin(2πat/λ − 2πx/λ) and comparing with sin(ωt − kx) gives ω = 2πa/λ, so the wave speed is a. Frequency f = ω/2π = a/λ. The expression 2πa/λ is the angular frequency, not the frequency.

32. Answer: (C) [M² L^(1/2) T⁻⁴]

B is added to √x, so [B] = [L^(1/2)]. Then V ≈ Ax²/√x gives [A] = [ML²T⁻²]/[L^(3/2)] = [M L^(1/2) T⁻²]. So [A²/B] = [M² L T⁻⁴]/[L^(1/2)] = [M² L^(1/2) T⁻⁴]. Treating B as dimensionless would give [M² L T⁻⁴].

33. Answer: (D) C and D only

x = A cos ωt and y = 2A cos ωt, so y = 2x: the particle moves to and fro along a straight line. Along that line its displacement varies as cos ωt, so the motion is simple harmonic and therefore periodic. The path is neither a parabola nor an ellipse; an ellipse would need a phase difference between the x and y motions.

34. Answer: (A) A, B and C only

Slow (thermal) neutrons cause fission of U-235 much more readily than fast ones; α-particles are helium nuclei; β-rays are fast electrons (β^-) or positrons (β^+). γ-rays are electromagnetic radiation of wavelength shorter than X-rays, not larger, so that statement is false.

35. Answer: (A) $\omega_1/x_1 = \omega_2/x_2 = \omega_3/x_3 = k$

Each hand turns uniformly, so its angular distance in time t is x = ωt. For the same t = 1 minute, ω/x = 1/t is the same for all three hands. The products ωx, ωx^2 or $\omega^2 x$ grow with ω and differ from hand to hand.

36. Answer: (A) 3M/π

M = m × l, where m is the pole strength. Bending into an arc of angle π/3 gives l = r(π/3), so r = 3l/π. The new pole separation is the chord, 2r sin 30° = r = 3l/π. So M' = m × 3l/π = 3M/π. Using the arc length instead of the chord leaves the moment wrongly unchanged.

37. Answer: (C) (4 − 3γ)/(γ − 1)

A non-linear polyatomic molecule has 3 translational and 3 rotational degrees of freedom, and each vibrational mode contributes kT (½kT kinetic plus ½kT potential). With f vibrational modes, C_V = (3 + f)R and C_P = (4 + f)R, so γ = 1 + 1/(3 + f). Then 3 + f = 1/(γ − 1) and f = (1 − 3γ + 3)/(γ − 1) = (4 − 3γ)/(γ − 1). Counting only ½kT per vibrational mode would give a different expression.

38. Answer: (B) 11.09 ms

0.5 = e^(−Rt/2L), so Rt/2L = ln 2 and t = 2L ln 2/R = (2 × 0.012 × 0.693)/1.5 = 0.016632/1.5 = 0.01109 s = 11.09 ms. Taking L as 12 H instead of 12 mH gives 11.09 s.

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.