

JEE Main January 2026
Question Paper With Text Solution
21 January | Shift-2

PHYSICS



JEE Main & Advanced | XI-XII Foundation | VI-X Pre-Foundation

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**JEE MAIN JANUARY 2026 | 21 JANUARY SHIFT-2****SECTION - A**

Question ID : 860654853

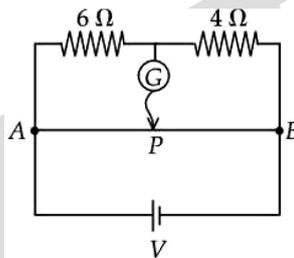
26. A river of width 200 m is flowing from west to east with a speed of 18 km/h. A boat, moving with speed of 36 km/h in still water, is made to travel one-round trip (bank to bank of the river). Minimum time taken by the boat for this journey and also the displacement along the river bank are and _____ respectively.

- (1) 40 s and 200 m (2) 40 s and 100 m (3) 40 s and 0 m (4) 20 s and 100 m

Ans. Official answer NTA (1)**Sol.**

Question ID : 860654863

27. The total length of potentiometer wire AB is 50 cm in the arrangement as shown in figure. If P is the point where the galvanometer shows zero reading then the length A P is _____ cm.



- (1) 30 (2) 20 (3) 15 (4) 25

Ans. Official answer NTA (1)**Sol.**

Question ID : 860654860

28. The kinetic energy of a simple harmonic oscillator is oscillating with angular frequency of 176 rad/s.

The frequency of this simple harmonic oscillator is _____ Hz. $\left[\text{take } \pi = \frac{22}{7} \right]$

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- (1) 14 (2) 28 (3) 88 (4) 176

Ans. Official answer NTA (1)**Sol.**

Question ID : 860654861

29. A capacitor C is first charged fully with potential difference of V_0 and disconnected from the battery. The charged capacitor is connected across an inductor having inductance L. In t s 25% of the initial



energy in the capacitor is transferred to the inductor. The value of t is _____ s.

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(1) $\frac{\pi\sqrt{LC}}{3}$

(2) $\frac{\pi\sqrt{LC}}{2}$

(3) $\pi\sqrt{\frac{LC}{2}}$

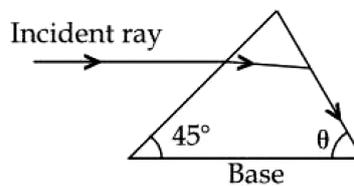
(4) $\frac{\pi\sqrt{LC}}{6}$

Ans. Official answer NTA (4)

Sol.

Question ID : 860654868

30. As shown in the diagram, when the incident ray is parallel to base of the prism, the emergent ray grazes along the second surface.



If refractive index of the material of prism is $\sqrt{2}$, the angle θ of prism is.

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(1) 45°

(2) 60°

(3) 75°

(4) 90°

Ans. Official answer NTA (2)

Sol.

Question ID : 860654852

31. A spherical body of radius r and density σ falls freely through a viscous liquid having density ρ and viscosity η and attains a terminal velocity v_0 . Estimated maximum error in the quantity η is :

(Ignore errors associated with σ, ρ and g , gravitational acceleration)

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(1) $\frac{2\Delta r}{r} + \frac{\Delta v_0}{v_0}$

(2) $2\left[\frac{\Delta r}{r} + \frac{\Delta v_0}{v_0}\right]$

(3) $2\frac{\Delta r}{r} - \frac{\Delta v_0}{v_0}$

(4) $2\left[\frac{\Delta r}{r} - \frac{\Delta v_0}{v_0}\right]$

Ans. Official answer NTA (1)

Sol.

Question ID : 860654866

32. A battery with EMF E and internal resistance r is connected across a resistance R . The power consumption in R will be maximum when :



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- (1) $R = r/2$ (2) $R = \sqrt{2}r$ (3) $R = r$ (4) $R = 2r$

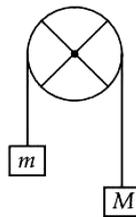
Ans. Official answer NTA (3)**Sol.**

Question ID : 860654854

33. The pulley shown in figure is made using a thin rim and two rods of length equal to diameter of the rim. The rim and each rod have a mass of M . Two blocks of mass of M and m are attached to two ends of a light string passing over the pulley, which is hinged to rotate freely in vertical plane about its center. The magnitudes of the acceleration experienced by the blocks is _____.

(assume no slipping of string on pulley).

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- (1) $\left[\left(\frac{13}{6} \right) M + m \right]$ (2) $\frac{(M - m)g}{2M + m}$ (3) $\frac{(M - m)g}{M + m}$ (4) $\left[\left(\frac{8}{3} \right) M + m \right]$

Ans. Official answer NTA (4)**Sol.**

Question ID : 860654851

34. Keeping the significant figures in view, the sum of the physical quantities 52.01 m, 153.2 m and 0.123 m is :

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- (1) 205 m (2) 205.333 m (3) 205.33 m (4) 205.3 m

Ans. Official answer NTA (4)**Sol.**

Question ID : 860654867

35. Given below are two statements :

Statement I : In a Young's double slit experiment, the angular separation of fringes will increase as the



screen is moved away from the plane of the slits

Statement II : In a Young's double slit experiment, the angular separation of fringes will increase when monochromatic source is replaced by another monochromatic source of higher wavelength

In the light of the above statements, choose the correct answer from the options given below :

Options :

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- (1) Both Statement I and Statement II are false
- (2) Statement I is false but Statement II is true
- (3) Statement I is true but Statement II is false
- (4) Both Statement I and Statement II are true

Ans. Official answer NTA (2)

Sol.

Question ID : 860654859

36. The r.m.s. speed of oxygen molecules at 47°C is equal to that of the hydrogen molecules kept at _____ $^\circ\text{C}$.
(Mass of oxygen molecule/ mass of hydrogen molecule = $32/2$)

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- (1) -100
- (2) -235
- (3) -253
- (4) -20

Ans. Official answer NTA (3)

Sol.

Question ID : 860654869

37. The energy of an electron in an orbit of the Bohr's atom is $-0.04 E_0 \text{ eV}$ where E_0 is the ground state energy. If L is the angular momentum of the electron in this orbit and h is the Planck's constant, then

$$\frac{2\pi L}{h} \text{ is } \underline{\hspace{2cm}} :$$

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- (1) 6
- (2) 2
- (3) 4
- (4) 5

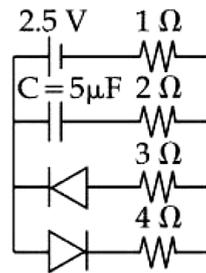
Ans. Official answer NTA (4)

Sol.

Question ID : 860654870

38. The charge stored by the capacitor C in the given circuit in the steady state is _____ μC .

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- (1) 12.5 (2) 10 (3) 5 (4) 7.5

Ans. Official answer NTA (2)

Sol.

Question ID : 860654855

39. Two cars A and B each of mass 10^3 kg are moving on parallel tracks separated by a distance of 10 m, in same direction with speeds 72 km/h and 36 km/h. The magnitude of angular momentum of car A with respect to car B is _____ J.s.

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- (1) 3×10^5 (2) 2×10^5 (3) 3.6×10^5 (4) 10^5

Ans. Official answer NTA (4)

Sol.

Question ID : 860654858

40. Surface tension of two liquids (having same densities), T_1 and T_2 , are measured using capillary rise method utilizing two tubes with inner radii of r_1 and r_2 where $r_1 > r_2$. The measured liquid heights in these tubes are h_1 and h_2 respectively. [Ignore the weight of the liquid about the lowest point of meniscus]. The heights h_1 and h_2 and surfaces tensions T_1 and T_2 satisfy the relation :

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- (1) $h_1 > h_2$ and $T_1 = T_2$ (2) $h_1 < h_2$ and $T_1 = T_2$
 (3) $h_1 > h_2$ and $T_1 < T_2$ (4) $h_1 = h_2$ and $T_1 = T_2$

Ans. Official answer NTA (2)

Sol.

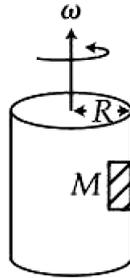
Question ID : 860654857

41. A large drum having radius R is spinning around its axis with angular velocity ω , as shown in figure. The minimum value of ω so that a body of mass M remains stuck to the inner wall of the drum, taking



the coefficient of friction between the drum surface and mass M as μ , is :

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(1) $\sqrt{\frac{\mu g}{R}}$

(2) $\sqrt{\frac{g}{2\mu R}}$

(3) $\sqrt{\frac{2g}{\mu R}}$

(4) $\sqrt{\frac{g}{\mu R}}$

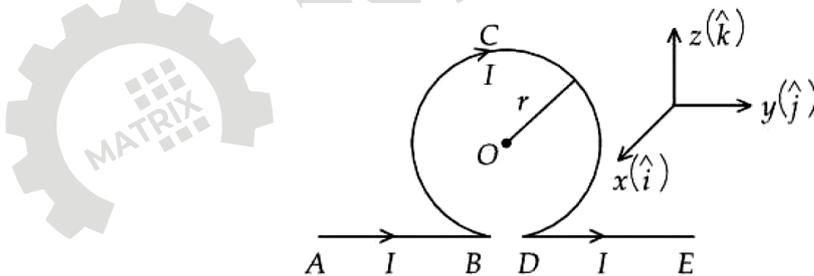
Ans. Official answer NTA (4)

Sol.

Question ID : 860654864

42. An infinitely long straight wire carrying current I is bent in a planer shape as shown in the diagram. The radius of the circular part is r . The magnetic field at the centre O of the circular loop is :

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(1) $-\frac{\mu_0 I}{2\pi r}(\pi + 1)\hat{i}$

(2) $\frac{\mu_0 I}{2\pi r}(\pi + 1)\hat{i}$

(3) $\frac{\mu_0 I}{2\pi r}(\pi - 1)\hat{i}$

(4) $-\frac{\mu_0 I}{2\pi r}(\pi - 1)\hat{i}$

Ans. Official answer NTA (4)

Sol.

Question ID : 860654862

43. Two known resistances of $R\Omega$ and $2R\Omega$ and one unknown resistance $X\Omega$ are connected in a circuit as shown in the figure. If the equivalent resistance between points A and B in the circuit is $X\Omega$, then the

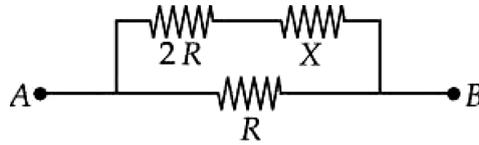
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value of X is _____ Ω .

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- (1) R (2) $(\sqrt{3} + 1)R$ (3) $2(\sqrt{3} - 1)R$ (4) $(\sqrt{3} - 1)R$

Ans. Official answer NTA (4)**Sol.**

Question ID : 860654865

44. Consider two identical metallic spheres of radius R each having charge Q and mass m. Their centers have an initial separation of $4R$. Both the spheres are given an initial speed of u towards each other. The minimum value of u, so that they can just touch each other is :

(Take $k = \frac{1}{4\pi\epsilon_0}$ and assume $kQ^2 > Gm^2$ where G is the Gravitational constant)

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- (1) $\sqrt{\frac{kQ^2}{4mR} \left(1 - \frac{Gm^2}{kQ^2}\right)}$ (2) $\sqrt{\frac{kQ^2}{2mR} \left(1 - \frac{Gm^2}{kQ^2}\right)}$
 (3) $\sqrt{\frac{kQ^2}{4mR} \left(1 + \frac{Gm^2}{kQ^2}\right)}$ (4) $\sqrt{\frac{kQ^2}{2mR} \left(1 - \frac{Gm^2}{2kQ^2}\right)}$

Ans. Official answer NTA (1)**Sol.**

Question ID : 860654856

45. A body of mass 2 kg is moving along x-direction such that its displacement as function of time is given by $x(t) = \alpha t^2 + \beta t + \gamma$, where $\alpha = 1 \text{ m/s}^2$, $\beta = 1 \text{ m/s}$, $\gamma = 1 \text{ m}$. The work done on the body during the time interval $t = 2 \text{ s}$ to $t = 3 \text{ s}$, is _____ J.

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- (1) 24 (2) 49 (3) 42 (4) 12

Ans. Official answer NTA (1)**Sol.****SECTION - B****MATRIX JEE ACADEMY**

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Question ID : 860654873

46. An electromagnetic wave of frequency 100 MHz propagates through a medium of conductivity, $\sigma = 10 \text{ mho / m}$. The ratio of maximum conduction current density to maximum displacement current density is _____.

$$\left[\text{Take } \frac{1}{4\pi\epsilon_0} = 9 \times 10^9 \text{ Nm}^2 / \text{C}^2 \right]$$

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Ans. Official answer NTA (1800)**Sol.**

Question ID : 860654874

47. In a Young's double slit experiment set up, the two slits are kept 0.4 mm apart and screen is placed at 1 m from slits. If a thin transparent sheet of thickness $20 \mu\text{m}$ is introduced in front of one of the slits then center bright fringe shifts by 20 mm on the screen. The refractive index of transparent sheet is given by

$$\frac{\alpha}{10}, \text{ where } \alpha \text{ is } \underline{\hspace{2cm}}.$$

क

Ans. Official answer NTA (14)**Sol.**

Question ID : 860654875

48. A particle having electric charge $3 \times 10^{-19} \text{ C}$ and mass $6 \times 10^{-27} \text{ kg}$ is accelerated by applying an electric potential of 1.21 V. Wavelength of the matter wave associated with the particle is $\alpha \times 10^{-12} \text{ m}$. The value of α is _____. (Take Planck's constant = $6.6 \times 10^{-34} \text{ J.s}$)

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Ans. Official answer NTA (10)**Sol.**

Question ID : 860654872

49. A diatomic gas ($\gamma = 1.4$) does 100 J of work when it is expanded isobarically. Then the heat given to the gas _____ J.



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Ans. Official answer NTA (350)**Sol.**

Question ID : 860654871

50. The terminal velocity of a metallic ball of radius 6 mm in a viscous fluid is 20 cm/s. The terminal velocity of another ball of same material and having radius 3 mm in the same fluid will be _____ cm/s.

क

Ans. Official answer NTA (5)**Sol.**