

JEE Main 2024 Physics Question Paper Jan 29 Shift 1 (B.E./B.Tech)

JEE Main Physics Questions

Ques 1. The voltage applied across the resistance R is 200 ± 5 and current in resistance is 20 ± 0.2 then find % error in resistance.

- A. 3.5 %**
- B. 5 %**
- C. 7 %**
- D. 3 %**

Ans. A

Ques 2. A body of mass 100 kg traveled 10 m before coming to rest. If $\mu = 0.4$, work done against friction is - (motion is happening in a horizontal surface, take $g = 10 \text{ m/s}^2$)

- A. 4500J**
- B. 50000J**
- C. 4200J**
- D. 4000J**

Ans. D

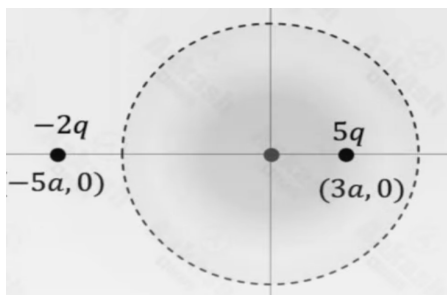
Ques 3. If an object is having the same weight at the same distance above and below the surface of earth. Find its distance from the surface of earth.

- A. $R/2$**

- B. $(\sqrt{5}-1)R/2$
- C. $(\sqrt{3}-1)R/2$
- D. $(\sqrt{5}-1)R$

Ans. B

Ques 4. A solid sphere of radius $4a$ units is placed with its centre at origin. Two charges $-2q$ at $(-5a, 0)$ and $5q$ at $(3a, 0)$ is placed. If the flux through the sphere is xq/ϵ_0 , find x



Ans. 5

Ques 5. Consider the two statements (Assume density of water to be constant):

Statement 1: A capillary tube is first dipped in hot water and then dipped in cold water. The rise is higher in hot water.

Statement 2: Capillary tube is first dipped in cold water and then in hot water. The rise is higher in cold water.

- A. Statement 1 is true and Statement 2 is false
- B. Statement 1 is false and Statement 2 is true
- C. Both Statement are true
- D. Both Statement are false

Ans. B

Ques 6. A stationary hydrogen atom deexcites from first excited state to ground state. Find recoil speed of hydrogen atom up to nearest integer value. (mass of hydrogen atom = 1.8×10^{-27} kg)

Ans. 3

Ques 7. If a particle starting from rest having constant acceleration covers distance S_1 in first $(P - 1)$ seconds & S_2 in first P seconds, then determine time for which displacement is $S_1 + S_2$:

- A. $\sqrt{2P^2 + 1} - 2P$**
- B. $\sqrt{2P^2 + 1} + 2P$**
- C. $\sqrt{(P - 1)^2} - P$**
- D. $2P$**

Ans. A

Ques 8. If the ratio of centripetal acceleration of two particles moving on the same circular path is 3: 4. Find the ratio of their speed.

- A. $2 : \sqrt{3}$**
- B. $\sqrt{3} : 2$**
- C. $\sqrt{3} : 1$**
- D. $\sqrt{2} : 1$**

Ans. B

Ques 9. The De-Broglie wavelength of a proton and an electron is the same. The ratio of kinetic energy of electron to that of proton is

- A. 1**
- B. 1835**
- C. 1/1867**
- D. 933.5**

Ans. B

Ques 10. A capacitor having capacitance of 100 μ F is charged with a potential difference of 12 V is connected to an inductor of inductance 10 mH. Find the maximum current through the inductor.

- A. 2 A**
- B. 1.6 A**
- C. 2.4 A**
- D. 1.2 A**

Ans. D

Ques 11. A gas undergoes a cyclic process ABCA as shown. Find the work done by the gas from $A \rightarrow B \rightarrow C$.

- A. 1800J**
- B. 1200J**
- C. 3600J**
- D. 600J**

Ans. B

Ques 12. If electric current passing through a conductor varies with time as $I = 10 + A \beta t$, where $I_0 = 20 \text{ A}$, $B = 3 \text{ A/S}$, then find charge flow through the conductor in first 10 sec is

- A. 400 C
- B. 500 C
- C. 200 C
- D. 350 C

Ans. D

Ques 13. A square loop of resistance 16Ω is connected with battery of 9 V and internal resistance of 1Ω . In steady state. Find energy stored in capacitor of capacity $C = 4 \mu\text{F}$ as shown. (at steady state current divides symmetrically)

- A. $51.84 \mu\text{J}$
- B. $12.96 \mu\text{J}$
- C. $25.92 \mu\text{J}$
- D. $103.68 \mu\text{J}$

Ans. C

Ques 14. If a biconvex lens of material of refractive index 1.5 has focal length 20 cm in air, then its focal length when it is submerged in a medium of refractive index 1.6 is

- A. -160 cm
- B. 160 cm
- C. 1.6 cm
- D. -16 cm

Ans. A

Ques 15. In a container, 1 g of hydrogen and 1 g of oxygen are taken. Find the ratio of hydrogen pressure to oxygen pressure.

Ans. 16

Ques 16. Potential energy function corresponding to conservative force is given as $U(x, y, z) = 3x^2/2 + 5y + 6z$ then the force at $x = 6$ is pN . The value of p upto 2 its nearest integral value is

Ans. 20

Ques 17. Consider a series of steps as shown. A ball is thrown from 0. Find the minimum speed to directly jump to 5th step.

- A. $5(\sqrt{2}+1)$ m/s
- B. $5(\sqrt{2})$ m/s
- C. $5(\sqrt{(\sqrt{2}+1)})$ m/s
- D. $6(\sqrt{3}+1)$ m/s

Ans. C

Ques 18. An electron is moving with the speed of 1 m/s at a distance of 1 m, from a large sheet of charge with density σ C/m². Find the maximum value of σ such that electron hits the sheet after 1 sec.

(mass of electron = 9×10^{-31} kg, Permittivity of free

space = 9×10^{12} C²/Nm²)

- A. 4.05×10^{-22} C/m²
- B. 8.10×10^{-22} C/m²
- C. 4.05×10^{-24} C/m²
- D. 2.02×10^{-20} C/m²

Ans. A

Ques 19. In a convex mirror having radius of curvature 30 cm the height of image is half the object height. What will be the object distance (in cm)?

Ans. -15 cm

Ques 20. In the voltage regulator circuit shown below, the reverse breakdown voltage of Zener diode is 3 V. Find the current through Zener diode.

- A. 7 mA
- B. 1.5 mA
- C. 5.5 mA
- D. 10 mA

Ans. C

Ques 21. Consider the circuit shown. Galvanometer resistance is $10\ \Omega$ and current through galvanometer is 3 mA. Find the resistance of shunt.



- A. $10^{-3}\ \Omega$
- B. $7.5 \times 10^{-3}\ \Omega$
- C. $6.75 \times 10^{-3}\ \Omega$
- D. $3.75 \times 10^{-3}\ \Omega$

Ans. D

Ques 22. A particle is executing simple harmonic motion along the x - axis, with amplitude A, about the origin. Then the ratio of Kinetic energy and total energy at $x = A/3$ is

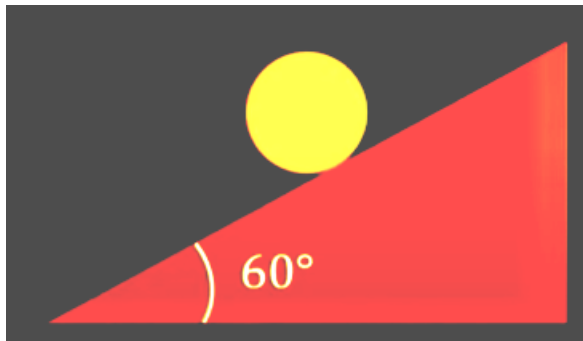
- A. 8/9
- B. $\frac{7}{8}$
- C. 1/9
- D. 1/8

Ans. A

Ques 23. Voltage and resistance for a resistor are measured as $V = 200 \pm 5V$ & $R = 20 \pm 0.2 \Omega$. Find the percentage error in the current $I = V / R$

Ans. 3.5

Ques 24. A solid cylinder is placed gently over an incline plane of inclination 60° . The acceleration of cylinder when it start rolling without slipping is $g/\sqrt{x}$ where μ is the coefficient of friction. [take $g = 10m / (s^2)$]



Ans. 3.00
