

JEE Main 2024 Physics Question Paper Jan 30 Shift 2 (B.E./B.Tech)

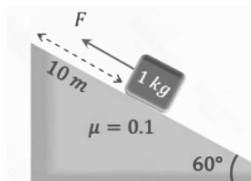
JEE Main Physics Questions

Ques 1. Two particles are projected from a tower of height 400 m & angles 45° & 60° horizontally. If they have the same time of flight, find the ratio of their velocities.

- A. $\sqrt{3}/\sqrt{2}$
- B. $\sqrt{5}/\sqrt{2}$
- C. $\sqrt{3}/\sqrt{4}$
- D. 1

Ans. A

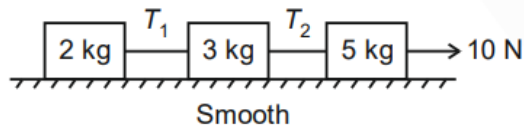
Ques 2. A block of mass 1 kg is ascended on an inclined plane by a distance of 10 m as shown in diagram, with the help of force of 10 N along the incline. Find work done against the friction.



- A. 10 J
- B. $5\sqrt{3}$ J
- C. 5J
- D. $(10 - 5\sqrt{3})$ J

Ans. C

Ques 3. A force of 10 N is applied on a three block system as shown. Find the two tensions T_1 and T_2 .



- A. 2N, 5 N
- B. 5N, 2 N
- C. 3N, 4 N
- D. 4N, 3 N

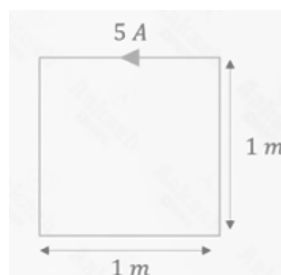
Ans. A

Ques 4. The slope of graph between stopping potential (V_0) and Frequency of incident photon (f) in photoelectric effect is (h = Plank's Constant, e = charge on electron)

- A. h/e
- B. $h/2e$
- C. $2h/e$
- D. e/h

Ans. A

Ques 5. A square loop of side 1 m is carrying a current of 5 A as shown. If the magnetic field at the center is $x\sqrt{2} \times 10^{-7}$ find x .



Ans. 40

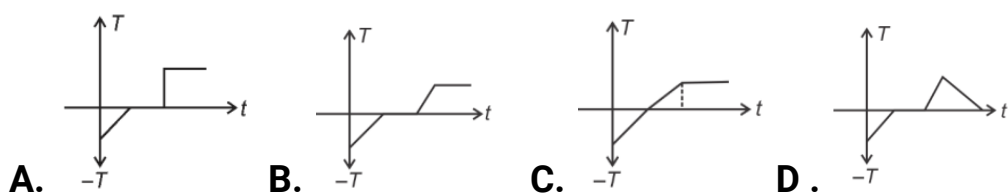
Ques 6. A planet exists of mass $1^{th}/6$ of the earth's mass and radius $1^{rd}/3$ of the earth's radius. If the escape speed for earth is 11.2 km / s then the escape speed for the planet shall be km/s. (nearest integer)

Ans. 8

Ques 7. An electron in the 5th excited state of He^+ atom moves to the 1st excited state. Find the number of possible spectral lines formed.

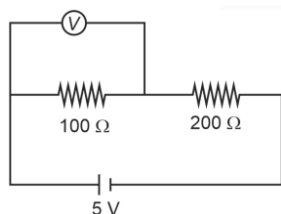
Ans. 10

Ques 8. Ice at temperature -10°C is converted to steam at 100°C , the curve plotted between temperature (T) and time (t) when it is being heated by constant power source is



Ans. B

Ques 9. In given circuit, reading of voltmeter is 1 V, then resistance of

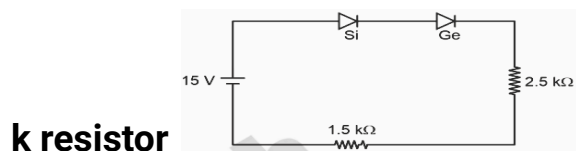


voltmeter is

- A. $100\ \Omega$**
- B. $200\ \Omega$**
- C. $200\sqrt{5}\ \Omega$**
- D. $50\ \Omega$**

Ans. A

Ques 10. In the circuit shown if the potential drop in forward bias across Si and Ge diodes are 0.7 V and 0.3 V, find the potential difference across 2.5 k resistor



k resistor

- A. 9.25 V
- B. 6.25 V
- C. 8.75 V
- D. 9.75 V

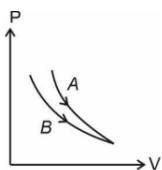
Ans. C

Ques 11. A point source is placed at origin. Its intensity at distance of 2 cm from source is I then intensity at distance 4 cm from the source shall be.

- A. I/2
- B. I/16
- C. I/4
- D. I

Ans. C

Ques 12. The Pressure (P) versus volume (V) of thermodynamic process shown in figure. The select the correct options (Take $\gamma = 1.1$)



- A. For process A : $PV^\gamma = \text{constant}$, For process B : $PV^\gamma = \text{constant}$
- B. For process A : $PV^{1/\gamma} = \text{constant}$ For process B : $PV = \text{constant}$
- C. For process A : $PV^{1.05} = \text{constant}$ For process B : $PV^\gamma = \text{constant}$
- D. For process A : $PV^{1.2} = \text{constant}$ For process B : $PV = \text{constant}$

Ans. D

Ques 13. Voltage across a 5Ω resistor is given as $V = 200 \sin(100\pi t)$. Find out time required for current through it to change from $i_0/2$ to i_0 [i_0 is peak current]

- A. $1/300$ s
- B. $1/600$ s
- C. $1/150$ s
- D. $1/1200$ s

Ans. A

Ques 14. A nucleus of mass M breaks into 3 nuclei with a mass defect of Δm . Find the speed of each daughter nuclei if they have equal mass.

- A. $c \sqrt{6\Delta m/(M-\Delta m)}$
- B. $c \sqrt{2\Delta m/(M-\Delta m)}$
- C. $c \sqrt{3\Delta m/(M-\Delta m)}$
- D. $c \sqrt{\Delta m/(M-\Delta m)}$

Ans. B

Ques 15. In a vernier caliper 49 main scale divisions are equal to 50 vernier scale divisions. If one main scale division is 0.5 mm, then the vernier constant is

- A. 0.01 mm
- B. 0.1 mm
- C. 0.1 cm
- D. 0.01 cm

Ans. A

Ques 16. 6×10^5 J of electromagnetic energy is incident on a surface in time t_0 . Find the total momentum imparted if the surface is completely absorbing.

- A. 2×10^{-3} kgm / s
- B. 10^{-3} kgm / s
- C. 10^{-2} kgm / s
- D. 2×10^{-4} kgm / s

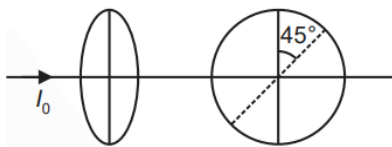
Ans. A

Ques 17. A particle is placed on upward parabolic curve $y = x^2/4$ having co-efficient of friction (μ) = 0.5 . What should be maximum height above x-axis so that it does not slip.

- A. $\frac{1}{4}$ m
- B. $\frac{1}{2}$ m
- C. $\frac{1}{3}$ m
- D. $\frac{3}{4}$ m

Ans. A

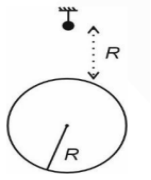
Ques 18. Two polaroids are placed at angle of 45° to each other. If unpolarized light of intensity I_0 falls as one polaroid, then intensity of light leaving second polaroid.



- A. $I_0 / 2$
- B. $I_0 / 2\sqrt{2}$
- C. $I_0 / 4$
- D. $I_0 / 8$

Ans. C

Ques 19. A simple pendulum of length 4 m is located at a height R above the surface of earth. The time period of the simple pendulum is $2\pi \sqrt{8/x}$



seconds. Find x .

Ans. 5

Ques 20. Mass can be expressed as $M = C^p G^{-1/2} h^{1/2}$, where C is speed of light, G is gravitational constant and h is Planck's constant. Find p .

- A. 1
- B. 0.5
- C. -1
- D. -0.5

Ans. B