

Physics Model Question Paper 1: (For Class 11 and 12 and Pre-Medical/Engineering Entrance)

Question 1 : A ray of light enters from a rarer to a denser medium. The angle of incidence is i . Then the reflected and refracted rays are mutually perpendicular to each other. The critical angle for the pair of media is

- (A) $\sin^{-1}(\tan i)$
- (B) $\tan^{-1}(\sin i)$
- (C) $\sin^{-1}(\cot i)$
- (D) $\cos^{-1}(\tan i)$

Answer : (C)

Question 2 : A simple pendulum is suspended from the ceiling of a lift. When the lift is at rest its time period is T . With what acceleration should the lift be accelerated upwards in order to reduce its period to $T/2$? (g is acceleration due to gravity).

- (A) $2g$
- (B) $3g$
- (C) $4g$
- (D) g

Answer : (B)

Question 3 : A small conducting sphere of radius r is lying concentrically inside a bigger hollow conducting sphere of radius R . The bigger and smaller spheres are charged with Q and q ($Q > q$) and are insulated from each other. The potential difference between the spheres will be

(A) $\frac{1}{4\pi\epsilon_0} \left(\frac{q}{r} - \frac{q}{R} \right)$

(B) $\frac{1}{4\pi\epsilon_0} \left(\frac{q}{R} - \frac{Q}{r} \right)$

(C) $\frac{1}{4\pi\epsilon_0} \left(\frac{q}{r} - \frac{Q}{R} \right)$

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(D) $\frac{1}{4\pi\epsilon_0} \left(\frac{Q}{R} - \frac{q}{r} \right)$

Answer : (A)

Question 4 : A string vibrates with a frequency of 200 Hz. When its length is doubled and tension is altered, it begins to vibrate with a frequency of 300 Hz. The ratio of the new tension to the original tension is

- (A) 9 : 1
- (B) 1 : 9
- (C) 3 : 1
- (D) 1 : 3

Answer : (A)

Question 5 : A train is moving slowly on a straight track with a constant speed of 2 ms^{-1} . A passenger in that train starts walking at a steady speed of 2 ms^{-1} to the bank of the train in the opposite direction of the motion of the train. So to an observer standing on the platform directly in front of that passenger, the velocity of the passenger appears to be _____.

- (A) 2 ms^{-1} in the opposite direction of the train
- (B) zero
- (C) 4 ms^{-1}
- (D) 2 ms^{-1}

Answer : (B)

Question 6 : A uniform wire of length L, diameter D and density P is stretched under a tension T. The correct relation between its fundamental frequency 'f', the length L and the diameter D is _____.

(A) $f \propto \frac{L}{D^2}$

(B) $f \propto \frac{1}{LD^2}$

(C) $f \propto \frac{1}{LD}$

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(D) $f \propto \frac{1}{L\sqrt{D}}$

Answer : (C)

Question 7 : According to Einstein's photoelectric equation, the graph of K.E. of the photoelectron emitted from the metal versus the frequency of the incident radiation gives a straight line graph, whose slope _____.

- (A) is same for all metals and independent of the intensity of the incident radiation.
- (B) depends on the nature of the metal.
- (C) depends on the intensity of the incident radiation.
- (D) depends on the nature of the metal and also on the intensity of incident radiation.

Answer : (A)

Question 8 : An astronaut on a strange planet finds that acceleration due to gravity is twice as that on the surface of Earth. Which of the following could explain this?

- (A) Both the mass and radius of the planet are twice as that of Earth.
- (B) Mass of the planet is half as that of Earth, but radius is same as that of Earth.
- (C) Both the mass and radius of the planet are half as that of Earth.
- (D) Radius of the planet is half as that of Earth, but the mass is the same as that of Earth.

Answer : (C)

Question 9 : An electron is moving in an orbit of a hydrogen atom from which there can be a maximum of six transitions. An electron is moving in an orbit of another hydrogen atom from which there can be a maximum of three transitions. The ratio of the velocity of the electron in these two orbits is _____.

(A) $\frac{5}{4}$

(B) $\frac{3}{4}$

(C) $\frac{1}{2}$

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(D) $\frac{2}{1}$

Answer : (B)

Question 10 : An ideal choke draws a current of 8A when connected to an AC supply of 100 V, 50 Hz. A pure resistor draws a current of 10 A when connected to the same source. The ideal choke and the resistor are connected in series and then connected to the AC source of 150 V, 40 Hz. The current in the circuit becomes _____.

(A) 18A

(B) 10A

(C) $\frac{15}{\sqrt{2}}$ A

(D) 8A

Answer : (C)



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