Physics Model Question Paper 5: (For Class 11 and 12 and Pre-Medical/Engineering Entrance)

**Question 1**: If $g$ is the ratio of specific heats and $R$ is the universal gas constant, then the molar specific heat at constant volume $C_v$ is given by

(A) $gR$

($\gamma - 1$) $\frac{R}{\gamma}$

(C) $\frac{R}{\gamma - 1}$

(D) $\frac{gR}{\gamma - 1}$

**Answer**: (C)

**Question 2**: If $\mu_0$ is permeability of free space and $\varepsilon_0$ is permittivity of free space, the speed of light in vacuum is given by

(A) $\sqrt{\mu_0 \varepsilon_0}$

(B) $\sqrt{\mu_0 \frac{1}{\varepsilon_0}}$

(C) $\sqrt{\frac{1}{\mu_0 \varepsilon_0}}$

(D) $\sqrt{\frac{\varepsilon_0}{\mu_0}}$

**Answer**: (C)

**Question 3**: If an electron and a proton have the same de-Broglie wavelength, then the kinetic energy of the electron is

(A) zero

(B) less than that of a proton

(C) more than that of a proton
(D) equal to that of a proton

**Answer : (C)**

**Question 4 :** If the linear momentum of a body is increased by 50%, then the kinetic energy of that body increases by _____
(A) 225%
(B) 25%
(C) 100%
(D) 125%

**Answer : (D)**

**Question 5 :** In a Fraunhofer diffraction experiment at a single slit using a light of wavelength 400 nm, the first minimum is formed at an angle of $30^\circ$. The direction $\Theta$ of the first secondary maximum is given by
(A) $\sin^{-1} \frac{2}{\sqrt{3}}$
(B) $\sin^{-1} \frac{3}{4}$
(C) $\sin^{-1} \frac{1}{4}$
(D) $\tan^{-1} \frac{2}{\sqrt{3}}$

**Answer : (B)**

**Question 6 :** In a given direction, the intensities of the scattered light by a scattering substance for two beams of light are in the ratio of 256 : 81. The ratio of the frequency of the first beam to the frequency of the second beam is ______.
(A) 64 : 27
(B) 2 : 1
(C) 64 : 127
(D) 1 : 2

**Answer : (D)**
**Question 7** : In a series resonant R-L-C circuit, the voltage across R is 100 V and the value of R = 1000 W. The capacitance of the capacitor is $2 \times 10^{-6}$ F; angular frequency of AC is 200 rad s$^{-1}$. Then the P.D. across the inductance coil is ______.

(A) 250 V  
(B) 400 V  
(C) 100 V  
(D) 40 V

**Answer** : (A)

**Question 8** : In an unbiased p-n junction

(A) Potential at p is more than that at n  
(B) Potential at p is less than that at n  
(C) Potential at p is equal to that at n  
(D) Potential at p is +ve and that at n is -ve

**Answer** : (B)

**Question 9** : In Young's double slit experiment, a third slit is made in between the double slits. Then

(A) intensity of fringes totally disappears.  
(B) only bright light is observed on the screen.  
(C) fringes of unequal width are formed.  
(D) contrast between bright and dark fringes is reduced.

**Answer** : (D)

**Question 10** : If a black body emits 0.5 joules of energy per second when it is at 27°C, then the amount of energy emitted by it when it is at 627°C will be

(A) 40.5 J  
(B) 162 J  
(C) 13.5 J  
(D) 135 J

**Answer** : (A)