

**Model Question Paper**  
**Dual nature of radiation and Matter - relativity - Part V**

12th Standard

**Physics**

Reg.No. : 

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I. Answer all the questions.

II. Use blue pen only.

Time : 01:30:00 Hrs

Total Marks : 80

5 x 1 = 5

**Part-A**

- 1) The wavelength of electron having frequency of  $3.3 \times 10^{-24} \text{ kgm/s}$  is \_\_\_\_\_  
(a)  $10 \text{ \AA}$  (b)  $2 \text{ \AA}$  (c)  $20 \text{ \AA}$  (d)  $1 \text{ \AA}$
- 2) An alpha particle and a proton are accelerated through the same potential. The ratio of their de Broglie wavelength is \_\_\_\_\_  
(a) 1 : 1 (b) 1 : 2 (c) 1 : 3 (d)  $1 : 2\sqrt{2}$
- 3) The energy required for the transition  $n = 2$  to  $n = \infty$   
(a) 3.4eV (b) 1.7eV (c) 6.8eV (d) -13.6eV
- 4) Threshold frequency of metal is  $10^5 \text{ Hz}$ , the frequency of incident light is  $2 \times 10^{15} \text{ Hz}$  then the energy of photo electron emitted is \_\_\_\_\_  
(a)  $6.6 \text{ J}$  (b)  $6.625 \times 10^{-19} \text{ J}$  (c)  $12.25 \times 10^{19} \text{ J}$  (d)  $2.25 \times 10^{-19} \text{ J}$
- 5) If threshold wavelength of sodium is  $6800 \text{ \AA}$  what is its work function?  
(a) 0.91eV (b) 13.6 eV (c) 1.82 eV (d) 1.72 eV

**Part-B**

- 6) Find de-Broglie wavelength of electron in the fourth orbit of hydrogen atom.
- 7) Calculate the de Broglie wavelength of an electron, if the speed is  $10^5 \text{ ms}^{-1}$ . (Given  $m = 9.1 \times 10^{-31} \text{ kg}$ ;  $h = 6.626 \times 10^{-34} \text{ J s}$ ).
- 8) Calculate the threshold frequency of photons, which can remove photoelectrons from cesium of work function 1.8 eV
- 9) What is the de- Broglie wavelength of an electron of kinetic energy 120 eV?

4 x 3 = 12

**Part-C**

- 10) At what speed is a particle moving if the mass is equal to three times its rest mass.
- 11) The time interval measured by an observer at rest is  $2.5 \times 10^{-8} \text{ s}$ . What is the time interval as measured by an observer moving with a velocity  $v = 0.73 c$ .
- 12) State the laws of photoelectric emission
- 13) List the uses and limitations of an electron microscope .
- 14) Explain the construction and working of a photo-emissive cell with diagram.
- 15) a) Explain the effect of frequency of incident radiation on stopping potential.  
(OR)  
b) Explain Lorentz-Fitzerald construction or Length contraction.

2 x 5 = 10

5 x 5 = 25

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