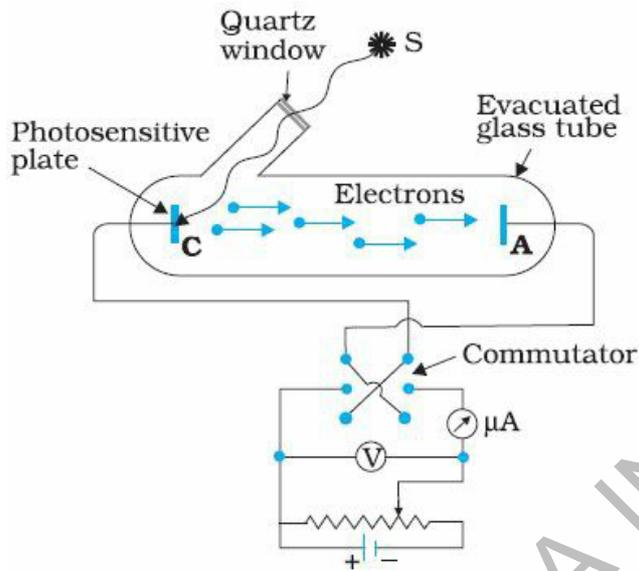**REVISION TEST -05**　　　　**Total Marks -30**

12th Physics -Dual Nature of Radiation and Matter

Multiple Choice Questions　　　　　　5x1 =5

1. For a given frequency of light and a positive plate potential in the set up below, If the intensity of light is increased then

   a. current is less with more intensity

   b. current is inversely proportional to intensity

   c. current is unaffected by more intensity

   d. current is more with more intensity

2. Work function of tungsten and sodium are 4.4eV and 2.3 eV respectively. If threshold wavelength of sodium is $5460\,\overset{0}{A}$, then threshold wavelength of tungsten is

   a. 6000 $\overset{0}{A}$

   b. 11360 $\overset{0}{A}$

   c. 8000 $\overset{0}{A}$

   d. 2854 $\overset{0}{A}$

3. Wavelength associated with a photon having energy 3.1eV is

   a. 4000 $\overset{0}{A}$

b. 3000 $\overset{0}{A}$

c. 5800 $\overset{0}{A}$

d. 5000 $\overset{0}{A}$

4. When an electron enters a magnetic field of 0.01 T with a speed of $10^7 \mathrm{ms}^{-1}$ it describes a circle of radius 6 mm there. Then specific charge of the electron is given by

  a. $1.87 \times 10^{11} \mathrm{Ckg}^{-1}$
  b. $1.67 \times 10^{11} \mathrm{Ckg}^{-1}$
  c. $1.57 \times 10^{11} \mathrm{Ckg}^{-1}$
  d. $1.77 \times 10^{11} \mathrm{Ckg}^{-1}$

5. Number of ejected photoelectrons increases with increase

  a. in frequency of light

  b. in wavelength of light

  c. never

  d. in intensity of light

Short Type 1 Questions   4 x2 =8

6. Write the expression for the de-Broglie wavelength associated with a charged particle having charge q and mass m, when it is accelerated by a potential.

7. Write the relationship of de-Broglie wavelength λ associated with a particle of mass m in terms of its kinetic energy E.

8. For a given photosensitive material and with a source of constant frequency of incident radiation, how does the photocurrent vary with the intensity of incident light?

9. Show that the wavelength of electromagnetic radiation equal to the deBroglie wavelength of its quantum (photon).

Short Type 2 Questions   3 x3 =9

10. The wavelength λ, of a photon and the de-Broglie wavelength of an electron have the same value. Show that energy of a photon is ($2\lambda mc/h$) times the kinetic energy of electron, where m, c and h have their usual meaning.

11. What is the: (a) momentum, (b) speed, and (c) deBroglie wavelength of an electron with kinetic energy of 120 eV?

12. An electron and a photon each have a wavelength 1nm. Find

    i. their momenta
    ii. the energy of the photon
    iii. the kinetic energy of electron.

Long Type Questions   2 x4 =8

13. An electron gun with its collector at a potential of 100 V fires out electrons in a spherical bulb containing hydrogen gas at low pressure (-10^{-2}mm of Hg). A magnetic field of $2.83 \times 10^{-4}T$ curves the path of the electrons in a circular orbit of radius 12.0 cm (The path can be viewed because the gas ions in the path focus the beam by attracting electrons, and emitting light by electron capture this method is known as the 'fine beam tube' method) Determine e/m from the data.

14. What two main observations in photoelectricity led Einstein to suggest the photon theory for the interaction of light with the free electron in metal? Obtain an expression for threshold frequency for photoelectric emission in terms of the work function of the metal.