



# SHIKSHA CLASSES

## BOARD QUESTION PAPER

Subject : Physics  
Class : XII

Topic: 14. Dual Nature of Radiation and Matter

Total Marks : 20  
Time : 1 Hr.

### Section (A)

**Q. 1. : Select and write the most appropriate answer from given alternatives in each sub-question.**

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- i) In Einstein's photoelectric equation,  $E_K = h\nu - \phi$ ,  $E_K$  denotes  
a) Minimum KE of emitted electron      b) Maximum KE of emitted electron  
c) Average KE of emitted electron      d) KE of all the emitted electron
- ii). The K.E. of most energetic photoelectron is  $8 \times 10^{-19} \text{J}$ . The stopping potential will be-  
a) 2 Volt      b) 4 Volt      c) 5 Volt      d) 8 Volt
- iii) Photo electric effect is the emission of  
a) Protons      b) Electrons      c) Photons      d) Positrons
- iv) If the photoelectric work function for a metallic surface is 4.125 eV, the cut-off wavelength for photoelectric phenomenon for the surface is  
a)  $4500 \text{ \AA}$       b)  $1700 \text{ \AA}$       c)  $2800 \text{ \AA}$       d)  $3000 \text{ \AA}$
- v) What happens to the magnetic moment if a hole is made at the centre of a bar magnet?  
a) Decreases      b) Increases  
c) Not a change      d) None of the above

**Q. 2. : Very short answer type Question**

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- i) What is photoelectric effect?  
ii) Calculate the frequency associated with a photon of energy  $3.3 \times 10^{-20} \text{J}$ .

### Section (B)

**: Attempt any three question.**

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**Q. 3. :** Define - a) Threshold frequency b) Stopping potential

**Q. 4. :** Calculate the energy of a photon in eV and in joule in a light of wavelength  $5000 \text{ \AA}$ .

**Q. 5. :** Sheet of silver is illuminated by monochromatic ultraviolet light of wavelength  $1810 \text{ \AA}$ . What is the maximum energy of the emitted electron? Threshold wavelength of silver is  $2640 \text{ \AA}$ .

**Q. 6. :** Explain the term wave particle duality?

**Section (C)**

**: Attempt any one question.**

**3**

**Q. 7. :** Derive de-Broglie wave equation for a particle of mass (m) moving with velocity V.

**Q. 8. :** The photoelectric workfunction of metal is 4.2 eV. If the stopping potential is 3V. Find the threshold wavelength and the maximum kinetic energy of emitted electrons.

**Section (D)**

**: Attempt any one question.**

**4**

**Q. 9. :** i) Explain the effect of potential and frequency of light on photoelectric current..

ii). Determine planck's from a certain metal surface by the light of frequency  $2.2 \times 10^{15}$  Hz are fully retarded by a reverse potential of 6.6V and those emitted by light of frequency  $4.6 \times 10^{15}$  Hz are stopped by a reverse potential of 16.5V.

**Q. 10. :** i) Draw schematic diagram of experimental set up for photoelectric effect. Describe the construction of photoelectric Hertz tube.

iii) Find the maximum kinetic energy of electrons ejected from a certain material , if the materials workfunction is 2.7 eV and the frequency of the incident radiation is  $3.2 \times 10^{15}$  Hz.

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