M.M: 35 **XII PHYSICS TEST (BOOK-2)** **TIME: 1½ HRS.**

1. Write the relationship between angle of incidence '*i*', angle of prism 'A' and angle of minimum deviation δ_m for a triangular prism. **1**

2. Calculate the de-Broglie wavelength of the electrons accelerated through a potential difference of 10 kV. **1**

3. Explain why elemental semiconductor cannot be used to make visible LEDs. **1**

4. In an experiment of photoelectric effect, the slope of the cut-off voltage versus frequency of incident light is found to be 4.12×10^{-15} Vs. Calculate the value of Planck's constant. **1**

5. Derive expression for lens maker formula. **2**

6. The refractive index of a medium is $\sqrt{3}$. What is the angle of refraction, if the unpolarized light is incident on it at the polarizing angle of the medium? **2**

7. Draw energy band diagram of p & n type semiconductors. Also write two differences between p and n type semiconductors. **2**

8. Energy gap in a p– n photodiode is 2.8 eV. Can it detect a wavelength of 6000 nm? Justify your answer. **2**

9. Suggest an idea to convert a full wave bridge rectifier to a half wave rectifier by changing the connecting wire/s. Draw the diagram and explain your answer. **3**

10. A spherical surface of radius of curvature *R* separates air (refractive index 1.0) from glass (refractive index 1.5). The centre of curvature is in glass. A point object P placed in air is found to have a real image Q in glass. The line PQ cuts the surface at a point O and PO = OQ. Find the distance of the object from the spherical surface. **3**

OR

An object of size 3.0 cm is placed 14 cm in front of a concave lens of focal length 21 cm. Describe the image produced by the lens. What happens if the object is moved further away from the lens?

11. Suppose while sitting in a parked car, you notice a jogger approaching towards you in the side view mirror of R = 2 m. If the jogger is running at a speed of 5 m s^{-1}, how fast does the image of the jogger appear to more when the jogger is :

a. 39 m **b.** 29 m **c.** 19 m and **d.** 9 m away? **3**

12. Ultraviolet light of wavelength 2271 Å from 100 W mercury source irradiates a photocell made of molybdenum metal. If the stopping potential is –1.3 V, estimate the work function of the metal. How would the photocell respond to a high intensity (-10^5 W m^{-2}) red light of wavelength 6328 Å produced by a He-Ne laser?

($h = 6.63 \times 10^{-34}$ J s, $c = 3 \times 10^8$ m s^{-1}). **3**

13. The value of ground state energy of hydrogen atom is –13.6 eV. **3**

a. What does the negative sign signify?

b. How much energy is required to take an electron in this atom from the ground state to the first excited state?

14. Explain with an example, whether the neutron to proton ratio increases or decreases during :

a. alpha decay **b.** beta decay **3**

OR

Draw the graph showing the variation of binding energy per nucleon with the mass number. What are the main features of the binding energy curve?

15. a. Discuss the intensity of transmitted light when a polaroid sheet is rotated between two crossed polaroids.

b. Two lenses of power + 15 D and –5 D are in contact with each other forming a combination of lens.

i. What is the focal length of this combination?

ii. An object of size 3 cm is placed at 30 cm from this combination lenses. Calculate the position and size of the image formed. **5**

OR

a. Draw a ray diagram to show the formation of the image of an object placed between the optical centre and focus of a convex lens. Deduce the relationship between the object distance, image distance and focal length under the conditions stated.

b. A diverging lens of focal length *f* is cut into two identical parts, each forming a plano concave lens. What is the focal length of each part?