

SECOND MID TERM TEST - 2024

12 -Std

PHYSICS

Total marks : 40

Time : 1.30 Hrs

10 X 1 = 10

- I. Choose the best answer:
1. First diffraction minimum due to a single slit of width 1.0×10^{-5} cm is at 30° . Then wavelength of light used is (a) 400 Å (b) 500 Å (c) 600 Å (d) 700 Å
 2. The transverse nature of light is shown in (a) interference (b) diffraction (c) scattering (d) polarisation
 3. In an electron microscope, the electrons are accelerated by a voltage of 224 kV. If the voltage is changed to 14 kV, then the de Broglie wavelength associated with the electrons would (a) increase by 2 times (b) decrease by 2 times (c) decrease by 4 times (d) increase by 4 times
 4. The threshold wavelength for a metal surface whose photoelectric work function is 3.313 eV is (a) 4125 Å (b) 3750 Å (c) 6000 Å (d) 2062.5 Å
 5. Emission of electrons by the absorption of heat energy is called _____ emission. (a) photoelectric (b) field (c) Thermionic (d) Secondary
 6. The ratio between the first three orbits of hydrogen atom is (a) 1:2:3 (b) 2:4:6 (c) 1:4:9 (d) 1:3:5
 7. The nucleus is approximately spherical in shape. Then the surface area of nucleus having mass number A varies as (a) $A^{2/3}$ (b) $A^{4/3}$ (c) $A^{1/3}$ (d) $A^{5/3}$
 8. A system consists of N_0 nucleus at $t = 0$. The number of nuclei remaining after half of a half-life (that is, at time $t = \frac{1}{2} T_{1/2}$) (a) $\frac{N_0}{2}$ (b) $\frac{N_0}{\sqrt{2}}$ (c) $\frac{N_0}{4}$ (d) $\frac{N_0}{8}$
 9. The energy of an electron in the third excited state is (a) -1.51 eV (b) -13.6 eV (c) -0.85 eV (d) -0.54 eV
 10. If the wavelength of electromagnetic radiation is doubled, then the energy of photons is (a) remains the same (b) doubled (c) halved (d) infinite

II. Answer any three questions. Q.No. 15 is compulsory.

3 X 2 = 6

11. Define wavefront.
12. State Malus' law.
13. Define work function of a metal. Give its unit.
14. What is isotope? Give an example.
15. Calculate the cut-off wavelength of x-rays from an X-ray tube of accelerating potential 20,000 V.

III. Answer any three questions. Q.No. 20 is compulsory.

3 X 3 = 9

16. Mention the differences between interference and diffraction.
17. Explain any three spectral series of hydrogen atom.
18. Derive the de broglie wavelength of an electron.
19. Write the applications of photoelectric cells.
20. Assuming that energy released by the fission of a single ${}_{92}^{235}\text{U}$ nucleus is 200 MeV, calculate the number of fissions per second required to produce 1 watt power.

IV. Answer all the questions:

3 X 5 = 15

21. Obtain the equation for bandwidth in Young's double slit experiment. (OR) Describe briefly Davisson - Germer experiment which demonstrated the wave nature of electrons.
22. List out the laws of photoelectric effect. (OR) Explain the J.J. Thomson experiment to determine the specific charge of electron.
23. Discuss the diffraction at single slit and obtain the condition for 'n' th minimum. (OR) Obtain the law of radioactivity.