

SECOND MID-TERM TEST - 2024

Time : 1-30 Hours

XII - PHYSICS

Exam No. 1 2 3 3 3

MARKS / 100

PART - I

Note: 1) Answer all the questions.

2) Choose the best answer and write option code with corresponding answer.

(10x1=10)

1. A ray of light travelling in a transparent medium of refractive index n falls on a surface separating the medium from air at an angle of incidence of 60° . The ray can undergo total internal reflection for the following n ,
 - a) $n=1.25$
 - b) $n=1.33$
 - c) $n=1.4$
 - d) $n=1.5$
2. The radius of curvature of curved surface at a thin planoconvex lens is 10cm and the refractive index is 1.5. If the plane surface is silvered, then the focal length will be,
 - a) 5cm
 - b) 10cm
 - c) 15cm
 - d) 20cm
3. When a biconvex lens of glass having refractive index 1.47 is dipped in a liquid, it acts as a plane sheet of glass. This implies that the liquid must have refractive index,
 - a) less than one
 - b) less than that of glass
 - c) greater than that of glass
 - d) equal to that of glass
4. In a Young's double-slit experiment, the slit separation is doubled. To maintain the same fringe spacing on the screen, the screen-to-slit distance D must be changed to,
 - a) $2D$
 - b) D^2
 - c) $\sqrt{2} D$
 - d) $\frac{D}{\sqrt{2}}$
5. A plane glass is placed over a various coloured letters (violet, green, yellow, red). The letter which appears to be raised more is,
 - a) red
 - b) yellow
 - c) green
 - d) violet
6. The transverse nature of light is shown in,
 - a) interference
 - b) diffraction
 - c) scattering
 - d) polarisation
7. If the maximum Kinetic Energy of the free electron inside the metal is 0.5 eV and the energy needed to overcome the surface barrier of a metal is 3 eV then the work function of the metal will be
 - a) 0.5 eV
 - b) 3 eV
 - c) 3.5 eV
 - d) 2.5 eV
8. 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) 20625 Å
9. Emission of electrons by the absorption of heat energy is called _____ emission
 - a) photoelectric
 - b) field
 - c) thermionic
 - d) secondary

10. Calculate the maximum Kinetic Energy and maximum velocity of the photoelectrons emitted when the stopping potential is 81 V
- a) 1.3×10^{-17} J
b) 3×10^{-17} J
c) 1.3×10^{17} J
d) 1.368×10^{-17} J

PART - II

Note: Answer any five questions. Question No.18 is compulsory.

(5x2=10)

11. Why do stars twinkle?
12. What is Rayleigh's scattering?
13. What is principle of reversibility?
14. State Brewster's law.
15. What is double refraction?
16. What is photoelectric effect?
17. Define stopping potential.
18. Calculate the momentum and the de Broglie wavelength in the following case a 4000kg car moving along the highways at 50m/s.

PART - III

Note: Answer any five questions. Question No.26 is compulsory.

(5x3=15)

19. Derive the equation for effective focal length for lenses in contact.
20. What are critical angle and total internal reflection?
21. Mention the differences between interference and diffraction.
22. Obtain the equation for radius of illumination (or) Snell's window.
23. How does photocurrent vary with the intensity of the incident light?
24. List the uses of polaroids.
25. Derive an expression for de Broglie wavelength of electrons.
26. Find the dispersive power of a prism if the refractive indices of flint glass for red, green and violet colours are 1.613, 1.620 and 1.632 respectively.

PART - IV

Note: Answer all the questions.

(3x5=15)

27. a) Derive the equation for refraction at single spherical surface.
(OR)
b) Explain about compound microscope and obtain the equation for the magnification.
28. a) Obtain lens maker's formula and mention its significance.
(OR)
b) Obtain Einstein's photoelectric equation with necessary explanation.
29. a) Prove law of refraction using Huygen's principle.
(OR)
b) Describe briefly Davission-Germer experiment which demonstrated the wave nature of electrons.