

SIR .CV .RAMAN COACHING CENTRE – IDAPPADI,SALEM –2025

XII- PHYSICS UNIT [6,7,8,9]-MODEL QUESTION PAPER – 2025

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TOTAL MARK : 70M ,TIME : 3 HRS

SECTION – A (15 X 1 = 15 M)

Choose the correct best answer :

1 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) $\frac{D}{2}$ |
| (c) $\sqrt{2}D$ | (d) $\frac{D}{\sqrt{2}}$ |

2. Light transmitted by Nicol prism is,

- (a) partially polarised (b) unpolarised (c) plane polarised (d) elliptically polarised

3. 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

4. For light incident from air on a slab of refractive index 2, the maximum possible angle of refraction is,

- | | |
|----------------|----------------|
| (a) 30° | (b) 45° |
| (c) 60° | (d) 90° |

5. 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

6. An air bubble in glass slab of refractive index 1.5 (near normal incidence) is 5 cm deep when viewed from one surface and 3 cm deep when viewed from the opposite face. The thickness of the slab is,

- a) 12 cm b) 10 cm c) 15 cm d) 18 cm

7. 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 45° . The ray can undergo total internal reflection for the following n ,

- | | |
|----------------|----------------|
| (a) $n = 1.25$ | (b) $n = 1.33$ |
| (c) $n = 1.4$ | (d) $n = 1.5$ |

8. In an electron microscope, the electrons are accelerated by a voltage of 14 kV. If the voltage is changed to 224 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

9. In photoelectric emission, a radiation whose frequency is 4 times threshold frequency of a certain metal is incident on the metal. Then the maximum possible velocity of the emitted electron will be

| | |
|-----------------------------|-----------------------------|
| a) $\sqrt{\frac{hv_0}{m}}$ | b) $\sqrt{\frac{6hv_0}{m}}$ |
| c) $2\sqrt{\frac{hv_0}{m}}$ | d) $\sqrt{\frac{hv_0}{2m}}$ |

10. 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 |

11. Emission of electrons by the absorption of heat energy is called.....emission

a) photo electric b) field c) thermionic d) secondary

12. 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) $A^{5/3}$ |

13. The charge of cathode rays particle is

a) positive b) negative c) zero d) infinity

14. A radioactive nucleus (initial mass number A and atomic number Z) emits two α -particles and 2 positrons. The ratio of number of neutrons to that of proton in the final nucleus will be

| | |
|-------------------------|--------------------------|
| (a) $\frac{A-Z-4}{Z-2}$ | (b) $\frac{A-Z-2}{Z-6}$ |
| (c) $\frac{A-Z-4}{Z-6}$ | (d) $\frac{A-Z-12}{Z-4}$ |

15. Photons of wavelength λ are incident on a metal. The most energetic electrons ejected from the metal are bent into a circular arc of radius R by a perpendicular magnetic field having magnitude B. The work function of the metal is

| | |
|--|--|
| a) $\frac{hc}{\lambda} - m_e c^2 + \frac{e^2 B^2 R^2}{2m_e}$ | c) $\frac{hc}{\lambda} - m_e c^2 - \frac{e^2 B^2 R^2}{2m_e}$ |
| b) $\frac{hc}{\lambda} + 2m_e \left[\frac{eBR}{2m_e} \right]^2$ | d) $\frac{hc}{\lambda} - 2m_e \left[\frac{eBR}{2m_e} \right]^2$ |

SECTION – B (6 X 2 = 12 M)

Answer any six questions compulsory no .24

16. How are rainbows formed?

17. What is power of a lens?

18. List the uses of polaroid.

19. What are coherent sources?

20. Why do we not see the wave properties of a baseball ?

21. What is surface barrier?

22. Define impact parameter

23. Define curie

24. Calculate the number of nuclei of carbon-14 undecayed after 22,920 years if the initial number of carbon-14 atoms is 10,000. The half-life of carbon-14 is 5730 years.

SECTION –C (6 X 3 = 18 M)

Answer any six questions compulsory no . 33

- 25.Explain the idea of carbon dating
- 26 .Discuss the gamma emission process with example
- 27Give the applications photocell
- 28.List out the laws of photoelectric effect
- 29.Discuss about Nicol prism
- 30.What is Fresnel's distance? Obtain the equation for Fresnel's distance
- 31.Obtain the equation for apparent depth
- 32.Derive the equation for effective focal length for lenses in contact.
- 33.A radiation of wavelength 300 nm is incident on a silver surface. Will photoelectrons be observed? [work function of silver = 4.7 eV]

SECTION –D (5X 5= 25M)

Answer All questions :

34 a) Explain the variation of average binding energy with the mass number using graph and discuss about its features

(or)

b) Explain in detail the nuclear force.

35 a) Give the construction and working of photo emissive cell.

(or)

b) Briefly explain the principle and working of electron microscope

36 .a) Prove law of reflection using Huygens' principle

(or)

b) Obtain the equation for resultant intensity due to interference of light

37 a) Derive the equation for acceptance angle and numerical aperture of optical fibre

(or)

b) Derive the mirror equation and the equation for lateral magnification.

38. a) Discuss the Millikan's oil drop experiment to determine the charge of an electron

(or)

b) What do you mean by electron emission? Explain briefly various methods of electron emission

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