

QUESTION BANK

SUBJECT : Engineering Physics-I

Module 4: Interference of Light

Module 5: superconductors

1. Give the relationship between optical path & geometrical path.
2. What will be the phase change or path change when light is reflected from :
 - i) rarer to denser boundary
 - ii) From denser to rarer boundary
3. What is a thin film?
4. Obtain the condition for maxima and minima of the light reflected from a thin transparent film of uniform thickness. Why is the visibility of the fringe much higher in the reflected system than in transmitted system?
5. Write the expression for path difference of wedge shaped film and hence deduce the condition for maxima and minima due to interference in a wedge shape film observed in reflected light.
6. Obtain the expression for the n^{th} dark ring in Newton's ring experiment, Hence explain the suitable way to calculate refractive index of liquid using the same set-up.
7. How is Newton's rings experiment used to determine wavelength of a monochromatic source of light.
8. How can Newton's ring be obtained in the laboratory? Why do we get circular rings? Show the radius of the Newton's ring is proportional to square root of natural numbers.
9. Explain in short what will be the Newton's rings pattern, if:
 - i. White light replaces the monochromatic light?
 - ii. The Plano convex lens of larger radius of curvature R is used?
10. What do you mean by a thin film? Comment on the colours in thin films in sunlight.
11. Explain why the system of Newton's rings observed by transmitted light is complementary to that observed by reflected light.
12. How is the phenomenon of interference used to test the optical flatness of a surface
13. Discuss the condition required for a film to act as anti-reflection coating.
14. What will be the fringe pattern if wedge shape air film is illuminated with a white beam of light

15. Explain why thin film interference pattern for wedge shaped film is parallel whereas newton's ring is circular.

16. Why does the fringe width decrease as order increases in Newton's rings but remains constant in a wedge shape film?

17. Compare Type I super conductor with Type II super conductor

18. Explain with a proper diagram the Meissner effect

- Define Critical Temperature and critical magnetic field for the superconductor

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19. What are high temperature and low temperature super conductors? On what basis are they classified? (2M).
20. What is the principal of magnetic levitation? (2M)
21. A parallel beam of light ($\lambda=5890 \text{ \AA}$) is incident on a thin glass ($\mu=1.5$) such that the angle of refraction into the plate is 60° . Calculate the smallest thickness of the glass plate which will appear dark by reflection.
22. A soap film of $\mu=4/3$ and of thickness $1.5 \times 10^{-4} \text{ cm}$ is illuminated by white light incident at an angle of 45° . The light reflected by it is examined by a spectroscope in which is found a dark band corresponding to wavelength of $5 \times 10^{-5} \text{ cm}$. Calculate the order of interference band.
23. Fringes of equal thickness are observed in a thin glass wedge of refractive index 1.52. The fringe spacing is 1 mm and wavelength of light is 5893 \AA . Calculate the angle of wedge in seconds of an arc.
24. White light falls normally on a film of soapy water whose thickness is $5 \times 10^{-5} \text{ cm}$ and $\mu=1.33$. Which wavelength in the visible region will be reflected most strongly?
25. A wedge shaped air film having angle of 40 seconds is illuminated by monochromatic light. Fringes are observed vertically through a microscope. The distance between 10 consecutive dark fringes is 1.2 cm. Find wavelength of monochromatic light
26. Two plane rectangular pieces of glass are in contact at one edge and are separated at the other end 10 cm away by a wire to form a wedge shaped film. When the film was illuminated by the light of wavelength 6000 \AA , 10 fringes were observed per cm. Determine the diameter of the wire.
27. In a Newton's ring experiment, the diameter of the 5th ring was 0.5 mm and the diameter of 25th ring was 0.8 mm. If the radius of curvature of the Plano convex lens is 100 cm, find the wavelength of light used.
28. A Newton's ring arrangement is used with a source emitting two wavelengths $\lambda_1=6 \times 10^{-5} \text{ cm}$ and $\lambda_2=4.5 \times 10^{-5} \text{ cm}$ and it is found that nth dark ring due to λ_1 coincides with (n+1)th dark ring for λ_2 . If radius of curvature of the curved surface is 90 cm, find the diameter of the nth dark ring for λ_1
29. In Newton's ring experiment, the diameters of the 4th and 12th dark rings are 4 mm and 7 mm respectively. Find the diameter of the 20th dark ring.
30. Can a thin film of water ($\mu_f=1.33$) formed on a glass window plane ($\mu_g=1.52$) act as a nonreflecting film. If so how thick should be the water film.

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