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QUESTION BANK

QUESTION PAPER

WAVE OPTICS ONE

MARK QUESTIONS

1. What is the polarizing angle of a medium of refractive index 1.732?
2. Sketch the variation of intensity of interference pattern in Young's double slit experiment.
3. What is the ratio of fringe width of bright and dark fringes in Young's double slit experiment?
4. What is the effect on interference fringes in Young's double slit experiment if one slit is covered?
5. A polarizer and analyzer are so oriented that intensity of transmitted light is maximum. If the analyzer is rotated through 60° what fraction of maximum light is transmitted?
6. Draw a graph showing variation of intensity of polarized light transmitted by an analyzer.
7. Bubbles of a colourless soap solution appear colored in sun light. Why?
8. What happens to the energy at destructive interference in interference pattern?

TWO MARK QUESTIONS

9. What will be the effect on interference fringes in Young's double slit experiment if (i) Monochromatic source is replaced by white light; (ii) Screen is moved away from the slit. Justify your answer.
10. Name one device for producing polarized light. Two polarizers are placed perpendicular to each other and the transmitted intensity is zero. What happens when one more Polaroid is placed between these two at an angle of 45° ?
11. In Young's experiment the width of the fringes obtained with light of wavelength 6000 \AA is 2mm. What will be the fringe width if the apparatus is immersed in a liquid of refractive index $4/3$?
12. Show that the maximum intensity in interference pattern is four times the intensity due to each slit.
13. In a single slit diffraction experiment, the width of the slit is made double the original width. How does this affect the size and intensity of central diffraction band?
14. How does the resolving power of a microscope change on (i) decreasing the wavelength of light (ii) decreasing the diameter of the objective lens?
15. Draw the wavefront for a beam of light (i) coming from a convex lens when a point source is placed at its focus (ii) divergent radially from a point source.
16. The refractive index of a denser medium is 1.732. Calculate (i) Polarising angle of the medium (ii) angle of refraction.
17. Determine the angular separation between the central maximum, and first order maximum of diffraction pattern due to a single slit of width 0.25mm.
18. State two conditions for sustained interference of light. Draw the variation of intensity with position in Young's double slit experiment.

THREE MARK QUESTIONS

19. State Huygens principle. For reflection of plane wavefront at a plane reflecting surface, construct the corresponding reflected wavefront. Using this diagram prove that angle of incidence is equal to angle of reflection.
20. Two independent sources of light cannot be coherent. Why? Two coherent sources have intensities in the ratio 25:16. Find the ratios of the intensities of maxima to minima after interference.

21. In a single slit diffraction experiment width of the slit is made double the original width. How does it affect the size and intensity of central diffraction band. Explain. Draw a graph showing variation of intensity with angle in single slit diffraction.
22. What is meant by plane polarized light. What type of waves show the property of polarization? Describe a method to produce plane polarized light.
23. Define polarizing angle. Derive the relation connecting polarizing angle and refractive index of the medium.
24. State Huygens's principle. Deduce the laws of refraction on the basis of Huygens's principle.
25. When two narrow slits 2mm apart are illuminated by a light of wavelength 5000 \AA the third minima is measured to be 0.5mm from the central maxima on a screen. What is the distance of the screen from the slit?
26. How does the resolving power of a microscope change when (i) the wavelength of the light is increased (ii) the microscope is kept inside water (iii) diameter of the objective lense is doubled.
27. In Young's double slit experiment when a source of light of wavelength 5000 \AA is used the fringe width obtained is 0.6cm. If the distance between slit and screen is reduced to half what would be the wavelength of source to get a 0.003 m wide fringes.

OR

State the essential

condition for diffraction of light to occur. The light of wavelength 600nm is incident normally on a slit if width 3mm. calculate the linear width of central maximum when the screen is 3m away from the slit.

FIVE MARK QUESTIONS

28. Explain the phenomenon of diffraction of light at a single slit. Show graphically the variation of intensity with angle in the diffraction pattern.
What is meant by the term angular resolution of a telescope?
29. What do you understand by polarization of light? What are plane of polarization and plane of vibration? Explain polarization (i) by scattering (ii) by reflection.
30. Explain Young's double slit experiment of interference of light waves. Calculate the path difference between interfering waves and give conditions for maxima and minima. . Get the expression for dark and bright fringes
