

BHARATIYA VIDYA BHAVAN'S V M PUBLIC SCHOOL, VADODARA

QUESTION BANK

Wave Optics Test 1

Marks: 20

1. Draw a diagram to show cylindrical wavefront? [1]
2. A light wave enters from air to glass. How will the following be affected: [1] (i)
Energy of the wave
(ii) Frequency of the wave:
3. Obtain an expression for the ratio of intensities at maxima and minima in an interference pattern. [2]
4. A slit S is illuminated by a monochromatic source of light to give two coherent sources P_1 and P_2 . These give bright and dark bands on a screen. At a point R, on the screen, there is a dark fringe. What relation must exist between the lengths P_1R and P_2R ? [2]
5. State Brewster law? Using this law prove that, at the polarizing angle of incidence, the reflected and transmitted rays are perpendicular to each other? [3]
6. In a single slit experiment, how is the angular width of central bright fringe maximum changed when [3]
 - 1) The slit width increased
 - 2) The distance between the slit and the screen is increased.
 - 3) Light of smaller wavelength is used.
7. In a young's double slit experiment, the slit are repeated by 0.24mm. The screen is 1.2m away from the slits. The fringe width is 0.3cm calculate the wavelength of light used in the experiment? [3]
8. (a) State Huygens's principle for constructing wavefronts? [2] (b) Using Huygens's principle deduce the laws of reflection of light? [3]

(c) What changes in diffraction pattern of a single slit will you observe when the monochromatic source of light is replaced by a source of white light? [2]

Wave Optics Test 2

Marks: 20

1. State the conditions that must be satisfied for two light sources to be coherent? [1]
2. In young's double slit experiment. The distance between the slits is halved, what change in the fringe width will take place? [1]
3. Consider interference between two sources of intensities I and $4I$.
What will be the intensity at points where phase differences is $(\frac{\pi}{2})$ [2]
4. Can white light produce interference? What is the nature? [2]
5. In young's double slit experiment while using a source of light of wavelength 5000\AA , the fringe width obtained is 0.6cm . If the distance between the slit and the screen is reduced to half, calculate the new fringe width? [3]
6. What is polarization of light? What type of waves show the property of polarization?
Name any two methods to produce plane polarized light? [3]
7. Draw the curve depicting, variation of intensity in the interference pattern in young's double slit experiment. State conditions for obtaining sustained interference of light? [3]

8. (a) Derive all expression for the fringe width in young's double slit experiment? [3]
 (b) If the two slits in young's double slit experiment have width ratio 4:1, deduce the ratio of intensity of maxima and minima in the interference pattern? [2]

Wave Optics Test 3

Marks: 20

1. What is the Brewster angle for air to glass transition? ($\mu_g=1.5$) [1]
2. What is the shape of the wavefront when light is diverging from a point source? [1]
3. In young's double slit experiment how is the fringe width change when
 (a) Light of smaller frequency is used
 (b) Distance between the slits is decreased? [2]
4. Write two points of difference between interference and diffraction? [2]
5. Two coherent sources whose intensity ratio is 81:1 produce interference fringes. Calculate the ratio of intensity of maxima and minima in the interference pattern? [2]
6. Using Huygens's principle deduce the laws of refraction? [3]
7. A young's double slit experiment using light of wavelength 400 nm, interference fringes of width to 600nm, and the separation between the slits is halved. If one wants the observed fringe width on the screen to be the same in the two cases, find the ratio of the distance between the screen and the plane of the interfering sources in the two arrangements. [3]
8. (a) Coloured spectrum is seen, when we look through a muslin cloth. Why? [1]
 (b) What changes in diffraction pattern of a single slit will you observe when the monochromatic source of light is replaced by a source of white light? [2]

9. A slit of width 'a' is illuminated by light of wavelength 6000 \AA . For what value of 'a' will the :-
- (i) First maximum fall at an angle of diffraction of 30° ?
 - (ii) First minimum fall at an angle of diffraction 30° ?
- [3]