



INDIAN SCHOOL DARSAIT
DEPARTMENT OF PHYSICS



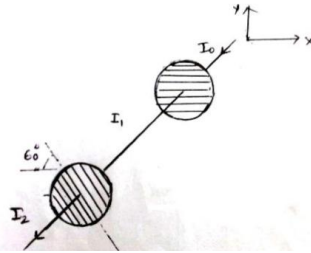
Subject : Physics	Topic : <u>WAVE OPTICS</u>	Date of Worksheet : 10.10.18
Resource Person: Susan Anil		Worksheet # 10
Name of the Student : _____	Class & Division : XII _____	Roll Number : ____

1. If the angle between the pass axis of polarizer and the analyser is 45° , write the ratio of the intensities of original light and the transmitted light after passing through the analyser. 1
2. Draw the wavefront coming out of a convex lens when a point source of light is placed at its focus. 1
3. Unpolarised light of intensity I is passed through a polaroid. What is the intensity of the light transmitted by the polaroid? 1
4. Why are coherent sources required to create interference of light? 1
5. How the angular separation and visibility of fringes in Young's double slit experiment change when (i) screen is moved away from the plane of the slits, and (ii) width of the source slit is increased? 2
6. The following table gives data about the single slit diffraction experiment: 2

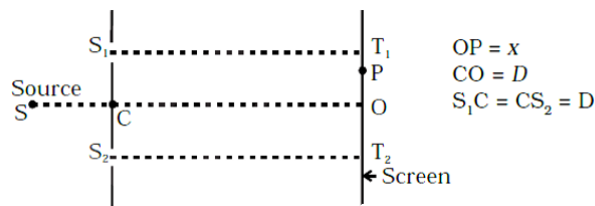
Wave length of Light	Half Angular width of the principal maxima
λ	θ
$p \lambda$	$q \theta$

Find the ratio of the widths of the slits used in the two cases. Would the ratio of the half angular widths of the first secondary maxima, in the two cases, be also equal to q ?

7. State Huygen's principle. Using it, construct a ray diagram for a plane wave front getting incident on a denser medium. 2
8. Define the term 'linearly polarised light.' When does the intensity of transmitted light become maximum, when a polaroid sheet is rotated between two crossed polaroids? 2
9. Figure shows a system of two polarizing sheets in the path of initially unpolarized light. The polarizing direction of first sheet is parallel to x-axis and that of second sheet is 60° clockwise from x-axis. Calculate what fraction of intensity of light emerges from the system. 2



10. When unpolarised light is incident on the boundary separating the two transparent media, explain, with the help of a suitable diagram, the conditions under which the reflected light gets polarised. Hence define Brewster's angle and write its relationship in terms of the relative refractive index of the two media. 3
11. In a single slit diffraction experiment, when a tiny circular obstacle is placed in the path of light from a distant source, a bright spot is seen at the centre of the shadow of the obstacle. Explain why? State two points of difference between the interference pattern obtained in Young's double slit experiment and the diffraction pattern due to a single slit. 3
12. Consider a two slit interference arrangement (shown in figure) such that the distance of the screen from the slits is half the distance between the slits. Obtain the value of D in terms of λ such that the first minima on the screen fall at a distance D from the centre O . 3



13. In Young's double slit experiment, monochromatic light of wavelength 630 nm illuminates the pair of slits and produces an interference pattern in which two consecutive bright fringes are separated by 8.1 mm. Another source of monochromatic light produces the interference pattern in which the two consecutive bright fringes are separated by 7.2 mm. Find the wavelength of light from the second source. What is the effect on the interference fringes if the monochromatic source is replaced by a source of white light? 3
14. (a) In a single slit diffraction experiment, a slit of width ' d ' is illuminated by red light of wavelength 650 nm. For what value of ' d ' will:
 (i) the first minimum fall at an angle of diffraction of 30° , and
 (ii) the first maximum fall at an angle of diffraction of 30° ? 3
 (b) Why does the intensity of the secondary maximum become less as compared to the central maximum?
15. (a) A monochromatic source of light of wavelength λ illuminates a narrow slit of width d to produce a diffraction pattern on the screen. Obtain the conditions when secondary wavelets originating from the slit interfere to produce maxima and minima on the screen. 5
 (b) How would the diffraction pattern be affected when
 (i) the width of the slit is decreased?
 (ii) the monochromatic source of light is replaced by white light?