INDIAN SCHOOL MUSCAT

CLASS :……XII……

SUBJECT:……Physics……..

WORKSHEET

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DATE :……

TOPIC/SUB-TOPIC :……Wave Optics ……

Section A Conceptual and application type questions

1	Which phenomenon of light shows the transverse nature of light ?.	1
2	Define polarisation of light.	1
3	What is the effect on the interference fringes if the monochromatic source is replaced by a source of white light?	1
4	What is the effect on the interference fringes if the monochromatic source of red is replaced by a source of blue light?	1
5	Which phenomenon of light could not be explained by wave theory?	1
6	What is the angle between refracted and reflected light when the reflected light is completely polarised ?	1
7	Which is more observable diffraction of light or sound ? Justify .	1
8	Explain the polarization of sun light by scattering in the atmosphere.	2
9	State and prove Brewster's law of polarisation.	2
10	State Huygen's postulates of wave theory	3
11	What is the shape of the wave front produced by a) a point source at finite distance b) a point source at infinite distance c) linear source.	3
12	Draw ray diagrams to show secondary wave fronts when a plane wave front incident on a) concave mirror b) convex mirror c) convex lens d) concave lens e) prism	3
13	Define wavefront . Using Huygen's construction draw a figure showing thepropagation of a plane wave refracting at a plane surface separating two media. Hence verify Snell's law of refraction	3
14	How does the fringe width of interference fringes change, when the whole apparatus of Young's experiment is kept in a liquid of refractive index 1.3 ?	2
15	State the differences between interference and diffraction.	2
16	Define angular width and linear width of central maximum of diffraction at a single slit.	
18	State Malus law of polarization and explain how will you represent Malus Law	

graphically?

19 Show that the resultant intensity of two light waves of same amplitude and frequency undergo interference is

$$I = 4\, I_0 \cos^2(\phi/2)$$

20 What is the effect on the interference fringes in a Young's double-slit experiment due to each of the following operations:
(a) the screen is moved away from the plane of the slits;
(b) the (monochromatic) source is replaced by another (monochromatic) source of shorter wavelength;
(c) the separation between the two slits is increased;
(d) the source slit is moved closer to the double-slit plane;
(e) the width of the source slit is increased;
(f) the monochromatic source is replaced by a source of white light?

Section B Numerical problems

1 Two slits are made one millimetre apart and the screen is placed one metre away. What is the fringe separation when bluegreen light of wavelength 500 nm is used? 2

2 For what distance is ray optics a good approximation when the aperture is 3 mm wide and the wavelength is 500 nm? 2

3 Assume that light of wavelength 6000Å is coming from a star. What is the limit of resolution of a telescope whose objective has a diameter of 100 inch? 2

4 Two slits are made one millimetre apart and the screen nis placed one metre away. What is the fringe separation when blue green light of wavelength 500 nm is used? 2

5 The angle of polarisation is 53° for a medium calculate the refractive index and critical angle of the medium. 2

6 In Young's double-slit experiment using monochromatic light of wavelength λ, the intensity of light at a point on the screen where path difference is λ, is K units. What is the intensity of light at a point where path difference is λ/3? 2

7 Two polaroids are set in crossed positions. A third polaroid is placed between the two making an angle θ with the pass axis of the first polaroid. Write the expression of the intensity of light transmitted from the second polaroid. In what orientations will the transmitted intensity be
(i) minimum and (ii) maximum? 3

8 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 3