# CLASS XII PHYSICS TEST ON WAVE OPTICS

**MARKS : 30** **TIME : 1 HR.**

**1.** What type of wavefront will emerge from a: **a.** point source **b.** distant light source **1**

**2.** Define wavefront. **1**

**3.** Why microscopes have oil immersions inside the tube? **1**

**4.** Draw a labelled ray diagram showing the formation of image in a compound microscope when image is formed at D. **2**

**5.** How will the interference pattern in Young's double slit experiment get affected, when **2**

**a.** distance between the slits $S_1$ and $S_2$ reduced

**b.** the entire set-up is immersed in water? Justify your answer in each case.

**OR**

In a single slit diffraction experiment, a monochromatic source of light of wavelength $\lambda$ illuminates a narrow slit of width a. Show, giving appropriate reasoning, that the half angular width of the central maximum in the observed pattern is (nearly) equal to $\lambda/a$.

**6.** Derive expressions for position of fringes and fringe width in YDS experiment. **2**

**7.** **a.** Using Huygens's principle deduce the laws of refraction of light?

**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 + 1 = 3**

**8.** Derive lens makers formula for a convex lens. **3**

**8.** What are coherent sources? Why are coherent sources required to produce interference of light? Give an example of interference of light in everyday life. In Young's double slit experiment, the two slits are 0.03 cm apart and the screen is placed at a distance of 1.5 m away from the slits. The distance between the central bright fringe and fourth bright fringe is 1 cm. Calculate the wavelength of light used. **5**

**10.** **a.**In Young's double slit experiment, derive the condition for (i) constructive interference and (ii) destructive interference at a point on the screen.

**b.** A beam of light consisting of two wavelengths, 800 nm and 600 nm to used to obtain the interference fringes in a Young's double slit experiment on a screen placed 1.4 m away. If the two slits are separated by 0.28 mm, calculate the least distance from the central bright maximum where the bright fringes of the two wavelengths coincide. **5**

**11. a.** Using Huygens principle explain how a diffraction pattern is obtained on a screen due to a narrow slit on which a narrow beam coming from a monochromatic source of light is incident normally.

**b.** Show that the angular width of the first diffraction fringe is half of that of the central fringe.

**c.** If a monochromatic source of light is replaced by white flight, what change would your observe in the diffraction pattern? **5**