Q1. 21 January Shift 1

In a double slit experiment the distance between the slits is 0.1 cm and the screen is placed at 50 cm from the slits plane. When one slit is covered with a transparent sheet having thickness t and refractive index $n(=1.5)$, the central fringe shifts by 0.2 cm. The value of t is ____ cm.

(1) 5.0×10^{-3} (2) 6.0×10^{-3} (3) 8×10^{-4} (4) 5.6×10^{-4}

Q2. 21 January Shift 2

Given below are two statements :

Statement I : In a Young's double slit experiment, the angular separation of fringes will increase as the screen is moved away from the plane of the slits

Statement II: In a Young's double slit experiment, the angular separation of fringes will increase when monochromatic source is replaced by another monochromatic source of higher wavelength.

In the light of the above statements, choose the correct answer from the options given below :

(1) Both Statement I and Statement II are false (2) Statement I is false but Statement II is true

(3) Both Statement I and Statement II are true (4) Statement I is true but Statement II is false

Q3. 21 January Shift 2

In a Young's double slit experiment set up, the two slits are kept 0.4 mm apart and screen is placed at 1 m from slits. If a thin transparent sheet of thickness 20μ m is introduced in front of one of the slits then center bright fringe shifts by 20 mm on the screen. The refractive index of transparent sheet is given by $\frac{\alpha}{10}$, where α is ____.

Q4. 22 January Shift 2

Which of the following are true for a single slit diffraction?

A. Width of central maxima increases with increase in wavelength keeping slit width constant.

B. Width of central maxima increases with decrease in wavelength keeping slit width constant.

C. Width of central maxima increases with decrease in slit width at constant wavelength.

D. Width of central maxima increases with increase in slit width at constant wavelength.

E. Brightness of central maxima increases for decrease in wavelength at constant slit width.

(1) A, D, E only (2) A, D only (3) B, D only (4) B, C only

Q5. 23 January Shift 1

In two separate Young's double-slit experimental set-ups and two monochromatic light sources of different wavelengths are used to get fringes of equal width. The ratios of the slits separations and that of the wavelengths of light used are 2 : 1 and 1 : 2 respectively. The corresponding ratio of the distances between the slits and the respective screens (D_1/D_2) is ____.

Q6. 23 January Shift 2

When an unpolarized light falls at a particular angle on a glass plate (placed in air), it is observed that the reflected beam is linearly polarized. The angle of refracted beam with respect to the normal is ____.
$\left(\tan^{-1}(1.52) = 57.7^\circ\right.$, refractive indices of air and glass are 1.00 and 1.52, respectively.)
(1) 39.6° (2) 32.3° (3) 36.3° (4) 42.6°

Q7. 24 January Shift 1

An unpolarised light is incident at an interface of two dielectric media having refractive indices of 2 (incident medium) and $2\sqrt{3}$ (medium) respectively. To satisfy the condition that reflected and refracted rays are perpendicular to each other, the angle of incidence is ____.
(1) 45° (2) 60° (3) 10° (4) 30°

Q8. 24 January Shift 2

In the Young's double slit experiment the intensity produced by each one of the individual slits is I_0. The distance between two slits is 2 mm. The distance of screen from slits is 10 m. The wavelength of light is 6000 A°. The intensity of light on the screen in front of one of the slits is ____.
(1) $\frac{I_o}{2}$ (2) $2I_o$ (3) $4I_o$ (4) I_o

Q9. 28 January Shift 1

Given below are two statements:
Statement I: A plane wave after passing through prism remains as plane wave but passing through small pin hole may become spherical wave.
Statement II: The curvature of a spherical wave emerging from a slit will increase for increasing slit width.
In the light of the above statements, choose the correct answer from the options given below
(1) Both Statement I and Statement II are true (2) Statement I is false but Statement II is true
(3) Both Statement I and Statement II are false (4) Statement I is true but Statement II is false

Q10. 28 January Shift 2

A beam of light consisting of wavelengths 650 nm and 550 nm illuminates the Young's double slits with separation of 2 mm such that the interference fringes are formed on a screen, placed at a distance of 1.2 m from the slits. The least distance of a point from the central maximum, where the bright fringes due to both the wavelengths coincide, is ____ $\times 10^{-5}$ m.

ANSWER KEYS

1. (3) **2.** (2) **3.** 14 **4.** (1) **5.** 4 **6.** (2) **7.** (2) **8.** (4)
9. (4) **10.** 429