Young's Double-Slit Experiment

Practice Questions (NEET Pattern)

Focus: n^{th} Bright Fringe & n^{th} Dark Fringe

Key Formulae:

- n^{th} **Bright Fringe**: $y_n = \dfrac{n\lambda D}{d} \quad (n = 0, 1, 2, \dots)$
- n^{th} **Dark Fringe**: $y_n = \dfrac{(2n-1)\lambda D}{2d} \quad (n = 1, 2, 3, \dots)$

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1. In Young's double-slit experiment, the distance between the slits is 0.2 mm and the screen is placed 1.5 m away. If light of wavelength 6000 Å is used, find the distance of the 4th bright fringe from the central maximum.

   (a) 18 mm

   (b) 12 mm

   (c) 24 mm

   (d) 6 mm

2. In a Young's double-slit experiment, the fringe width is 0.4 mm. What is the distance of the 5th dark fringe from the central bright fringe?

   (a) 1.8 mm

   (b) 2.0 mm

   (c) 1.6 mm

   (d) 2.2 mm

3. The distance between two slits in Young's experiment is 0.5 mm and the screen is 2 m away. Light of wavelength 500 nm is used. Find the position of the 3rd dark fringe from the center.

   (a) 5 mm

   (b) 6 mm

   (c) 4 mm

   (d) 7 mm

4. In Young's double-slit experiment, the 8th bright fringe is located at a distance of 4.8 mm from the central maximum. If the screen distance is 1.2 m and slit separation is 0.4 mm, what is the wavelength of light used?

   (a) 500 nm

(b) 600 nm

(c) 400 nm

(d) 700 nm

5. Two slits separated by 0.3 mm are illuminated by light of wavelength 650 nm. The screen is placed at 1.5 m. Calculate the distance between the 2nd bright fringe and the 5th dark fringe on the same side of the central maximum.

(a) 4.875 mm

(b) 5.2 mm

(c) 4.5 mm

(d) 5.5 mm

6. In Young's experiment, the angular position of the 3rd bright fringe is 0.03 radians. If the wavelength of light is 600 nm, find the slit separation.

(a) 6×10^{-5} m

(b) 5×10^{-5} m

(c) 7×10^{-5} m

(d) 4×10^{-5} m

7. The fringe width in Young's double-slit experiment is 2 mm. The distance between the 4th bright fringe and the 3rd dark fringe on opposite sides of the central maximum is:

(a) 10.5 mm

(b) 9 mm

(c) 11 mm

(d) 8.5 mm

8. In a double-slit experiment, the 5th dark fringe is formed at a distance of 3.5 mm from the central maximum. If $D = 1$ m and $d = 0.2$ mm, the wavelength of light is:

(a) 700 nm

(b) 600 nm

(c) 500 nm

(d) 800 nm

9. Light of wavelength 550 nm falls on two slits separated by 0.25 mm. The screen is at 1.8 m. How many bright fringes will be seen between the points where the path difference is 2.2 μm and 4.4 μm?

(a) 4

(b) 3

(c) 5

(d) 2

10. In Young's experiment, the distance of the n^{th} bright fringe from the central maximum is 7.5 mm. If the fringe width is 1.5 mm, the value of n is:

(a) 5

(b) 6

(c) 4

(d) 7

11. The 6th dark fringe in Young's double-slit experiment is observed at a distance of 4.5 cm from the central maximum on a screen placed 2 m away. If the slit separation is 0.1 mm, the wavelength of the light used is approximately:

(a) 409 nm

(b) 500 nm

(c) 600 nm

(d) 450 nm

12. In a Young's double-slit experiment with light of wavelength λ, the distance between the slits is d and the screen distance is D. The distance between the $(n+1)^{\text{th}}$ bright fringe and the n^{th} dark fringe is:

(a) $\dfrac{\lambda D}{2d}$

(b) $\dfrac{3\lambda D}{2d}$

(c) $\dfrac{\lambda D}{d}$

(d) $\dfrac{\lambda D}{4d}$

13. In Young's experiment, the slit separation is doubled and the screen distance is halved. The fringe width becomes β'. If the original fringe width was β, then the ratio β'/β is:

(a) 1/4

(b) 1/2

(c) 2

(d) 4

14. Two coherent sources separated by 0.4 mm produce interference fringes on a screen 1.5 m away. The 2nd bright fringe is at 3.75 mm from the central maximum. The wavelength of light used is:

(a) 500 nm

(b) 600 nm

(c) 450 nm

(d) 550 nm

15. In Young's double-slit experiment, the intensity at a point where the path difference is $\lambda/4$ is K. If I_0 is the maximum intensity, then K/I_0 is equal to:

(a) 1/2

(b) 1/4

(c) 3/4

(d) $1/\sqrt{2}$

Answer Key

1. (a) 18 mm
2. (a) 1.8 mm
3. (a) 5 mm
4. (a) 500 nm
5. (a) 4.875 mm
6. (a) 6×10^{-5} m
7. (a) 10.5 mm
8. (a) 700 nm
9. (a) 4
10. (a) 5
11. (a) 409 nm
12. (a) $\dfrac{\lambda D}{2d}$
13. (a) 1/4
14. (a) 500 nm
15. (a) 1/2

Best of luck!