PYQSide PYQSide.com — free PYQs with solutions Powered by PrepBlink

JEE MAIN WAVE OPTICS — PYQS

Max. Marks: 168 **Questions:** 42

Section A (MCQ) — 29 questions

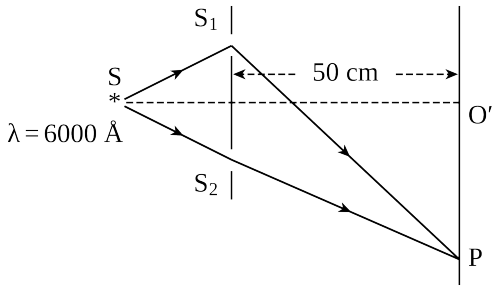
Q.1 In interference experiment the path difference between two interfering waves at a point A on the screen is λ/3, where λ is the wavelength of these waves, and at another point B the path difference is λ/6. The ratio of intensities at points A and B is _____. [JEE Main 2026 (Online) 6th April Morning Shift]

(1) 3 (2) 4 (3) 1/3 (4) 1/4

Scan or tap for the full solution

Q.2 In a Young double slit experiment, the wavelength of incident light is 6000 Å, the separation between slits S_1 and S_2 is 5 cm and the distance between slits plane and screen is 50 cm, as shown in the figure below. If the resultant intensity at P is equal to the intensity due to individual slits, the path difference between interfering waves is _____ Å.

[JEE Main 2026 (Online) 6th April Evening Shift]



(1) 4000 (2) 3000 (3) 2000 (4) 1000

Scan or tap for the full solution

Q.3 In Young's double slit experiment, the fringe width of the interference pattern produced on the screen is 2.4 μm. If the experiment is carried out in another medium having refractive index 1.2, the fringe width will be _____ μm.

[JEE Main 2026 (Online) 5th April Morning Shift]

(1) 1.2 (2) 2 (3) 2.4 (4) 2.88

Scan or tap for the full solution

Q.4 The maximum intensity in a Young's double slit experiment is I_0. Distance between the slits (d) is 5λ, where λ is the wavelength of light used. The intensity of the fringe, exactly opposite to one of the slits on the screen, placed at D = 10d is _____.

[JEE Main 2026 (Online) 5th April Evening Shift]

(1) $\frac{I_0}{4}$ (2) $\frac{I_0}{2}$ (3) I_0 (4) $\frac{3I_0}{4}$

Scan or tap for the full solution

Q.5 A slit of width a is illuminated by light of wavelength λ. The linear separation between 1st and 3rd minima in the diffraction pattern produced on a screen placed at a distance D from the slit system is _____. [JEE Main 2026 (Online) 4th April Morning Shift]

(1) $\frac{D\lambda}{a}$ (2) $1.5\frac{D\lambda}{a}$ (3) $2\frac{D\lambda}{a}$ (4) $3\frac{D\lambda}{a}$

Scan or tap for the full solution

Q.6 A telescope with objective diameter R is used to observe a distant star emitting light of wavelength 500 nm, at a resolution of 5×10^{-7} radian. The value of R is _____ cm.

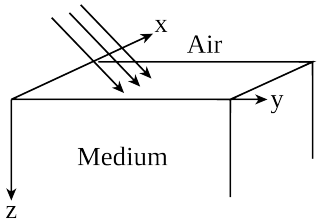
[JEE Main 2026 (Online) 4th April Morning Shift]

(1) 61 (2) 122 (3) 244 (4) 305

Scan or tap for the full solution

Q.7 An unpolarized light is incident on the plane interface of air-dielectric medium shown in figure. If the incident angle is equal to Brewster angle, identify the expression representing reflected wave.

[JEE Main 2026 (Online) 4th April Morning Shift]



(1) $(E_x\hat{i} + E_y\hat{j})\sin(kx - kz - \omega t)$

(2) $(E_x\hat{i} + E_z\hat{k})\sin(kx + ky - \omega t)$

(3) $(E_x\hat{j} + E_y\hat{k})\sin(ky + kz - \omega t)$

(4) $(E_x\hat{i} + E_y\hat{j} + E_z\hat{k})\sin(kx + ky - kz - \omega t)$

Scan or tap for the full solution

Q.8 An unpolarized light of certain intensity passes through a combination of two polarizers whose transmission axes are at 30° and 90°, respectively, with respect to the horizontal axis. A third polarizer with its transmission axis at 60° with the horizontal axis is placed between the two existing polarizers. The ratio of the output intensities with and without the third polarizer is _____.

[JEE Main 2026 (Online) 4th April Evening Shift]

(1) 3/4 (2) 4/3 (3) 9/4 (4) 4/9

Scan or tap for the full solution

Q.9 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 :

[JEE Main 2026 (Online) 28th January Morning Shift]

(1) Both Statement-I and Statement-II are false

(2) Both Statement-I and Statement-II are true

(3) Statement-I is true but Statement-II is false

(4) Statement-I is false but Statement-II is true

Scan or tap for the full solution

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

[JEE Main 2026 (Online) 24th January Morning Shift]

(1) 45° (2) 60° (3) 10° (4) 30°

Scan or tap for the full solution

Q.11 In the Young's double slit experiment the intensity produced by each one of the individual slits is I_o. The distance between two slits is 2 mm. The distance of screen from slits is 10 m. The wavelength of light is 6000 Å. The intensity of light on the screen in front of one of the slits is _____

[JEE Main 2026 (Online) 24th January Evening Shift]

(1) $\frac{I_o}{2}$ (2) I_o (3) $2I_o$ (4) $4I_o$

Scan or tap for the full solution

Q.12 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 _____. ($\tan^{-1}(1.52) = 57.7°$, refractive indices of air and glass are 1.00 and 1.52, respectively.)

[JEE Main 2026 (Online) 23rd January Evening Shift]

(1) 36.3° (2) 39.6° (3) 42.6° (4) 32.3°

Scan or tap for the full solution

Q.13 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.

[JEE Main 2026 (Online) 22nd January Evening Shift]

(1) B, D only (2) A, D only

(3) A, C, E only (4) B, C only

Scan or tap for the full solution

Q.14 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.

[JEE Main 2026 (Online) 21st January Morning Shift]

(1) 6.0×10^{-3} (2) 8×10^{-4}

(3) 5.0×10^{-3} (4) 5.6×10^{-4}

Scan or tap for the full solution

Q.15 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 :

[JEE Main 2026 (Online) 21st January Evening Shift]

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

Scan or tap for the full solution

Q.16 In a Young's double slit experiment, the source is white light. One of the slits is covered by red filter and another by a green filter. In this case:

[JEE Main 2025 (Online) 8th April Evening Shift]

(1) there shall be alternate interference fringes of red and green.
(2) there shall be an interference pattern for red distinct from that for green.
(3) there shall be an interference pattern, where each fringe's pattern center is green and outer edges is red.
(4) there shall be no interference fringes.

Scan or tap for the full solution

Q.17 Two plane polarized light waves combine at a certain point whose electric field components are

$E_1 = E_0 \sin \omega t$

$E_2 = E_0 \sin\left(\omega t + \frac{\pi}{3}\right)$

Find the amplitude of the resultant wave.

[JEE Main 2025 (Online) 7th April Morning Shift]

(1) 1.7 E_0 (2) E_0 (3) 0.9 E_0 (4) 3.4 E_0

Scan or tap for the full solution

Q.18 In a Young's double slit experiment, the slits are separated by 0.2 mm. If the slits separation is increased to 0.4 mm, the percentage change of the fringe width is :

[JEE Main 2025 (Online) 4th April Morning Shift]

(1) 25% (2) 50% (3) 0% (4) 100%

Scan or tap for the full solution

Q.19 Two polarisers P_1 and P_2 are placed in such a way that the intensity of the transmitted light will be zero. A third polariser P_3 is inserted in between P_1 and P_2, at particular angle between P_2 and P_3. The transmitted intensity of the light passing through all three polarisers is maximum. The angle between the polarisers P_2 and P_3 is :

[JEE Main 2025 (Online) 4th April Evening Shift]

(1) $\pi/6$ (2) $\frac{\pi}{3}$ (3) $\frac{\pi}{4}$ (4) $\pi/8$

Scan or tap for the full solution

Q.20 Two monochromatic light beams have intensities in the ratio 1:9. An interference pattern is obtained by these beams. The ratio of the intensities of maximum to minimum is

[JEE Main 2025 (Online) 3rd April Evening Shift]

(1) 8:1 (2) 4:1 (3) 3:1 (4) 9:1

Scan or tap for the full solution

Q.21 Width of one of the two slits in a Young's double slit interference experiment is half of the other slit. The ratio of the maximum to the minimum intensity in the interference pattern is:

[JEE Main 2025 (Online) 3rd April Evening Shift]

(1) 3:1
(2) $(2\sqrt{2}+1):(2\sqrt{2}-1)$
(3) 9:1
(4) $(3+2\sqrt{2}):(3-2\sqrt{2})$

Scan or tap for the full solution

Q.22 A light wave is propagating with plane wave fronts of the type x + y + z = constant. The angle made by the direction of wave propagation with the x-axis is :

[JEE Main 2025 (Online) 2nd April Morning Shift]

(1) $\cos^{-1}(2/3)$ (2) $\cos^{-1}\left(\frac{1}{\sqrt{3}}\right)$
(3) $\cos^{-1}\left(\frac{1}{3}\right)$ (4) $\cos^{-1}\left(\sqrt{\frac{2}{3}}\right)$

Scan or tap for the full solution

Q.23 The Young's double slit interference experiment is performed using light consisting of 480 nm and 600 nm wavelengths to form interference patterns. The least number of the bright fringes of 480 nm light that are required for the first coincidence with the bright fringes formed by 600 nm light is

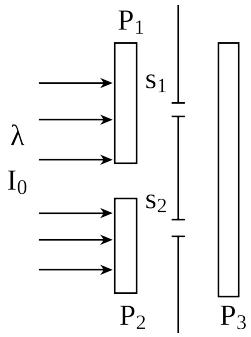
[JEE Main 2025 (Online) 24th January Morning Shift]

(1) 8 (2) 4 (3) 5 (4) 6

Scan or tap for the full solution

Q.24 In a Young's double slit experiment, three polarizers are kept as shown in the figure. The transmission axes of P_1 and P_2 are orthogonal to each other. The polarizer P_3 covers both the slits with its transmission axis at 45° to those of P_1 and P_2. An unpolarized light of wavelength λ and intensity I_0 is incident on P_1 and P_2. The intensity at a point after P_3 where the path difference between the light waves from s_1 and s_2 is $\frac{\lambda}{3}$, is

[JEE Main 2025 (Online) 24th January Evening Shift]



(1) I_0 (2) $\frac{I_0}{3}$ (3) $\frac{I_0}{4}$ (4) $\frac{I_0}{2}$

Scan or tap for the full solution

Q.25 Young's double slit interference apparatus is immersed in a liquid of refractive index 1.44. It has slit separation of 1.5 mm. The slits are illuminated by a parallel beam of light whose wavelength in air is 690 nm. The fringe-width on a screen placed behind the plane of slits at a distance of 0.72 m, will be: [JEE Main 2025 (Online) 24th January Evening Shift]

(1) 0.63 mm (2) 0.33 mm
(3) 0.46 mm (4) 0.23 mm

Scan or tap for the full solution

Q.26 The width of one of the two slits in Young's double slit experiment is d while that of the other slit is x d. If the ratio of the maximum to the minimum intensity in the interference pattern on the screen is 9:4 then what is the value of x ? (Assume that the field strength varies according to the slit width.)

[JEE Main 2025 (Online) 23rd January Evening Shift]

(1) 2 (2) 3 (3) 4 (4) 5

Scan or tap for the full solution

Q.27 Given below are two statements : one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

Assertion (A): If Young's double slit experiment is performed in an optically denser medium than air, then the consecutive fringes come closer.

Reason (R): The speed of light reduces in an optically denser medium than air while its frequency does not change.

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

[JEE Main 2025 (Online) 22nd January Morning Shift]

(1) (A) is false but (R) is true
(2) Both (A) and (R) are true but (R) is not the correct explanation of (A)
(3) Both (A) and (R) are true and (R) is the correct explanation of (A)
(4) (A) is true but (R) is false

Scan or tap for the full solution

Q.28 A transparent film of refractive index, 2.0 is coated on a glass slab of refractive index, 1.45. What is the minimum thickness of transparent film to be coated for the maximum transmission of Green light of wavelength 550 nm . [Assume that the light is incident nearly perpendicular to the glass surface.]

[JEE Main 2025 (Online) 22nd January Evening Shift]

(1) 68.7 nm (2) 137.5 nm
(3) 94.8 nm (4) 275 nm

Scan or tap for the full solution

Q.29 Given below are two statements. One is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

Assertion (A): In Young's double slit experiment, the fringes produced by red light are closer as compared to those produced by blue light.

Reason (R): The fringe width is directly proportional to the wavelength of light.

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

[JEE Main 2025 (Online) 22nd January Evening Shift]

(1) (A) is true but (R) is false
(2) Both (A) and (R) are true and (R) is the correct explanation of (A)
(3) (A) is false but (R) is true
(4) Both (A) and (R) are true but (R) is NOT the correct explanation of (A)

Scan or tap for the full solution

Section B (Numerical) — 13 questions

Q.30 Some distant star is to be observed by some telescope of diameter of objective lens a, at an angular resolution of 3.0×10^{-7} radian. If the wavelength of light from the star reaching the telescope is 500 nm, the minimum diameter of the objective lens of the telescope is _____ cm. (nearest integer)

[JEE Main 2026 (Online) 8th April Evening Shift]

Scan or tap for the full solution

Q.31 An unpolarized light of intensity I_0 passes through polarizer and then through a certain optically active solution and finally it goes to analyser. If the angle between analyser and polariser is 0° and intensity of light emerged from analyser is $\frac{3}{8}I_0$, the angle of rotation of the light by the solution with respect to analyser is _____ degrees.

[JEE Main 2026 (Online) 6th April Morning Shift]

Scan or tap for the full solution

Q.32 In a double slit experiment, when one of the slits is covered by a transparent mica sheet of refractive index 1.56, the central fringe shifts to the position of 7th bright fringe, obtained with both slits uncovered. If the light source wavelength is 450 nm, the thickness of mica sheet is $\alpha \times 10^{-9}$ m. The value of α is _____.

[JEE Main 2026 (Online) 4th April Evening Shift]

Scan or tap for the full solution

Q.33 In single slit diffraction pattern, the wavelength of light used is 628 nm and slit width is 0.2 mm, the angular width of central maximum is $\alpha \times 10^{-2}$ degrees. The value of α is _____.

[JEE Main 2026 (Online) 2nd April Morning Shift]

Scan or tap for the full solution

Q.34 In a Young's double slit experiment, the intensity at some point on the screen is found to be $\frac{3}{4}$ times of the maximum of the interference pattern. The path difference between the interfering waves at this point is $\frac{\lambda}{x}$ where λ is wavelength of the incident light. The value of x is _____.

[JEE Main 2026 (Online) 2nd April Evening Shift]

Scan or tap for the full solution

Q.35 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.

[JEE Main 2026 (Online) 28th January Evening Shift]

Scan or tap for the full solution

Q.36 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 _____.

[JEE Main 2026 (Online) 23rd January Morning Shift]

Scan or tap for the full solution

Q.37 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 20 μm 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 _____.

[JEE Main 2026 (Online) 21st January Evening Shift]

Scan or tap for the full solution

Q.38 In a Young's double slit experiment, two slits are located 1.5 mm apart. The distance of screen from slits is 2 m and the wavelength of the source is 400 nm. If the 20 maxima of the double slit pattern are contained within the central maximum of the single slit diffraction pattern, then the width of each slit is $x \times 10^{-3}$ cm, where x-value is _____.

[JEE Main 2025 (Online) 4th April Evening Shift]

Scan or tap for the full solution

Q.39 Two coherent monochromatic light beams of intensities 4I and 9I are superimposed. The difference between the maximum and minimum intensities in the resulting interference pattern is xI. The value of x is _____.

[JEE Main 2025 (Online) 3rd April Morning Shift]

Scan or tap for the full solution

Q.40 If the measured angular separation between the second minimum to the left of the central maximum and the third minimum to the right of the central maximum is 30° in a single slit diffraction pattern recorded using 628 nm light, then the width of the slit is _____ μm.

[JEE Main 2025 (Online) 2nd April Morning Shift]

Scan or tap for the full solution

Q.41 A double slit interference experiment performed with a light of wavelength 600 nm forms an interference fringe pattern on a screen with 10th bright fringe having its centre at a distance of 10 mm from the central maximum. Distance of the centre of the same 10th bright fringe from the central maximum when the source of light is replaced by another source of wavelength 660 nm would be _____ mm.

[JEE Main 2025 (Online) 28th January Morning Shift]

Scan or tap for the full solution

Q.42 A thin transparent film with refractive index 1.4, is held on circular ring of radius 1.8 cm. The fluid in the film evaporates such that transmission through the film at wavelength 560 nm goes to a minimum every 12 seconds. Assuming that the film is flat on its two sides, the rate of evaporation is _____ $\pi \times 10^{-13}$ m^3/s.

[JEE Main 2025 (Online) 28th January Evening Shift]

Scan or tap for the full solution

ANSWER KEY

Section A (MCQ) — 29 questions

Ques.	1	2	3	4	5	6	7	8	9	10	11
Ans.	**3**	**3**	**2**	**2**	**3**	**2**	**1**	**3**	**3**	**2**	**2**
Ques.	12	13	14	15	16	17	18	19	20	21	22
Ans.	**4**	**3**	**2**	**3**	**4**	**1**	**2**	**3**	**2**	**4**	**2**
Ques.	23	24	25	26	27	28	29				
Ans.	**3**	**3**	**4**	**4**	**3**	**2**	**3**				

Section B (Numerical) — 13 questions

Ques.	30	31	32	33	34	35	36
Ans.	**203**	**30**	**5625**	**36**	**6**	**429**	**4**
Ques.	37	38	39	40	41	42	
Ans.	**14**	**15**	**24**	**6**	**11**	**54**	