CHAPTER

07 Wave Optics

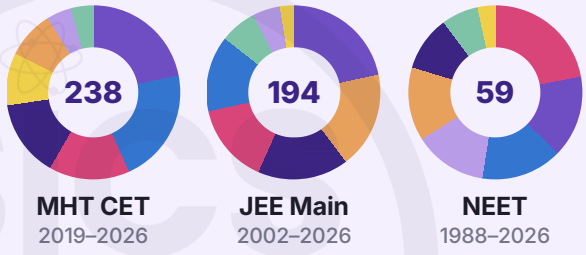
MHT CET · JEE · NEET Physics

PHYSICS CIRCLE

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EXAM WEIGHTAGE



MHT CET 2019–2026 | **JEE Main** 2002–2026 | **NEET** 1988–2026

	CET	JEE	NEET
Superposition, Coherence & Intensity	52 22%	42 22%	9 15%
Diffraction at a Single Slit	51 21%	27 14%	9 15%
YDSE: Fringe Width & Fringe Positions	36 15%	29 15%	13 22%
YDSE: Film, Medium & Two Wavelengths	34 14%	33 17%	6 10%
Polarisation	21 9%	35 18%	8 14%
Biprism, Thin Films & Other Devices	23 10%	5 3%	2 3%
Wave Theory, Wavefronts & Doppler Effect	11 5%	10 5%	8 14%
Resolving Power	10 4%	13 7%	4 7%

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01 CONCEPT Wave Theory, Wavefronts & Doppler Effect

IN ONE LINE

Light travels as a wave. Every point on a wavefront starts new wavelets, and their envelope is the next wavefront.

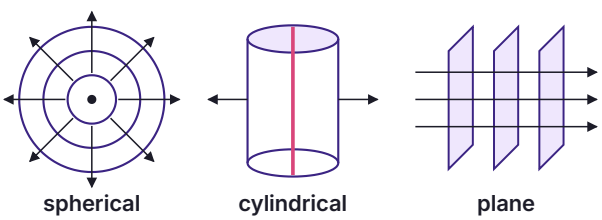
7.1.1 Newton and Huygens

Newton: corpuscles	Huygens: waves
tiny particles from a luminous body	disturbance travelling as a wave
colour = size of corpuscle	colour = wavelength
speed greater in a denser medium (wrong)	speed smaller in a denser medium (correct)
fails: interference, diffraction, polarisation	explains: interference, diffraction, reflection, refraction

- Huygens first took light waves as longitudinal; polarisation showed they are **transverse** (Fresnel).
- The wave theory cannot explain the photoelectric effect, Compton effect or origin of spectra.

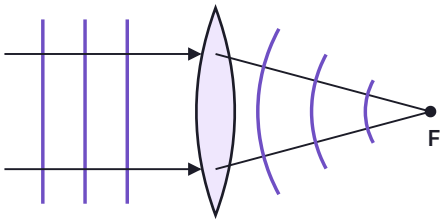
7.1.2 What a wavefront is

- A wavefront is the locus of all particles vibrating in the **same phase**.
- A ray is always **perpendicular** to the wavefront.
- Phase difference between two points on one wavefront is zero.



Spherical, cylindrical and plane wavefronts

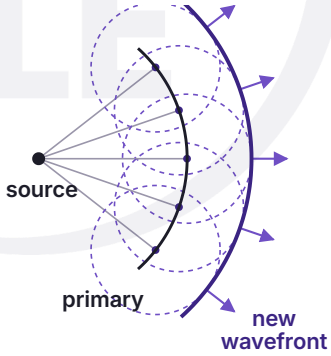
Wavefront	Source	I	A
spherical	point	$\propto \frac{1}{r^2}$	$\propto \frac{1}{r}$
cylindrical	line	$\propto \frac{1}{r}$	$\propto \frac{1}{\sqrt{r}}$
plane	very far	constant	constant



Parallel rays: plane. Converging rays: spherical, radius decreasing

- A source at the focus of a convex lens gives a **plane** wavefront.
- Diverging rays: spherical wavefront of increasing radius.

7.1.3 Huygens' principle

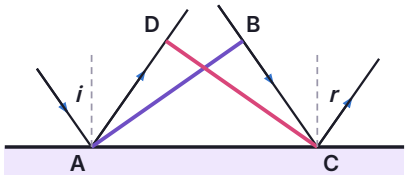


Secondary wavelets and the new wavefront

- Every point on a wavefront is a source of **secondary wavelets**.
- They spread with the speed of light in that medium.
- The surface touching them in the forward direction is the **new wavefront**.

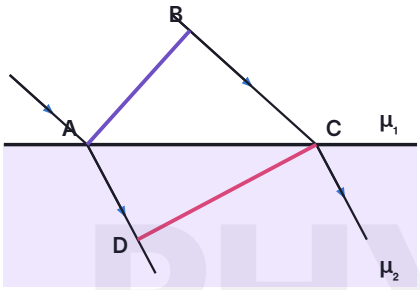
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7.1.4 Wavefronts at a boundary



Reflection: BC = AD

- Reflection: speed is unchanged, so BC = AD and ∠i = ∠r.
- Widths of incident and reflected wavefronts are **equal**.



Refraction: light goes BC and AD in the same time

$$\frac{BC}{AD} = \frac{v_1}{v_2} = \frac{\sin i}{\sin r} = \frac{\mu_2}{\mu_1}$$

$$\frac{\text{width of refracted wavefront}}{\text{width of incident wavefront}} = \frac{\cos r}{\cos i}$$

7.1.5 What changes and what does not

$$v = \frac{c}{\mu} \cdot \lambda' = \frac{\lambda}{\mu} \cdot \nu' = \nu$$

- **Frequency** (and photon energy) does not change.
- Speed, wavelength and momentum of the photon change.
- μλ is constant for the same light.
- Ray optics is valid when the size of the obstacle is much larger than λ.

7.1.6 Doppler effect of light

$$\frac{\Delta\lambda}{\lambda} = \frac{\Delta\nu}{\nu} = \frac{v}{c} \quad (v \ll c)$$

- Source **approaching**: λ decreases, shift towards violet (blue shift).
- Source **receding**: λ increases, shift towards red (red shift).
- Used to find speeds of stars and galaxies.

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Solved Examples 01 Wave Theory, Wavefronts & Doppler Effect

SOLVED 1 MHT CET 2026 · 13 Apr · Shift 1

According to corpuscular theory of light, which is NOT the property of light?

(a) The velocity of light does not change after reflection
(b) Light travels in a straight line
(c) The velocity of light in air is greater than in glass
(d) The velocity of light changes after refraction

STEP 1 Newton's corpuscles are attracted towards a denser medium
STEP 2 So the theory predicts a greater speed in glass than in air
STEP 3 Speed in air greater than in glass is **not** its prediction: **(c)**

Answer: **(c)**

SOLVED 2 AIPMT 1988

Which one of the following phenomena is not explained by Huygen's construction of wavefront?

(a) Refraction (b) Reflection
(c) Diffraction (d) Origin of spectra

STEP 1 Secondary wavelets explain how a wave travels and bends
STEP 2 Reflection, refraction and diffraction all follow from them
STEP 3 Origin of spectra needs atomic theory: **(d)**

Answer: **(d)**

SOLVED 3 MHT CET 2026 · 15 May · Shift 1

According to Huygens principle, a wave front propagates through a medium by

(a) pushing particles of the medium
(b) propagating through medium with speed of light
(c) carrying particles of same phase along with it
(d) creating secondary wavelets which forms a new wave front

STEP 1 Every point of a wavefront is a source of secondary wavelets
STEP 2 The forward envelope of the wavelets is the new wavefront
STEP 3 It moves by **creating secondary wavelets**

Answer: **(d)**

SOLVED 4 MHT CET 2024 · 9 May · Shift 1

A wavefront is a surface

(a) perpendicular to the direction of propagation of light.
(b) parallel to the direction of propagation of light.
(c) without any specific orientation with direction of propagation of light.
(d) which has nothing to do with intensity of light.

STEP 1 A wavefront joins points vibrating in the same phase
STEP 2 Rays are always normal to the wavefront
STEP 3 It is **perpendicular to the direction of propagation**

Answer: **(a)**

SOLVED 5 JEE Main 2024 · 5 Apr · Shift 1

Light emerges out of a convex lens when a source of light is kept at its focus. The shape of wavefront of the light is

(a) cylindrical (b) spherical
(c) plane (d) both spherical and cylindrical

STEP 1 A source at the focus gives a parallel beam from the lens
STEP 2 Parallel rays have plane wavefronts
STEP 3 Wavefront is **plane**

Answer: **(c)**

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Solved Examples 01 Wave Theory, Wavefronts & Doppler Effect (contd.)

SOLVED 6 MHT CET 2026 · 12 May · Shift 2

A parallel beam of monochromatic light is incident on a plane reflecting surface. If width of the plane incident and reflected plane wavefront is represented by AB and CD respectively then

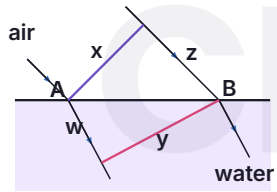
(a) AB > CD (b) AB < CD
(c) AB = CD (d) AB >> CD

STEP 1 In reflection the speed does not change and i = r
STEP 2 Width of the wavefront $\propto$ cos i, and cos i = cos r
STEP 3 **AB = CD**

Answer: **(c)**

SOLVED 7 MHT CET 2026 · 18 Apr · Shift 2

A plane wavefront of width x is incident on an air-water interface and the corresponding refracted wavefront has a width y as shown in figure. The refractive index of air with respect to water in terms of distances w and z is



(a) $\frac{w}{z}$ (b) $\frac{z}{w}$
(c) $\sqrt{\frac{w}{z}}$ (d) $\sqrt{\frac{z}{w}}$

STEP 1 In the same time light goes z in air and w in water
STEP 2 $\frac{z}{w} = \frac{v_a}{v_w}$ = refractive index of water w.r.t. air
STEP 3 Air w.r.t. water = $\frac{w}{z}$

Answer: **(a)**

SOLVED 8 MHT CET 2020 · 16 Oct · Shift 1

When a photon enters glass from air, which one of the following quantity does not change?

(a) Velocity (b) Wavelength
(c) Momentum (d) Energy

STEP 1 Frequency is fixed by the source: it does not change on refraction
STEP 2 Energy E = hv depends only on frequency
STEP 3 **Energy** stays the same

Answer: **(d)**

SOLVED 9 MHT CET 2025 · 20 Apr · Shift 2

The apparent wavelength of light from a star moving away from the earth is 0.02% more than the actual wavelength. The velocity of star is [c = 3 × 10^8 m/s]

(a) 30 km/s (b) 60 km/s
(c) 90 km/s (d) 120 km/s

STEP 1 $\frac{\Delta\lambda}{\lambda} = \frac{v}{c} = \frac{0.02}{100} = 2 \times 10^{-4}$
STEP 2 $v = 2 \times 10^{-4} \times 3 \times 10^8 = 6 \times 10^4$ m/s
STEP 3 v = **60 km/s**

Answer: **(b)**

SOLVED 10 MHT CET 2019 · 2 May · Shift 1

If a star emitting yellow light is accelerated towards earth, then to an observer on earth it will appear

(a) becoming orange.
(b) shining yellow.
(c) gradually changing to blue.
(d) gradually changing to red.

STEP 1 An approaching source shows a smaller wavelength: violet shift
STEP 2 As it speeds up, the shift keeps growing
STEP 3 Yellow moves towards the **blue** end

Answer: **(c)**

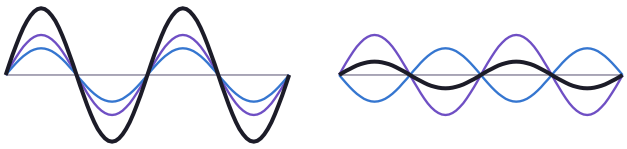
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02 CONCEPT Superposition, Coherence & Intensity

IN ONE LINE

Two coherent waves add at every point. Intensity is largest where they meet in phase and smallest where they meet in opposite phase.

7.2.1 Adding two waves



The resultant (thick line) is the sum of the two waves

- Resultant displacement is the vector sum: $y = y_1 + y_2$.
- Take $y_1 = a_1 \sin \omega t$ and $y_2 = a_2 \sin(\omega t + \varphi)$.

$$A^2 = a_1^2 + a_2^2 + 2a_1a_2 \cos \varphi$$

- Equal amplitudes a: $A = 2a \cos \frac{\varphi}{2}$.
- Intensity $\propto$ (amplitude)^2.
- Intensity $\propto$ slit width (if amplitude $\propto$ width, intensity $\propto$ width^2).

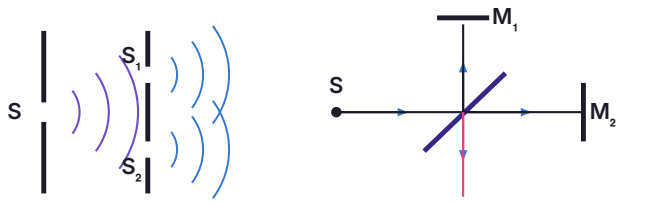
$$I = I_1 + I_2 + 2\sqrt{I_1 I_2} \cos \varphi$$

7.2.2 Phase and path difference

$$\varphi = \frac{2\pi}{\lambda} \Delta \cdot \text{time difference} = \frac{T}{2\pi} \varphi$$

7.2.3 Coherent sources

- **Coherent sources**: same frequency and a **constant** phase difference.
- Two independent lamps are never coherent.
- They are made from one source, by two methods:



Division of wavefront (YDSE, biprism) and of amplitude (thin films)

- **Division of wavefront**: virtual or imaginary sources. Examples: YDSE, Fresnel's biprism, Lloyd's mirror.
- **Division of amplitude**: real sources, by partial reflection. Examples: thin films, Newton's rings.

7.2.4 Conditions for sustained interference

- Sources must be coherent: same frequency, constant phase difference.
- Red and blue filters on the two slits: **no fringes**.
- One slit covered: no interference fringes.
- Light should be monochromatic and sources close to each other.
- Equal amplitudes give the best contrast: $I_{max} = 4I_0$, $I_{min} = 0$.
- Energy is not lost, only redistributed: **conservation of energy**.
- Interference occurs for both light and sound waves.

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WAVE OPTICS

LEVEL 1 · EASY

Topic-wise Previous Year Questions

MHT CET · NEET · JEE Main

205	33	8
questions	concepts	topics

CONTENTS

01	Wave Theory, Wavefronts & Doppler Effect	Q 1–20	20 Qs
02	Superposition, Coherence & Intensity	Q 21–50	30 Qs
03	YDSE: Fringe Width & Fringe Positions	Q 51–104	54 Qs
04	YDSE: Film, Medium & Two Wavelengths	Q 105–120	16 Qs
05	Biprism, Thin Films & Other Devices	Q 121–129	9 Qs
06	Diffraction at a Single Slit	Q 130–170	41 Qs
07	Resolving Power	Q 171–188	18 Qs
08	Polarisation	Q 189–205	17 Qs
	Answer key		

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TOPIC 01

Wave Theory, Wavefronts & Doppler Effect

20 PYQs · Easy 20 · Medium 0 · Difficult 0 | MHT CET 9 · NEET 7 · JEE 4

Concepts covered: Newton's & Huygens' theories of light (3) · Wavefronts & secondary wavelets (3) · Reflection & refraction of wavefronts (2) · Speed, wavelength & frequency in a medium (5) · Doppler effect of light (3) · Ray optics limit, colours & scattering (4)

LEVEL 1 · EASY 20 questions

◆ Newton's & Huygens' theories of light 3 Qs

1. According to corpuscular theory of light, Which is NOT the property of light?
MHT CET 2026 · 13 APR · SHIFT 1
(a) The velocity of light does not change after reflection
(b) Light travels in a straight line
(c) The velocity of light in air is greater than in glass
(d) The velocity of light changes after refraction

2. According to Huygen's wave theory of light, which one of the following statements is not correct?
MHT CET 2025 · 21 APR · SHIFT 2
(a) Different colours of light are due to different wavelengths of waves.
(b) Different colours of light are due to different sizes of the corpuscles.
(c) Speed of light in denser medium is less than that in rarer medium.
(d) It can explain laws of reflection and refraction.

3. Which one of the following phenomena is not explained by Huygen's construction of wavefront?
AIPMT 1988
(a) Refraction (b) Reflection
(c) Diffraction (d) Origin of spectra

◆ Wavefronts & secondary wavelets 3 Qs

4. According to Huygens principle, a wave front propagates through a medium by
MHT CET 2026 · 15 MAY · SHIFT 1
(a) pushing particles of the medium
(b) propagating through medium with speed of light
(c) carrying particles of same phase along with it
(d) creating secondary wavelets which forms a new wave front

5. A wavefront is a surface
MHT CET 2024 · 9 MAY · SHIFT 1
(a) perpendicular to the direction of propagation of light.
(b) parallel to the direction of propagation of light.
(c) without any specific orientation with direction of propagation of light.
(d) which has nothing to do with intensity of light.

6. Light emerges out of a convex lens when a source of light is kept at its focus. The shape of wavefront of the light is:
JEE MAIN 2024 · 5 APR · SHIFT 1
(a) cylindrical
(b) spherical
(c) plane
(d) both spherical and cylindrical

◆ Reflection & refraction of wavefronts 2 Qs

7. A Parallel beam of monochromatic light is incident on a plane reflecting surface. If width of the plane incident and reflected plane wavefront is represented by AB and CD respectively then
MHT CET 2026 · 12 MAY · SHIFT 2
(a) $AB > CD$ (b) $AB < CD$
(c) $AB = CD$ (d) $AB >> CD$

8. When wavefronts pass from denser medium to rarer medium, the width of the wavefront
MHT CET 2024 · 3 MAY · SHIFT 1
(a) increases.
(b) may increase or decrease.
(c) decreases.
(d) remains unchanged.

◆ Speed, wavelength & frequency in a medium 5 Qs

9. When a photon enters glass from air, which one of the following quantity does not change?
MHT CET 2020 · 16 OCT · SHIFT 1
(a) Velocity (b) Wavelength
(c) Momentum (d) Energy

10. The frequency of a light wave in a material is 2×1014 Hz and wavelength is 5000 A°. The refractive index of material will be
AIPMT 2007
(a) 1.50 (b) 3.00 (c) 1.33 (d) 1.40

11. A ray of light travelling in air has wavelength λ, frequency n, velocity v and intensity I. If this ray enters into water then these parameters are λ', n', v' and I' respectively. Which relation is correct from following?
AIPMT 2001
(a) $\lambda = \lambda'$ (b) n = n' (c) v = v' (d) $I = I'$.

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12. The wavelength of light, while it is passing through water is 540 nm. The refractive index of water is $4/3$. The wavelength of the same light when it is passing through a transparent medium having refractive index of $3/2$ is ____ nm.

JEE MAIN 2026 · 22 JAN · SHIFT 2

(a) 540 (b) 840 (c) 480 (d) 380

13. A monochromatic light of frequency 5×10^{14} Hz travelling through air, is incident on a medium of refractive index ' 2 '. Wavelength of the refracted light will be:

JEE MAIN 2025 · 3 APR · SHIFT 2

(a) 400 nm (b) 300 nm (c) 600 nm (d) 500 nm

◆ Doppler effect of light 3 Qs

14. If a star emitting yellow light is accelerated towards earth, then to an observer on earth it will appear

MHT CET 2019 · 2 MAY · SHIFT 1

(a) becoming orange.
(b) shining yellow.
(c) gradually changing to blue.
(d) gradually changing to red.

15. A star, which is emitting radiation at a wavelength of 5000 Å, is approaching the earth with a velocity of 1.5×10^6 m/s. The change in wavelength of the radiation as received on the earth is

AIPMT 1995

(a) 25 Å (b) 100 Å (c) zero (d) 2.5 Å

16. A galaxy is moving away from the earth at a speed of 286 kms^{-}1. The shift in the wavelength of a redline at 630 nm is x $\times 10^{-10}$ m. The value of x, to the nearest integer, is _____. [Take the value of speed of light c, as 3×108 ms^{-}1]

JEE MAIN 2021 · 18 MAR · SHIFT 2 *(Numerical)*

◆ Ray optics limit, colours & scattering 4 Qs

17. The rays of different colours fail to converge at a point after passing through a thick converging lens. This defect is called

MHT CET 2023 · 9 MAY · SHIFT 1

(a) spherical aberration (b) distortion
(c) coma (d) chromatic aberration

18. The reddish appearance of the sun at sunrise and sunset is due to

NEET 2013

(a) the scattering of light
(b) the polarisation of light
(c) the colour of the sun
(d) the colour of the sky

19. Ray optics is valid, when characteristic dimensions are

AIPMT 1994

(a) much smaller than the wavelength of light
(b) of the same order as the wavelength of light
(c) of the order of one millimetre
(d) much larger than the wavelength of light

20. Ray optics is valid, when characteristic dimensions are

AIPMT 1989

(a) much smaller than the wavelength of light
(b) of the same order as the wavelength of light
(c) of the order of one millimetre
(d) much larger than the wavelength of light

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TOPIC 02

Superposition, Coherence & Intensity

30 PYQs · Easy 30 · Medium 0 · Difficult 0 | MHT CET 15 · NEET 4 · JEE 11

Concepts covered: Superposition & resultant amplitude (3) · Conditions for interference & coherence (11) · Phase & path conditions (3) · Imax/Imin ratio & slit widths (12) · Intensity at a point (1)

LEVEL 1 · EASY 30 questions

◆ Superposition & resultant amplitude 3 Qs

21. Two sound waves each of wavelength ' λ ' and having the same amplitude ' A ' from two source ' S_1 ' and ' S_2 ' interfere at a point P. If the path difference, $S_2P - S_1P = \lambda/3$ then the amplitude of resultant wave at point ' P ' will be $[\cos(120^\circ) = -0.5]$

MHT CET 2024 · 16 MAY · SHIFT 1

(a) A (b) 2A (c) $\frac{A}{2}$ (d) $\frac{3A}{2}$

22. When two light waves each of amplitude 'A' and having a phase difference of $\frac{\pi}{2}$ superimposed then the amplitude of resultant wave is

MHT CET 2023 · 14 MAY · SHIFT 2

(a) $\frac{A}{\sqrt{2}}$ (b) 2 A (c) $\sqrt{2}$ A (d) $\frac{A}{2}$

23. Ratio of intensities of two waves are given by 4: 1. Then ratio of the amplitudes of the two waves is

AIPMT 1991

(a) 2 : 1 (b) 1 : 2 (c) 4 : 1 (d) 1 : 4

◆ Conditions for interference & coherence 11 Qs

24. For obtaining maximum contrast between the bright and dark fringes in an interference pattern, the intensities of the two light coherent sources should be

MHT CET 2026 · 17 APR · SHIFT 2

(a) large (b) small
(c) equal (d) in the ratio 2 : 1

25. If the two sources of light emit waves of different amplitudes and interfere then

MHT CET 2025 · 25 APR · SHIFT 1

(a) there is some intensity of light in the region of destructive interference.
(b) fringe width is less.
(c) brightness of fringes is less.
(d) fringes disappear after short time.

26. In a Young's double slit experiment, the source is white light. One of the holes is covered by a red filter and another by a blue filter. In this case

MHT CET 2024 · 2 MAY · SHIFT 1

(a) there shall be alternative interference fringes of red and blue.
(b) there shall be interference fringes for red distinct from that for blue.
(c) there shall be no interference fringes.
(d) there shall be interference fringes for red mixing with one for blue.

27. In Young's experiment with a monochromatic source and two slits, one of the slits is covered with black opaque paper, the fringes will

MHT CET 2021 · 23 SEP · SHIFT 1

(a) be darker (b) be narrower
(c) be broader (d) not be observed

28. If two sources emit light waves of different amplitudes then

MHT CET 2021 · 22 SEP · SHIFT 2

(a) brightness of fringes is less.
(b) fringes disappear after short time.
(c) fringe width is less.
(d) there is some intensity of light in the region of destructive interference.

29. The phenomenon of interference is based on

MHT CET 2019 · 3 MAY · SHIFT 1

(a) conservation of momentum
(b) quantum nature of light
(c) conservation of energy
(d) conservation of charge

30. In interference and diffraction, the light energy is redistributed. If it reduces in one region, producing a dark fringe, it increases in another region, producing a bright fringe.
A. As there is no gain or loss of energy, these phenomena are consistent with the principle of conservation of energy.
B. Diffraction and interference are characteristics exhibited only by light waves. Choose the correct answer from the options given below:

NEET 2026

(a) A is true and B is also true
(b) A is false, but B is true
(c) A is true, but B is false
(d) Both A and B are false

31. Two coherent sources of light interfere and produce fringe pattern on a screen. For central maximum, the phase difference between the two waves will be,

NEET 2020 · PHASE 2

(a) $\pi/2$ (b) Zero (c) π (d) $3\pi/2$

32. Interference is possible in

AIPMT 1989

(a) light waves only
(b) sound waves only
(c) both light and sound waves
(d) neither light nor sound waves

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33. 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 · 8 APR · SHIFT 2
(a) there shall be alternate interference fringes of red and green.
(b) there shall be an interference pattern for red distinct from that for green.
(c) there shall be an interference pattern, where each fringe's pattern center is green and outer edges is red.
(d) there shall be no interference fringes.

34. To demonstrate the phenomenon of interference, we require two sources which emit radiation
AIEEE 2003
(a) of nearly the same frequency
(b) of the same frequency
(c) of different wavelengths
(d) of the same frequency and having a definite phase relationship

◆ Phase & path conditions 3 Qs

35. In Young's double slit experiment, for the n^{th} dark fringe $(n = 1, 2, 3, \ldots)$ the phase difference of the interfering waves in radian will be
MHT CET 2026 · 19 APR · SHIFT 1
(a) $n \cdot \frac{\pi}{2}$ (b) $(2n+1)\pi$
(c) $(2n-1)\pi$ (d) $(2n-1)\frac{\pi}{2}$

36. In Young's double slit experiment, for the nth dark fringe ($n = 1, 2, 3 \ldots$) the phase difference of the interfering waves in radian will be
MHT CET 2025 · 20 APR · SHIFT 1
(a) $n\frac{\pi}{2}$ (b) $(2n+1)\pi$
(c) $(2n-1)\pi$ (d) $(2n-1)\frac{\pi}{2}$

37. The phase difference between two waves giving rise to dark fringe in Young's double slit experiment is (n is the integer)
MHT CET 2024 · 11 MAY · SHIFT 2
(a) zero (b) $(4n+1)\frac{\pi}{2}$
(c) $(2n-1)\pi$ (d) $(2n+1)\frac{\pi}{2}$

◆ Imax/Imin ratio & slit widths 12 Qs

38. In Young's experiment, the intensity ratio of the maxima and minima in an interference pattern produced by two coherent sources is $36 : 1$. The ratio of the amplitudes of the two individual sources will be
MHT CET 2026 · 17 APR · SHIFT 2
(a) $4 : 7$ (b) $5 : 7$ (c) $7 : 5$ (d) $7 : 4$

39. Two light waves amplitudes in the ratio $3 : 1$ produce interference. The ratio of the maximum to minimum intensity is
MHT CET 2026 · 11 APR · SHIFT 1
(a) $9 : 4$ (b) $16 : 9$ (c) $3 : 2$ (d) $4 : 1$

40. Two monochromatic beams of intensities I and 4 I respectively are superposed to form a steady interference pattern. The maximum and minimum intensities in the pattern are
MHT CET 2021 · 24 SEP · SHIFT 2
(a) 4I and I (b) 9 I and 3I
(c) 5 I and 3 I (d) 9 I and I

41. 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 · 3 APR · SHIFT 2
(a) $8 : 1$ (b) $4 : 1$ (c) $3 : 1$ (d) $9 : 1$

42. The width of one of the two slits in a Young's double slit experiment is 4 times that of the other slit. The ratio of the maximum to the minimum intensity in the interference pattern is:
JEE MAIN 2024 · 4 APR · SHIFT 2
(a) $1 : 1$ (b) $4 : 1$ (c) $16 : 1$ (d) $9 : 1$

43. In a Young's double slits experiment, the ratio of amplitude of light coming from slits is $2 : 1$. The ratio of the maximum to minimum intensity in the interference pattern is:
JEE MAIN 2023 · 13 APR · SHIFT 2
(a) 25: 9 (b) 9: 1 (c) 9: 4 (d) 2: 1

44. Two light beams of intensities in the ratio of 9: 4 are allowed to interfere. The ratio of the intensity of maxima and minima will be:
JEE MAIN 2022 · 24 JUN · SHIFT 2
(a) 2: 3 (b) 16: 81 (c) 25: 169 (d) 25: 1

45. The light waves from two coherent sources have same intensity I1 = I2 = I0. In interference pattern the intensity of light at minima is zero. What will be the intensity of light at maxima?
JEE MAIN 2021 · 27 AUG · SHIFT 2
(a) I0 (b) 2 I0 (c) 5 I0 (d) 4 I0

46. In an interference experiment the ratio of amplitudes of coherent waves is $\frac{a_1}{a_2} = \frac{1}{3}$. The ratio of maximum and minimum intensities of fringes will be:
JEE MAIN 2019 · 8 APR · SHIFT 1
(a) 2 (b) 4 (c) 18 (d) 9

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47. Two monochromatic light beams of intensity 16 and 9 units are interfering. The ratio of intensities of bright and dark parts of the resultant pattern is:

JEE MAIN 2014 · 11 APR · SHIFT 1

(a) $\frac{16}{9}$ (b) $\frac{4}{3}$ (c) $\frac{7}{1}$ (d) $\frac{49}{1}$

48. 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 $x\mathrm{I}$. The value of x is_____.

JEE MAIN 2025 · 3 APR · SHIFT 1 *(Numerical)*

49. Two coherent monochromatic light beams of intensities I and 4 I are superimposed. The difference between maximum and minimum possible intensities in the resulting beam is $x\,\mathrm{I}$. The value of x is _____.

JEE MAIN 2024 · 6 APR · SHIFT 2 *(Numerical)*

◆ Intensity at a point 1 Q

50. Two identical light waves having phase difference ϕ propagate in same direction. When they superpose, the intensity of resultant wave is proportional to

MHT CET 2024 · 11 MAY · SHIFT 1

(a) $\cos^2\left(\frac{\phi}{4}\right)$ (b) $\cos^2\left(\frac{\phi}{3}\right)$

(c) $\cos^2\left(\frac{\phi}{2}\right)$ (d) $\cos^2\phi$

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TOPIC 03

YDSE: Fringe Width & Fringe Positions

54 PYQs · Easy 54 · Medium 0 · Difficult 0 | MHT CET 25 · NEET 11 · JEE 18

Concepts covered: Fringe width (5) · Changing λ, D and d (17) · Position of bright & dark fringes (15) · Path difference & fringe order (7) · Fringes in a region (nλ = constant) (5) · Angular width & angular position (3) · White light & fringe shape (2)

LEVEL 1 · EASY 54 questions

◆ Fringe width 5 Qs

51. In Young's double slit experiment the wavelength of light used is 6000Å, the screen is 40 cm from the slits and the fringe width is 0.012 cm, the distance between two slits is

MHT CET 2025 · 23 APR · SHIFT 1

(a) 0.024 cm (b) 2.4 cm (c) 0.24 cm (d) 0.2 cm

52. Two slits in Young's double slit experiment are 1.5 mm apart and the screen is placed at a distance of 1 m from the slits. If the wavelength of light used is 600×10^{-9} m then the fringe separation is

NEET 2024

(a) 4×10^{-5} m (b) 9×10^{-8} m
(c) 4×10^{-7} m (d) 4×10^{-4} m

53. In a Young's double slit experiment two slits are separated by 2 mm and the screen is placed one meter away. When a light of wavelength 500 nm is used, the fringe separation will be:

JEE MAIN 2021 · 26 FEB · SHIFT 1

(a) 0.50 mm (b) 0.25 mm (c) 1 mm (d) 0.75 mm

54. 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 · 23 JAN · SHIFT 1 *(Numerical)*

55. A fringe width of 6 mm was produced for two slits separated by 1 mm apart. The screen is placed 10 m away. The wavelength of light used is 'x' nm. The value of 'x' to the nearest integer is _____.

JEE MAIN 2021 · 16 MAR · SHIFT 1 *(Numerical)*

◆ Changing λ, D and d 17 Qs

56. In Young's double slit experiment, the separation between the slits is decreased to $\left(\frac{1}{3}\right)^{th}$ of its original distance and the distance between the slits and the screen is doubled. The fringe width

MHT CET 2026 · 19 MAY · SHIFT 2

(a) remains unchanged.
(b) becomes 2 times the original.
(c) becomes 3 times the original.
(d) becomes 6 times the original.

57. In Young's double slit experiment, the fringe width is 2.4 mm with light of wavelength 9000 A.U. If the light of wavelength 5400 A.U. is used, with no other change in the experimental set up. The change in fringe width is

MHT CET 2026 · 12 MAY · SHIFT 1

(a) 0.86 mm (b) 0.96 mm (c) 0.86 cm (d) 0.96 cm

58. In a double slit experiment, the distance between slits is increased 10 times, whereas their distance from screen is halved, the fringe width

MHT CET 2024 · 16 MAY · SHIFT 2

(a) remain the same. (b) becomes $\frac{1}{10}$ times.
(c) becomes $\frac{1}{20}$ times. (d) becomes $\frac{1}{90}$ times.

59. How is the interference pattern affected when violet light replaces sodium light?

MHT CET 2024 · 11 MAY · SHIFT 2

(a) The fringes become brighter.
(b) The fringes become faint.
(c) Fringewidth decreases.
(d) Fringewidth increases.

60. In Young's double slit experiment, green light is incident on two slits. The interference pattern is observed on a screen. Which one of the following changes would cause the observed fringes to be more closely spaced?

MHT CET 2023 · 11 MAY · SHIFT 2

(a) Reducing the separation between the slits
(b) Using blue light instead of green light
(c) Using red light instead of green light
(d) Moving the screen away from the slits

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61. In Young's double slit experiment the separation between the slits is doubled without changing other setting of the experiment to obtain same fringe width, the distance 'D' of the screen from slit should be made
MHT CET 2023 · 10 MAY · SHIFT 1
(a) $\frac{D}{2}$ (b) $\frac{D}{\sqrt{2}}$ (c) 2D (d) 4D

62. In Young's double slit experiment green light is incident on the two slits. The interference pattern is observed on a screen. Which one of the following changes would cause the observed fringes to be more closely spaced?
MHT CET 2020 · 16 OCT · SHIFT 1
(a) Moving the screen away from the slits
(b) Using blue light instead of green light
(c) Using red light instead of green light
(d) Reducing the separation between the slits

63. If the screen is moved away from the plane of the slits in a Young's double slit experiment, then the:
NEET 2022 · PHASE 2
(a) linear separation of the fringes decreases
(b) angular separation of the fringes increases
(c) angular separation of the fringes decreases
(d) linear separation of the fringes increase

64. In Young's double slit experiment, if the separation between coherent sources is halved and the distance of the screen from the coherent sources is doubled, then the fringe width becomes:
NEET 2020 · PHASE 1
(a) half (b) four times
(c) one-fourth (d) double

65. In Young's double slit experiment the distance between the slits and the screen is doubled. The separation between the slits is reduced to half. As a result the fringe width
NEET 2013
(a) is halved (b) becomes four times
(c) remains unchanged (d) is doubled

66. If yellow light emitted by sodium lamp in Young's double slit experiment is replaced by monochromatic blue light of the same intensity
AIPMT 1992
(a) fringe width will decrease
(b) fringe width will increase
(c) fringe width will remain unchanged
(d) fringes will become less intense

67. 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 · 4 APR · SHIFT 1
(a) 25% (b) 50% (c) 0% (d) 100%

68. 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 · 22 JAN · SHIFT 2
(a) (A) is true but (R) is false
(b) Both (A) and (R) are true and (R) is the correct explanation of (A)
(c) (A) is false but (R) is true
(d) Both $(\mathbf{A})$ and $(\mathbf{R})$ are true but $(\mathbf{R})$ is NOT the correct explanation of (A)

69. The width of fringe is 2 mm on the screen in a double slits experiment for the light of wavelength of 400 nm. The width of the fringe for the light of wavelength 600 nm will be:
JEE MAIN 2023 · 8 APR · SHIFT 2
(a) 4 mm (b) 1.33 mm (c) 2 mm (d) 3 mm

70. Using Young's double slit experiment, a monochromatic light of wavelength 5000 $\overset{o}{A}$ produces fringes of fringe width 0.5 mm. If another monochromatic light of wavelength 6000 $\overset{o}{A}$ is used and the separation between the slits is doubled, then the new fringe width will be:
JEE MAIN 2022 · 29 JUN · SHIFT 1
(a) 0.5 mm (b) 1.0 mm (c) 0.6 mm (d) 0.3 mm

71. In Young's double slit experiment, if the source of light changes from orange to blue then:
JEE MAIN 2021 · 27 JUL · SHIFT 1
(a) the central bright fringe will become a dark fringe.
(b) the distance between consecutive fringes will decrease.
(c) the distance between consecutive fringes will increases.
(d) the intensity of the minima will increase.

72. If the source of light used in a Young's double slit experiment is changed from red to violet:
JEE MAIN 2021 · 24 FEB · SHIFT 2
(a) the fringes will become brighter.
(b) the intensity of minima will increase.
(c) consecutive fringe lines will come closer.
(d) the central bright fringe will become a dark fringe.

◆ Position of bright & dark fringes 15 Qs

73. If fringe width is 0.4 mm, the distance between fifth bright and third dark band on the same side in interference pattern of Young's double slit experiment is (in mm)
MHT CET 2026 · 14 MAY · SHIFT 1
(a) 1 (b) 2 (c) 3 (d) 4

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74. In Young's double slit experiment, the fringe width is 0.4 mm. What is the distance between 4^{th} dark band and 6^{th} bright band on the same side of the interference pattern?

MHT CET 2026 · 16 APR · SHIFT 1

(a) 0.5 mm (b) 0.75 mm (c) 1.0 mm (d) 1.5 mm

75. In young's double slit experiment, the n^{th} maximum of wavelength λ_1 is at a distance of y_1 from the central maximum. When the wavelength of the source is changed to λ_2, $\left(\frac{n}{3}\right)^{th}$ maximum is at a distance of y_2 from its central maximum. The ratio $\frac{y_1}{y_2}$ is

MHT CET 2024 · 10 MAY · SHIFT 1

(a) $\frac{3\lambda_1}{\lambda_2}$ (b) $\frac{3\lambda_2}{\lambda_1}$ (c) $\frac{\lambda_1}{3\lambda_2}$ (d) $\frac{\lambda_2}{3\lambda_1}$

76. In Young's double slit experiment, 8^{th} maximum with wavelength 'λ_1' is at a distance 'd_1' from the central maximum and 6^{th} maximum with wavelength 'λ_2' is at a distance 'd_2'. Then $\frac{d_2}{d_1}$ is

MHT CET 2023 · 14 MAY · SHIFT 1

(a) $\frac{3\lambda_1}{4\lambda_2}$ (b) $\frac{3\lambda_2}{4\lambda_1}$ (c) $\frac{4\lambda_1}{3\lambda_2}$ (d) $\frac{4\lambda_2}{3\lambda_1}$

77. In Young's double slit experiment, the fifth maximum with wavelength 'λ_1' is at a distance 'y_1' and the same maximum with wavelength 'λ_2' is at a distance 'y_2' measured from the central bright band. Then $\frac{y_1}{y_2}$ is equal to [D and d are constant]

MHT CET 2023 · 11 MAY · SHIFT 2

(a) $\frac{\lambda_1}{\lambda_2}$ (b) $\frac{\lambda_2}{\lambda_1}$ (c) $\frac{\lambda_1^2}{\lambda_2^2}$ (d) $\frac{\lambda_2^2}{\lambda_1^2}$

78. In Young's double slit experiment, the fringe width is 2 mm. The separation between the 13^{th} bright fringe and the 4^{th} dark fringe from the centre of the screen on same side will be

MHT CET 2023 · 9 MAY · SHIFT 2

(a) 13 mm. (b) 17 mm. (c) 19 mm. (d) 23 mm.

79. In Young's double slit experiment, the distance of n^{th} dark band from the central bright band in terms of bandwidth 'β' is

MHT CET 2021 · 23 SEP · SHIFT 2

(a) $n\beta$ (b) $(n-1)\beta$
(c) $(n-0.5)\beta$ (d) $(n+0.5)\beta$

80. In Young's double slit experiment, the 10^{th} maximum of wavelength 'λ_1' is at a distance of 'Y_1' from the central maximum. When the wavelength of the source is changed to 'λ_2', 5^{th} maximum is at a distance 'Y_2' from the central maximum. The ratio $\frac{Y_1}{Y_2}$ is

MHT CET 2021 · 22 SEP · SHIFT 1

(a) $\frac{2\lambda_1}{\lambda_2}$ (b) $\frac{\lambda_2}{2\lambda_1}$ (c) $\frac{2\lambda_2}{\lambda_1}$ (d) $\frac{\lambda_1}{2\lambda_2}$

81. In Young's double slit experiment, the 'n^{th}' maximum of wavelength 'λ_1' is at a distance 'y_1' from the central maximum. When the wavelength of the source is changed to 'λ_2', $\left(\frac{n}{2}\right)^{th}$ maximum is at a distance of 'y_2' from its central maximum. The ratio $\frac{y_1}{y_2}$ is

MHT CET 2021 · 20 SEP · SHIFT 1

(a) $\frac{\lambda_2}{2\lambda_1}$ (b) $\frac{2\lambda_1}{\lambda_2}$ (c) $\frac{2\lambda_2}{\lambda_1}$ (d) $\frac{\lambda_1}{2\lambda_2}$

82. In Young's double slit experiment carried out with light of wavelength $(\lambda) = 5000$ Å, the distance between the slits is 0.2 mm and the screen is at 200 cm from the slits. The central maximum is at $x = 0$. The third maximum (taking the central maximum as zeroth maximum) will be at x equal to

AIPMT 1992

(a) 1.67 cm (b) 1.5 cm (c) 0.5 cm (d) 5.0 cm

83. The Young's double slit experiment is performed with blue and with green light of wavelengths 4360 Å and 5460 Å respectively. If x is the distance of 4th maxima from the central one, then

AIPMT 1990

(a) $x(\text{blue}) = x(\text{green})$ (b) $x(\text{blue}) > x(\text{green})$
(c) $x(\text{blue}) < x(\text{green})$ (d) $\frac{x(\text{blue})}{x(\text{green})} = \frac{5460}{4360}$

84. In Young's double slits experiment, the position of 5^{th} bright fringe from the central maximum is 5 cm. The distance between slits and screen is 1 m and wavelength of used monochromatic light is 600 nm. The separation between the slits is:

JEE MAIN 2023 · 25 JAN · SHIFT 1

(a) 60 μm (b) 48 μm (c) 36 μm (d) 12 μm

85. In Young's double slit arrangement, slits are separated by a gap of 0.5 mm, and the screen is placed at a distance of 0.5 m from them. The distance between the first and the third bright fringe formed when the slits are illuminated by a monochromatic light of 5890 $\mathring{A}$ is :-

JEE MAIN 2021 · 18 MAR · SHIFT 1

(a) 1178×10^{-9} m (b) 1178×10^{-6} m
(c) 1178×10^{-12} m (d) 5890×10^{-7} m

86. In Young's double slit experiment, carried out with light of wavelength 5000 $\mathring{A}$, the distance between the slits is 0.3 mm and the screen is at 200 cm from the slits. The central maximum is at $x = 0$ cm. The value of x for third maxima is _____ mm.

JEE MAIN 2024 · 5 APR · SHIFT 1 *(Numerical)*

87. In a Young's double slit experiment, a laser light of 560 nm produces an interference pattern with consecutive bright fringes' separation of 7.2 mm. Now another light is used to produce an interference pattern with consecutive bright fringes' separation of 8.1 mm. The wavelength of second light is _____ nm.

JEE MAIN 2022 · 28 JUL · SHIFT 1 *(Numerical)*

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◆ Path difference & fringe order 7 Qs

88. Two coherent sources P and Q produce interference at a point A on the screen where there is a dark band which is formed between 4^{th} bright band and 5^{th} bright band. Wavelength of light used is 6000 Å. The path difference between PA and QA is $x \times 10^{-4}$ cm. The value of x is

MHT CET 2026 · 13 MAY · SHIFT 2

(a) 1.4 (b) 2.7 (c) 4.5 (d) 6.2

89. The path difference between two identical light waves at a point Q on the screen is $3\mu m$. If wavelength of the waves is $5000\,\overset{o}{A}$, then at point Q there is

MHT CET 2023 · 13 MAY · SHIFT 2

(a) 3rd dark band (b) 4th bright band
(c) 5th dark band (d) 6 th bright band

90. The path difference between two interfering light waves meeting at a point on the screen is $\left(\frac{57}{2}\right)\lambda$. The bond obtained at that point is

MHT CET 2021 · 24 SEP · SHIFT 2

(a) 29th bright band (b) 57th dark band
(c) 57th bright band (d) 29th dark band

91. Two coherent sources of wavelength 'λ' produce steady interference pattern. The path difference corresponding to 10^{th} order maximum will be

MHT CET 2021 · 21 SEP · SHIFT 2

(a) 9.5 λ (b) 10.5 λ (c) 9 λ (d) 10 λ

92. Two coherent sources 'P' and 'Q' produce interference at point 'A' on the screen, where there is a dark band which is formed between 4th and 5th bright band. Wavelength of light used is 6000 $\overset{o}{A}$. The path difference PA and QA is

MHT CET 2021 · 21 SEP · SHIFT 2

(a) 3.6×10^{-4} cm (b) 3.2×10^{-4} cm
(c) 2.4×10^{-4} cm (d) 2.7×10^{-4} cm

93. In Young's double slit experiment, with a source of light having wavelength $6300\,\overset{o}{A}$, the first maxima will occur when the

MHT CET 2021 · 20 SEP · SHIFT 2

(a) path difference is $9200\,\overset{o}{A}$
(b) phase difference is n radian
(c) phase difference is $-\frac{\pi}{2}$ radian.
(d) path difference is $6300\,\overset{o}{A}$

94. In a Young's double slit experiment, if there is no initial phase difference between the light from the two slits, a point on the screen corresponding to the fifth minimum has path difference

NEET 2019

(a) $\frac{11\lambda}{2}$ (b) $\frac{5\lambda}{2}$ (c) $\frac{10\lambda}{2}$ (d) $\frac{9\lambda}{2}$

◆ Fringes in a region (nλ = constant) 5 Qs

95. In a certain region of the screen, number of fringes formed is observed to be 8 in Young's double slit experiment when light of wavelength 6600 Å is used. If the light of wavelength 4400 Å is used, the number of fringes observed in the same region of the screen will be

MHT CET 2026 · 18 APR · SHIFT 1

(a) 10 (b) 12 (c) 16 (d) 18

96. In Young's double slit experiment, when light of wavelength 600 nm is used, 18 fringes are observed on the screen. If the wavelength of light is changed to 400 nm, the number of fringes observed on the screen is

MHT CET 2025 · 20 APR · SHIFT 1

(a) 12 (b) 27 (c) 22 (d) 24

97. In a Young's double slit experiment, a student observes 8 fringes in a certain segment of screen when a monochromatic light of 600 nm wavelength is used. If the wavelength of light is changed to 400 nm, then the number of fringes he would observe in the same region of the screen is

NEET 2022 · PHASE 1

(a) 6 (b) 8 (c) 9 (d) 12

98. In a Young's double slit experiment, 16 fringes are observed in a certain segment of the screen when light of a wavelength 700 nm is used. If the wavelength of light is changed to 400 nm, the number of fringes observed in the same segment of the screen would be

JEE MAIN 2020 · 2 SEP · SHIFT 2

(a) 28 (b) 24 (c) 30 (d) 18

99. In a Young's double slit experiment 15 fringes are observed on a small portion of the screen when light of wavelength 500 nm is used. Ten fringes are observed on the same section of the screen when another light source of wavelength λ is used. Then the value of λ is (in nm) _____.

JEE MAIN 2020 · 9 JAN · SHIFT 2 *(Numerical)*

◆ Angular width & angular position 3 Qs

100. For Young's double slit experiment, two statements are given below:

Statement I: If screen is moved away from the plane of slits, angular separation of the fringes remains constant.

Statement II: If the monochromatic source is replaced by another monochromatic source of larger wavelength, the angular separation of fringes decreases.

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

NEET 2023

(a) Both Statement I and Statement II are false
(b) Statement I is true but Statement II is false
(c) Statement I is false but Statement II is true
(d) Both Statement I and Statement II are true

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101. 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 · 21 JAN · SHIFT 2

(a) Both Statement I and Statement II are true
(b) Statement I is true but Statement II is false
(c) Statement I is false but Statement II is true
(d) Both Statement I and Statement II are false

102. In a Young's double slit experiment, light of 500 nm is used to produce an interference pattern. When the distance between the slits is 0.05 mm, the angular width (in degree) of the fringes formed on the distance screen is close to

JEE MAIN 2020 · 3 SEP · SHIFT 1

(a) 0.17° (b) 1.7° (c) 0.57° (d) 0.07°

◆ White light & fringe shape 2 Qs

103. If the monochromatic source in Young's double slit experiment is replaced by white light, then

NEET 2024

(a) Interference pattern will disappear
(b) There will be a central dark fringe surrounded by a few coloured fringes
(c) There will be a central bright white fringe surrounded by a few coloured fringes
(d) All bright fringes will be of equal width

104. A Young's double slit experiment uses a monochromatic source. The shape of the interference fringes formed on a screen is

AIEEE 2005

(a) circle (b) hyperbola
(c) parabola (d) straight line

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TOPIC 04

YDSE: Film, Medium & Two Wavelengths

16 PYQs · Easy 16 · Medium 0 · Difficult 0 | MHT CET 9 · NEET 3 · JEE 4

Concepts covered: Optical path & phase (2) · Fringe shift by a film (1) · YDSE in a medium (13)

LEVEL 1 · EASY 16 questions

◆ Optical path & phase 2 Qs

105. The thickness of a plate (refractive index μ) which will produce a change in optical path equal to half the wavelength λ of the light passing through it normally, is

MHT CET 2026 · 14 MAY · SHIFT 1

(a) $\frac{\lambda}{4(\mu-1)}$ (b) $\frac{3\lambda}{4(\mu-1)}$
(c) $\frac{\lambda}{(\mu-1)}$ (d) $\frac{\lambda}{2(\mu-1)}$

106. A ray of light from a monochromatic point source of light is incident at a point on the screen. If a thin mica film of thickness ' t ' and refractive index ' n ' is introduced in its path, then the optical path

MHT CET 2025 · 22 APR · SHIFT 2

(a) is decreased by $(n-1)t$.
(b) is increased by $(n+1)t$.
(c) is not affected.
(d) is increased by $(n-1)t$.

◆ Fringe shift by a film 1 Q

107. A plate of refractive index 1.6 is introduced in the path of light from one of the slits in Young's double slit experiment then

MHT CET 2024 · 15 MAY · SHIFT 2

(a) the fringe width towards the side of the plate will decrease.
(b) the central maximum will shift towards this side
(c) number of fringes seen will decrease.
(d) interference pattern will disappear.

◆ YDSE in a medium 13 Qs

108. If Young's double slit experiment is performed in water

MHT CET 2026 · 14 MAY · SHIFT 2

(a) the fringe width will decrease
(b) the fringe width will increase
(c) the fringe width will remain unchanged
(d) the fringe width first decreases and then increases

109. A double slit experiment is immersed in water of refractive index 1.33. The slit separation is 1 mm, distance between slit and screen is 1.33 m. The slits are illuminated by a light of wavelength 6300 \AA. The fringewidth is $x \times 10^{-4}\,m$. The value of $'x'$ is

MHT CET 2026 · 12 MAY · SHIFT 2

(a) 5.8 (b) 8.6 (c) 4.9 (d) 6.3

110. A double slit experiment is immersed in water of refractive index 1.33. The slit separation is 1 mm, distance between slit and screen is 1.33 m. The slits are illuminated by light of wavelength 6300 \AA. The fringe width is

MHT CET 2026 · 15 APR · SHIFT 2

(a) 4.9×10^{-4} m (b) 6.3×10^{-4} m
(c) 8.6×10^{-4} m (d) 5.8×10^{-4} m

111. In Young's double slit experiment, the angular width of a fringe is found to be 0.2° on a screen placed 1m away. The wavelength of light used in 600 nm. If the entire apparatus is immersed in water of refractive index 4/3. the angular width of the fringe will be

MHT CET 2026 · 13 APR · SHIFT 1

(a) 0.10° (b) 0.15° (c) 0.20° (d) 0.25°

112. A double slit experiment is immersed in water of refractive index 1.33. The slit separation is 1 mm, distance between slit and screen is 1.33 m The slits are illuminated by a light of wavelength 6300 $\mathring{A}$. The fringe width is

MHT CET 2023 · 11 MAY · SHIFT 1

(a) 4.9×10^{-4} m (b) 5.8×10^{-4} m
(c) 6.3×10^{-4} m (d) 8.6×10^{-4} m

113. A double slit experiment is immersed in water of refractive index 1.33. The slit separationis 1 mm and the distance between slit and screen is 1.33 m. The slits are illuminated by a light of wavelength 6300 $\mathring{A}$. The fringewidth is

MHT CET 2021 · 21 SEP · SHIFT 1

(a) 4.9×10^{-4} m (b) 6.3×10^{-4} m
(c) 8.6×10^{-4} m (d) 5.8×10^{-4} m

114. In a double slit experiment, when light of wavelength 400 nm was used, the angular width of the first minima formed on a screen placed 1m away, was found to be 0.2°. What will be the angular width of the first minima, (μ_{water} = 4/3) if the entire experimental apparatus is immersed in water?

NEET 2019

(a) 0.15° (b) 0.05° (c) 0.1° (d) 0.266°

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115. Interference was observed in interference chamber where air was present, now the chamber is evacuated, and if the same light is used, a careful observer will see

AIPMT 1993

(a) no interference
(b) interference with brighter bands
(c) interference with dark bands
(d) interference with larger width

116. In Young's double slit experiment, the fringe width is found to be 0.4 mm. If the whole apparatus is immersed in water of refractive index $\frac{4}{3}$, without disturbing the geometrical arrangement, the new fringe width will be

AIPMT 1990

(a) 0.30 mm (b) 0.40 mm
(c) 0.53 mm (d) 450 microns

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

JEE MAIN 2026 · 5 APR · SHIFT 1

(a) 1.2 (b) 2 (c) 2.4 (d) 2.88

118. 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 · 22 JAN · SHIFT 1

(a) (A) is false but (R) is true
(b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
(c) Both (A) and (R) are true and (R) is the correct explanation of (A)
(d) (A) is true but (R) is false

119. In Young's double slit experiment, the fringe width is 12 mm. If the entire arrangement is placed in water of refractive index $\frac{4}{3}$, then the fringe width becomes (in mm):

JEE MAIN 2022 · 26 JUL · SHIFT 1

(a) 16 (b) 9 (c) 48 (d) 12

120. In a Young's double slit experiment, an angular width of the fringe is 0.35° on a screen placed at 2 m away for particular wavelength of 450 nm. The angular width of the fringe, when whole system is immersed in a medium of refractive index 7/5, is $\frac{1}{\alpha}$. The value of α is _____.

JEE MAIN 2022 · 28 JUN · SHIFT 2 *(Numerical)*

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TOPIC 05

Biprism, Thin Films & Other Devices

9 PYQs · Easy 9 · Medium 0 · Difficult 0 | MHT CET 8 · NEET 1 · JEE 0

Concepts covered: Fresnel biprism (8) · Thin film interference (1)

LEVEL 1 · EASY 9 questions

◆ Fresnel biprism 8 Qs

121. In a biprism experiment a steady interference pattern is observed on the screen using a light of wavelength 5000 $\mathring{A}$. Without disturbing the set up of the experiment, the source of light is replaced by a source of wavelength 6400$\mathring{A}$.
The fringe width will
MHT CET 2025 · 25 APR · SHIFT 2
(a) decrease by 48% (b) decrease by 28%
(c) increase by 48% (d) increase by 28%

122. In biprism experiment, the fringe width is 0.6 mm. The distance between 6^{th} dark fringe and 8^{th} bright fringe on the same side of central bright fringe is
MHT CET 2024 · 15 MAY · SHIFT 1
(a) 6 mm (b) 4 mm (c) 1.5 mm (d) 0.9 mm

123. In a biprism experiment, monochromatic light of wavelength 'γ' is used. The distance between the two coherent sources 'd' is kept constant. If the distance between slit and eyepiece 'D' is varied as D_1, D_2, D_3, D_4 and corresponding measured fringe widths are W_1, W_2, W_3, W_4 then
MHT CET 2024 · 4 MAY · SHIFT 2
(a) $W_1D_1 = W_2D_2 = W_3D_3 = W_4D_4$
(b) $\frac{W_1}{D_1} = \frac{W_2}{D_2} = \frac{W_3}{D_3} = \frac{W_4}{D_4}$
(c) $W_1\sqrt{D_1} = W_2\sqrt{D_2} = W_3\sqrt{D_3} = W_3\sqrt{D_3}$
(d) $D_1\sqrt{W_1} = D_2\sqrt{W_2} = D_3\sqrt{W_3} = D_4\sqrt{W_4}$

124. In a biprism experiment, monochromatic light of wavelength 'λ' is used. The distance between two coherent sources 'd' is kept constant. If the distance between slit and eyepiece 'D' is varied as $D_1, D_2, D_3 \& D_4$ and corresponding measured fringe widths are Z_1, Z_2, Z_3 and Z_4 then
MHT CET 2023 · 13 MAY · SHIFT 1
(a) $Z_1D_1 = Z_2D_2 = Z_3D_3 = Z_4D_4$
(b) $\frac{Z_1}{D_1} = \frac{Z_2}{D_2} = \frac{Z_3}{D_3} = \frac{Z_4}{D_4}$
(c) $D_1\sqrt{Z_1} = D_2\sqrt{Z_2} = D_3\sqrt{Z_3} = D_4\sqrt{Z_4}$
(d) $Z_1\sqrt{D_1} = Z_2\sqrt{D_2} = Z_3\sqrt{D_3} = Z_4\sqrt{D_4}$

125. In two separate setups for Biprism experiment using same wavelength, fringes of equal width are obtained. If ratio of slit separation is 2 : 3 then the ratio of the distance between the slit and screen in the two setups is
MHT CET 2023 · 12 MAY · SHIFT 1
(a) 2 : 3 (b) 1 : 2 (c) 4 : 9 (d) 9 : 4

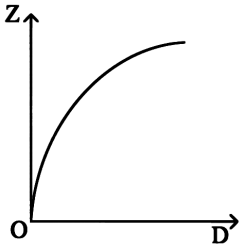
126. In the interference experiment using a biprism, the distance of the slits from the screen is increased by 25% and the separation between the slits is halved. If 'W' represents the original fringewidth, the new fringewidth is
MHT CET 2021 · 23 SEP · SHIFT 1
(a) 2 W (b) 2.5 W (c) 4 W (d) 1.5 W

127. In biprism experiment, 21 fringes are observed in a given region using light of wavelength 4800 $\mathring{A}$. If light of wavelength 5600 $\mathring{A}$ is used, the number of fringes in the same region will be
MHT CET 2021 · 21 SEP · SHIFT 1
(a) 18 (b) 24 (c) 14 (d) 21

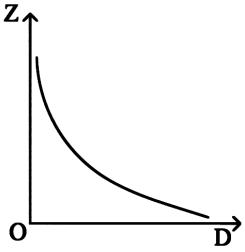
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128. A graph is plotted between the fringe-width Z and the distance D between the slit and eye-piece, keeping other adjustment same. The correct graph is

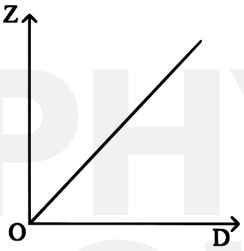
(A)



(B)

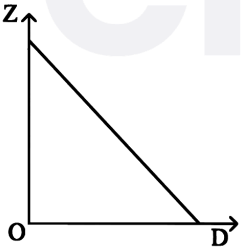


(C)



(D)

MHT CET 2020 · 19 OCT · SHIFT 2



(a) A (b) B (c) D (d) C

◆ **Thin film interference** 1 Q

129. Colours of thin soap bubbles are due to

AIPMT 1999

(a) refraction (b) dispersion
(c) interference (d) diffraction

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TOPIC 06

Diffraction at a Single Slit

41 PYQs · Easy 41 · Medium 0 · Difficult 0 | MHT CET 25 · NEET 7 · JEE 9

Concepts covered: Minima of a single slit (10) · Central maximum width (14) · Secondary maxima (5) · Pattern features & effect of changes (12)

LEVEL 1 · EASY 41 questions

◆ Minima of a single slit 10 Qs

130. Light of wavelength $5000\,\mathring{A}$ is incident normally on a slit. The first minimum of the diffraction pattern is observed to lie at a distance of $5\ \text{mm}$ from the central maximum on a screen placed at a distance of $2\ \text{m}$ from the slit. The width of the slit is

MHT CET 2023 · 13 MAY · SHIFT 2

(a) 2 cm (b) 0.2 cm (c) 0.02 cm (d) 0.01 cm

131. A linear aperture whose width is 0.02 cm is placed immediately in front of a lens of focal length 60 cm. The aparture is illuminated normally by a parallel beam of wavelength 5×10^{-5} cm. The distance of the first dark band of the diffraction pattern from the centre of the screen is

NEET 2016 · PHASE 2

(a) 0.10 cm (b) 0.25 cm (c) 0.20 cm (d) 0.15 cm

132. A parallel beam of light of wavelength λ is incident normally on a narrow slit. A diffraction pattern is formed on a screen placed perpendicular to the direction of the incident beam. At the second minimum of the diffraction pattern, the phase difference between the rays coming from the two edges of slit is

NEET 2013

(a) 2π (b) 3π (c) 4π (d) $\pi\lambda$

133. A parallel beam of monochromatic light of wavelength 5000 Å is incident normally on a single narrow slit of width 0.001 mm. The light is focussed by a convex lens on a screen placed in focal plane. The first minimum will be formed for the angle of diffraction equal to

AIPMT 1993

(a) 0° (b) 15° (c) 30° (d) 50°

134. A single slit of width a is illuminated by a monochromatic light of wavelength $600\ \text{nm}$. The value of 'a' for which first minimum appears at $\theta = 30^\circ$ on the screen will be:

JEE MAIN 2023 · 15 APR · SHIFT 1

(a) $3\mu\text{m}$ (b) $0.6\mu\text{m}$ (c) $1.8\mu\text{m}$ (d) $1.2\mu\text{m}$

135. Light of wavelength $550\ nm$ falls normally on a slit of width $22.0 \times 10^{-5}\ cm$. The angular position of the second minima from the central maximum will be (in radians):

JEE MAIN 2018 · 15 APR · SHIFT 1

(a) $\frac{\pi}{12}$ (b) $\frac{\pi}{8}$ (c) $\frac{\pi}{6}$ (d) $\frac{\pi}{4}$

136. A single slit of width 0.1 mm is illuminated by a parallel beam of light of wavelength $6000\ \mathring{A}$ and diffraction bands are observed on a screen 0.5 m from the slit. The distance of the third dark band from the central bright band is:

JEE MAIN 2017 · 9 APR · SHIFT 1

(a) 3 mm (b) 9 mm (c) 4.5 mm (d) 1.5 mm

137. A parallel beam of monochromatic light of wavelength $600\ \text{nm}$ passes through single slit of $0.4\ \text{mm}$ width. Angular divergence corresponding to second order minima would be _____ $\times 10^{-3}$ rad.

JEE MAIN 2024 · 8 APR · SHIFT 1 *(Numerical)*

138. In a single slit experiment, a parallel beam of green light of wavelength $550\ \text{nm}$ passes through a slit of width $0.20\ \text{mm}$. The transmitted light is collected on a screen $100\ \text{cm}$ away. The distance of first order minima from the central maximum will be $x \times 10^{-5}\ \text{m}$. The value of x is:

JEE MAIN 2024 · 5 APR · SHIFT 2 *(Numerical)*

139. A parallel beam of monochromatic light of wavelength $5000\ \mathring{A}$ is incident normally on a single narrow slit of width $0.001\ \text{mm}$. The light is focused by convex lens on screen, placed on its focal plane. The first minima will be formed for the angle of diffraction of _____ (degree).

JEE MAIN 2024 · 27 JAN · SHIFT 2 *(Numerical)*

◆ Central maximum width 14 Qs

140. In Fraunhofer diffraction pattern, slit width is 0.2 mm and screen is at 2 m away from the lens. If the distance between the first minimum on either side of the central maximum is 1 cm, the wavelength of light used is

MHT CET 2025 · 19 APR · SHIFT 2

(a) $2000\mathring{A}$ (b) $4000\mathring{A}$ (c) $5000\mathring{A}$ (d) $10000\mathring{A}$

141. The angular separation of the central maximum in the Fraunhofer diffraction pattern is measured. The slit is illuminated by the light of wavelength $6000\,\mathring{A}$. If the slit is illuminated by light of another wavelength, the angular separation decreases by 20%. The wavelength of light used is

MHT CET 2024 · 16 MAY · SHIFT 1

(a) $6400\,\mathring{A}$ (b) $5600\,\mathring{A}$ (c) $4800\,\mathring{A}$ (d) $4400\,\mathring{A}$

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142. In Fraunhofer diffraction pattern, slitwidth is 0.5 mm and screen is at 2 m away from the lens. If wavelength of light used is $5500\,\mathring{A}$, then the distance between the first minimum on either side of the central maximum is (θ is small and measured in radian)
MHT CET 2024 · 11 MAY · SHIFT 1
(a) 1.1 mm (b) 2.2 mm (c) 4.4 mm (d) 5.5 mm

143. A beam of light of wavelength 600 nm from a distant source falls on a single slit 1 mm wide and the resulting diffraction pattern is observed on a screen 2 m away. The distance between the first dark fringe on either side of the central bright fringe is
MHT CET 2023 · 11 MAY · SHIFT 2
(a) 1.2 mm (b) 2.4 mm (c) 1.2 cm (d) 2.4 cm

144. A parallel beam of monochromatic light falls normally on a single narrow slit. The angular width of the central maximum in the resulting diffraction pattern
MHT CET 2023 · 10 MAY · SHIFT 2
(a) increases with increase of slit width.
(b) decreases with increase of slit width.
(c) decreases with decrease of slit width.
(d) may increase or decrease with decrease of slit width.

145. Light of wavelength ',λ' is incident on a slit of width 'd '. The resulting diffraction pattern is observed on a screen at a distance 'D'. The linear width of the principal maximum is then equal to the width of the slit if D equals
MHT CET 2023 · 9 MAY · SHIFT 2
(a) $\frac{d}{\lambda}$ (b) $\frac{d^2}{2\lambda}$ (c) $\frac{2\lambda}{d}$ (d) $\frac{2\lambda^2}{d}$

146. A parallel beam of monochromatic light falls normally on a single narrow slit. The angular width of the central maximum in the resulting diffraction pattern
MHT CET 2022 · 11 AUG · SHIFT 2
(a) decreases with increase of slitwidth
(b) may increase or decrease
(c) decreases with decrease of slitwidth
(d) increases with increase in slitwidth

147. A beam of light having wavelength 5400 A from a distant source falls on a single slit 0.96 mm wide and the resultant diffraction pattern is observed on a screen 2 m away. What is the distance between the first dark fringe on either side of central bright fringe?
MHT CET 2021 · 24 SEP · SHIFT 1
(a) 4.8 mm (b) 1.2 mm (c) 2.4 mm (d) 3.6 mm

148. In Fraunhofer diffraction pattern, slit width is 0.2 mm and screen is at 2m away from the lens. If wavelength of light used is $5000\,\mathring{A}$ then the distance between the first minimum on either side of the central maximum is (θ is small and measured in radian)
MHT CET 2021 · 20 SEP · SHIFT 1
(a) 2×10^{-2} m (b) 10^{-1} m
(c) 10^{-2} m (d) 10^{-3} m

149. A light wave of wavelength λ is incident on a slit of width d. The resulting diffraction pattern is observed on a screen at a distance D. If linear width of the principal maxima is equal to the width of the slit, then the distance D is
MHT CET 2020 · 16 OCT · SHIFT 2
(a) $\frac{2\lambda}{d}$ (b) $\frac{d^2}{2\lambda}$ (c) $\frac{2\lambda^2}{d}$ (d) $\frac{d}{\lambda}$

150. Angular width of the central maxima in the Fraunhofer diffraction for $\lambda = 6000$ Å is θ_0. When the same slit is illuminated by another monochromatic light, the angular width decreases by 30%. The wavelength of this light is
NEET 2019
(a) 420 Å (b) 1800 Å (c) 4200 Å (d) 6000 Å

151. For a parallel beam of monochromatic light of wavelength 'λ', diffraction is produced by a single slit whose width 'a' is of the order of the wavelength of the light. If 'D' is the distance of the screen from the slit, the width of the central maxima will be
AIPMT 2015 · CANCELLED PAPER
(a) $\frac{Da}{\lambda}$ (b) $\frac{2Da}{\lambda}$ (c) $\frac{2D\lambda}{a}$ (d) $\frac{D\lambda}{a}$

152. A beam of light of $\lambda = 600$ nm from a distant source falls on a single slit 1 mm wide and the resulting diffraction pattern is observed on a screen 2 m away. The distance between first dark fringes on either side of the central bright fringe is
AIPMT 2014
(a) 1.2 cm (b) 1.2 mm (c) 2.4 cm (d) 2.4 mm

153. 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 · 2 APR · SHIFT 1 *(Numerical)*

◆ Secondary maxima 5 Qs

154. In the diffraction pattern due to a single slit of width 'a ' with incident light of wavelength 'λ', at an angle of diffraction 'θ', the condition for the second maximum is
MHT CET 2026 · 19 MAY · SHIFT 1
(a) $a \sin\theta = 2\lambda$ (b) $2\lambda \sin\theta = 3a$
(c) $5\lambda \sin\theta = 3a$ (d) $2a \sin\theta = 5\lambda$

155. In a diffraction pattern due to single slit of width ' a ', the first minimum is observed at an angle 30° when light of wavelength $5000\,\mathring{A}$ is incident on the slit. The first secondary maximum is observed at an angle $\left[\sin 30 = \frac{1}{2}\right]$
MHT CET 2024 · 10 MAY · SHIFT 1
(a) $\sin^{-1}\left(\frac{1}{2}\right)$ (b) $\sin^{-1}\left(\frac{3}{4}\right)$
(c) $\sin^{-1}\left(\frac{1}{4}\right)$ (d) $\sin^{-1}\left(\frac{3}{5}\right)$

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156. In a diffraction pattern due to single slit of width 'a', the first minimum is observed at an angle of 30° when the light of wavelength $5400\overset{o}{A}$ is incident on the slit. The first secondary maximum is observed at an angle of $\left(\sin 30^\circ = \frac{1}{2}\right)$

MHT CET 2023 · 9 MAY · SHIFT 1

(a) $\sin^{-1}\left(\frac{3}{4}\right)$ (b) $\sin^{-1}\left(\frac{2}{3}\right)$
(c) $\sin^{-1}\left(\frac{1}{2}\right)$ (d) $\sin^{-1}\left(\frac{1}{4}\right)$

157. In a Fraunhofer diffraction at a single slit of width 'd' and incident light of wavelength $5500\overset{o}{A}$, the first minimum is observed at an angle 30°. The first secondary maxima is observed at an angle θ, equal to

MHT CET 2022 · 11 AUG · SHIFT 2

(a) $\sin^{-1}\left(\frac{1}{4}\right)$ (b) $\sin^{-1}\left(\frac{3}{4}\right)$
(c) $\sin^{-1}\left(\frac{\sqrt{3}}{2}\right)$ (d) $\sin^{-1}\left(\frac{1}{\sqrt{2}}\right)$

158. In a diffraction pattern due to a single slit of width a, the first minimum is observed at an angle 30° when light of wavelength 5000 $\overset{o}{A}$ is incident on the slit. The first secondary maximum is observed at an angle of

NEET 2016 · PHASE 1

(a) $\sin^{-1}\left(\frac{1}{2}\right)$ (b) $\sin^{-1}\left(\frac{3}{4}\right)$
(c) $\sin^{-1}\left(\frac{1}{4}\right)$ (d) $\sin^{-1}\left(\frac{2}{3}\right)$

◆ Pattern features & effect of changes 12 Qs

159. In diffraction experiment from single slit, the angular width of the central maxima does NOT depend upon

MHT CET 2026 · 20 APR · SHIFT 2

(a) width of the slit
(b) wavelength of light used.
(c) ratio of wavelength and slit width.
(d) distance of the slit from the screen.

160. When the distance of separation between the slit and screen is doubled, the angular separation between fringes in single slit diffraction pattern experiment

MHT CET 2026 · 15 APR · SHIFT 1

(a) increases
(b) decreases
(c) remains same
(d) first increases and then decreases

161. In a single slit diffraction pattern, identify the incorrect statement from the following.

MHT CET 2025 · 22 APR · SHIFT 1

(a) The fringes have unequal width.
(b) The fringes have unequal intensity.
(c) The fringes have unequal width and unequal intensity.
(d) The fringes have equal width and equal intensity.

162. A diffraction pattern is obtained using a beam of red light. If red light is replaced by blue light then

MHT CET 2024 · 2 MAY · SHIFT 2

(a) no change in diffraction pattern.
(b) diffraction bands become narrow and crowded together.
(c) diffraction bands become broader and farther apart.
(d) bands disappear.

163. The diffraction fringes obtained by a single slit are of

MHT CET 2023 · 14 MAY · SHIFT 1

(a) equal width
(b) equal width and unequal intensity
(c) unequal width but equal intensity
(d) unequal width and unequal intensity

164. In the experiment of diffraction due to a single slit, if the slit width is decreased, the width of the central maximum

MHT CET 2023 · 11 MAY · SHIFT 1

(a) becomes zero. (b) does not change.
(c) increases. (d) decreases.

165. The width of central maximum of a diffraction pattern on a single slit does not depend upon

MHT CET 2021 · 22 SEP · SHIFT 1

(a) frequency of light used
(b) width of the slit
(c) distance between slit and source
(d) wavelength of light used

166. In diffraction experiment, from a single slit, the angular width of central maximum does NOT depend upon

MHT CET 2021 · 21 SEP · SHIFT 1

(a) ratio of wavelength and slit width
(b) distance of the slit from the screen
(c) wavelength of light used
(d) width of the slit

167. In diffraction experiment, from a single slit, the angular width of the central maxima does not depend upon

MHT CET 2020 · 16 OCT · SHIFT 1

(a) ratio of wavelength and slit width
(b) distance of the slit from the screen
(c) wavelength of light used
(d) width of the slit

168. The luminous border that surrounds the profile of a mountain just before sun rises behind it, is an example of

MHT CET 2019 · 2 MAY · SHIFT 2

(a) dispersion
(b) total internal reflection
(c) interference
(d) diffraction

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169. 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 · 22 JAN · SHIFT 2

(a) B, D only (b) A, D only
(c) A, C, E only (d) B, C only

170. Consider the diffraction pattern obtained from the sunlight incident on a pinhole of diameter 0.1 μm. If the diameter of the pinhole is slightly increased, it will affect the diffraction pattern such that:

JEE MAIN 2021 · 25 FEB · SHIFT 2

(a) its size increases, but intensity decreases
(b) its size increases, and intensity increases
(c) its size decreases, but intensity increases
(d) its sizes decreases, and intensity decreases

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TOPIC 07

Resolving Power

18 PYQs · Easy 18 · Medium 0 · Difficult 0 | MHT CET 8 · NEET 3 · JEE 7

Concepts covered: Telescope (9) · Microscope (9)

LEVEL 1 · EASY 18 questions

◆ Telescope 9 Qs

171. Resolving power of a telescope can be increased by
MHT CET 2026 · 12 MAY · SHIFT 1
(a) increasing the diameter of objective.
(b) decreasing the diameter of the objective
(c) increasing the distance between the objects which have to be seen through the telescope.
(d) decreasing the the distance between the objects which have to be seen through the telescope.

172. In telescopes for a given wavelength, the objectives with large aperture are used for
MHT CET 2026 · 17 APR · SHIFT 1
(a) greater resolution.
(b) reducing lens aberration.
(c) greater magnification.
(d) ease of manufacture.

173. Resolving power of a telescope can be increased by increasing
MHT CET 2025 · 5 MAY · SHIFT 2
(a) the diameter of eyepiece.
(b) the wavelength of light.
(c) the focal length of eye-piece.
(d) the diameter of the objective.

174. Assume that light of wavelength 600 nm is coming from a star. The limit of resolution of telescope whose objective has a diameter of 2 m is:
NEET 2020 · PHASE 1
(a) 1.83 × 10-7 rad (b) 7.32 × 10-7 rad
(c) 6.00 × 10-7 rad (d) 3.66 × 10-7 rad

175. The angular resolution of a 10 cm diameter telescope at a wavelength of 5000 $\mathring{A}$ is of the order of
AIPMT 2005
(a) 106 rad (b) 10^{-2} rad
(c) 10^{-4} rad (d) 10^{-6} rad.

176. Diameter of the objective lens of a telescope is 250 cm. For light of wavelength 600nm. coming from a distant object, the limit of resolution of the telescope is close to :-
JEE MAIN 2019 · 9 APR · SHIFT 2
(a) 3.0 × 10–7 rad (b) 4.5 × 10–7 rad
(c) 1.5 × 10–7 rad (d) 2.0 × 10–7 rad

177. Calculate the limit of resolution of a telescope objective having a diameter of 200 cm, if it has to detect light of wavelength 500 nm coming from a star :-
JEE MAIN 2019 · 8 APR · SHIFT 2
(a) 610 × 10–9 radian (b) 457.5 × 10–9 radian
(c) 305 × 10–9 radian (d) 152.5 × 10–9 radian

178. 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 · 4 APR · SHIFT 1 *(Not in current JEE/NEET syllabus)*
(a) 61 (b) 122 (c) 244 (d) 305

179. 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 interger)
JEE MAIN 2026 · 8 APR · SHIFT 2 *(Numerical)*

◆ Microscope 9 Qs

180. To improve the resolving power of a compound microscope we should
MHT CET 2026 · 20 APR · SHIFT 2
(a) decrease the diameter of the objective lens.
(b) decrease the focal length of the eye-piece.
(c) increase the refractive index of the medium between the object and objective lens.
(d) increase the wavelength of light.

181. In an optical instrument- microscope, the wavelength of light used are $\lambda_1 = 6800$ Å and $\lambda_2 = 5100$ Å. The ratio of the resolving power of microscope corresponding to 'λ_1' to that for 'λ_2' is
MHT CET 2026 · 18 APR · SHIFT 2
(a) 9 : 16 (b) 5 : 4 (c) 4 : 3 (d) 3 : 4

182. Two points separated by a distance of 0.1 mm can just be seen in microscope when light of wavelength 6000 $\mathring{A}$ is used. If the light of wavelength 4800 $\mathring{A}$ is used, the limit of resolution will become
MHT CET 2024 · 2 MAY · SHIFT 2
(a) 0.8 mm (b) 0.12 mm (c) 0.10 mm (d) 0.08 mm

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183. A person is observing a bacteria through a compound microscope. For better observation and to improve its resolving power he should

MHT CET 2023 · 10 MAY · SHIFT 1

(a) increase the wavelength of light.
(b) increase the refractive index of the medium between the object and objective lens.
(c) decrease the focal length of the eyepiece.
(d) decrease the diameter of the objective lens.

184. When wavelength of light used in optical instruments A and B are $4500\overset{o}{A}$ and $6000\overset{o}{A}$ respectively, the ratio of resolving power of A to B will be

MHT CET 2020 · 16 OCT · SHIFT 2

(a) 9: 16 (b) 16: 9 (c) 7: 1 (d) 4: 3

185. The ratio of resolving powers of an optical microscope for two wavelength $\lambda_1 = 4000\ \overset{\circ}{A}$ and $\lambda_2 = 6000\ \overset{\circ}{A}$ is

NEET 2017

(a) 9: 4 (b) 3: 2 (c) 16: 81 (d) 8: 27

186. A scientist is observing a bacteria through a compound microscope. For better analysis and to improve its resolving power he should. (Select the best option)

JEE MAIN 2023 · 29 JAN · SHIFT 2

(a) Decrease the focal length of the eye piece.
(b) Increase the wavelength of the light
(c) Increase the refractive index of the medium between the object and objective lens
(d) Decrease the diameter of the objective lens

187. The diameter of the objective lens of microscope makes an angle β at the focus of the microscope. Further, the medium between the object and the lens is an oil of refractive index n. Then the resolving power of the microscope.

JEE MAIN 2014 · 19 APR · SHIFT 1

(a) Increases with decreasing value of n
(b) Increases with decreasing value of β
(c) Increases with increasing value of n sin 2β
(d) Increases with increasing value of $\frac{1}{n\sin 2\beta}$

188. Wavelengths of light used in an optical instrument are $\lambda_1 = 4000\overset{\circ}{A}$ and $\lambda_2 = 5000\overset{\circ}{A}$, then ratio of their respective resolving powers (corresponding to λ_1 and λ_2) is:

AIEEE 2002

(a) 16 : 25 (b) 9 : 1 (c) 4 : 5 (d) 5 : 4

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TOPIC 08

Polarisation

17 PYQs · Easy 17 · Medium 0 · Difficult 0 | MHT CET 4 · NEET 5 · JEE 8

Concepts covered: Malus's law: two polaroids (8) · Three or more polaroids (2) · Brewster's law (6) · Other polarisation effects (1)

LEVEL 1 · EASY 17 questions

◆ Malus's law: two polaroids 8 Qs

189. Two polaroids are oriented with their planes perpendicular to incident light and transmission axis making an angle 30° with each other. What fraction of incident unpolarised light is transmitted? $\left(\cos 30^\circ = \sqrt{3}/2\right)$

MHT CET 2025 · 23 APR · SHIFT 1

(a) 57.5% (b) 17.5% (c) 27.5% (d) 37.5%

190. A beam of unpolarized light passes through a tourmaline crystal A and then it passes through a second tourmaline crystal B oriented so that its principal plane is parallel to that of A. The intensity of emergent light is I_0. Now B is rotated by 45° about the ray. The emergent light will have intensity $\left(\cos 45^\circ = \frac{1}{\sqrt{2}}\right)$

MHT CET 2023 · 9 MAY · SHIFT 1

(a) $\frac{I_0}{2}$ (b) $\frac{I_0}{\sqrt{2}}$ (c) $\frac{\sqrt{2}}{I_0}$ (d) $\frac{2}{I_0}$

191. After passing through a polariser a linearly polarised light of intensity I is incident on an analyser making an angle of 30° with that of the polariser. The intensity of light emitted from the analyser will be

NEET 2022 · PHASE 2

(a) $\frac{2I}{3}$ (b) $\frac{I}{2}$ (c) $\frac{I}{3}$ (d) $\frac{3I}{4}$

192. A beam of unpolarised light of intensity I_0 is passed through a polaroid A and then through another polaroid B which is oriented so that its principal plane makes an angle of 45° relative to that of A. The intensity of emergent light is:

JEE MAIN 2024 · 30 JAN · SHIFT 2

(a) $I_0/2$ (b) $I_0/8$ (c) $I_0/4$ (d) I_0

193. Two poloroids P_1 and P_2 are placed parallel to each other with common axis.The light of intensity I_0 passes through a polaroid sheet P_1 and then passes through polaroid P_2. If P_2 is now rotated by 60°, then the intensity of the output light from P_2 will be:

JEE MAIN 2022 · 30 JUL · SHIFT 2

(a) $\frac{I_0}{2}$ (b) $\frac{I_0}{4}$ (c) Zero (d) $\frac{I_0}{8}$

194. An unpolarised light beam of intensity $2I_0$ is passed through a polaroid P and then through another polaroid Q which is oriented in such a way that its passing axis makes an angle of 30° relative to that of P. The intensity of the emergent light is

JEE MAIN 2022 · 29 JUL · SHIFT 2

(a) $\frac{I_0}{4}$ (b) $\frac{I_0}{2}$ (c) $\frac{3I_0}{4}$ (d) $\frac{3I_0}{2}$

195. A beam of unpolarised light of intensity I_0 is passed through a polaroid A and then through another polaroid B which is oriented so that its principal plane makes an angle of 45° relative to that of A. The intensity of the emergent light is

JEE MAIN 2013

(a) I_0 (b) $\frac{I_0}{2}$ (c) $\frac{I_0}{4}$ (d) $\frac{I_0}{8}$

196. When an unpolarized light of intensity I_0 is incident on a polarizing sheet, the intensity of the light which does not get transmitted is

AIEEE 2005

(a) $\frac{1}{4} I_0$ (b) $\frac{1}{2} I_0$ (c) I_0 (d) zero

◆ Three or more polaroids 2 Qs

197. The intensity of transmitted light when a polaroid sheet, placed between two crossed polaroids at 22.5° from the polarization axis of one of the polaroids, is ($I0_0$ is the intensity of polarised light after passing through the first polaroid):

NEET 2025

(a) $\frac{I_0}{8}$ (b) $\frac{I_0}{16}$ (c) $\frac{I_0}{2}$ (d) $\frac{I_0}{4}$

198. When a polaroid sheet is rotated between two crossed polaroids then the transmitted light intensity will be maximum for a rotation of:

JEE MAIN 2024 · 27 JAN · SHIFT 2

(a) 90° (b) 30° (c) 45° (d) 60°

◆ Brewster's law 6 Qs

199. Choose the correct statement from the following.

Brewster's angle for a transparent medium is

MHT CET 2026 · 13 APR · SHIFT 1

(a) different for light of different colours
(b) same for lights of different colours
(c) independent of refractive index of the medium
(d) different for lights of same colour

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200. A ray of light is incident of the surface of a glass plate at an angle of incidence equal to Brewster's angle Φ. If μ denotes the refractive index of glass w.r.t. air, then what will be the angle between reflected and refracted rays?

MHT CET 2026 · 11 APR · SHIFT 1

(a) $90^\circ - \sin^{-1}(\sin\Phi/\mu)$ (b) 90°

(c) $\sin^{-1}(\mu\cos\Phi)$ (d) $90^\circ + \Phi$

201. An unpolarised light beam strikes a glass surface at Brewster's angle. Then

NEET 2024

(a) The reflected light will be partially polarised.

(b) The refracted light will be completely polarised.

(c) Both the reflected and refracted light will be completely polarised.

(d) The reflected light will be completely polarised but the refracted light will be partially polarised.

202. Unpolarised light is incident from air on a plane surface of a material of refractive index μ. At a particular angle of incidence i, it is found that the reflected and refracted rays are perpendicular to each other. Which of the following options is correct for this situation?

NEET 2018

(a) Reflected light is polarised with its electric vector parallel to the plane of incidence

(b) Reflected light is polarised with its electric vector perpendicular to the plane of incidence

(c) $i = \sin^{-1}\left(\frac{1}{\mu}\right)$

(d) i = tan-1 $\left(\frac{1}{\mu}\right)$

203. When unpolarized light is incident at an angle of 60° on a transparent medium from air, the reflected ray is completely polarized. The angle of refraction in the medium is:

JEE MAIN 2024 · 31 JAN · SHIFT 2

(a) 60° (b) 90° (c) 30° (d) 45°

204. The angle of incidence at which reflected light is totally polarized for reflection from air to glass (refractive index n) is:

AIEEE 2004

(a) $\tan^{-1}(1/n)$ (b) $\sin^{-1}(1/n)$

(c) $\sin^{-1}(n)$ (d) $\tan^{-1}(n)$

◆ Other polarisation effects 1 Q

205. Which of the phenomenon is not common to sound and light waves?

AIPMT 1988

(a) Interference (b) Diffraction

(c) Coherence (d) Polarisation

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ANSWER KEY

Shaded by level: **Easy**

01 Wave Theory, Wavefronts & Doppler Effect

1. (c)	2. (b)	3. (d)	4. (d)	5. (a)	6. (c)	7. (c)	8. (c)	9. (d)	10. (b)
11. (b)	12. (c)	13. (b)	14. (c)	15. (a)	16. 6	17. (d)	18. (a)	19. (d)	20. (d)

02 Superposition, Coherence & Intensity

21. (a)	22. (c)	23. (a)	24. (c)	25. (a)	26. (c)	27. (d)	28. (d)	29. (c)	30. (c)
31. (b)	32. (c)	33. (d)	34. (d)	35. (c)	36. (c)	37. (c)	38. (c)	39. (d)	40. (d)
41. (b)	42. (d)	43. (b)	44. (d)	45. (d)	46. (b)	47. (d)	48. 24	49. 8	50. (c)

03 YDSE: Fringe Width & Fringe Positions

51. (d)	52. (d)	53. (b)	54. 4	55. 600	56. (d)	57. (b)	58. (c)	59. (c)	60. (b)
61. (c)	62. (b)	63. (d)	64. (b)	65. (b)	66. (a)	67. (b)	68. (c)	69. (d)	70. (d)
71. (b)	72. (c)	73. (a)	74. (c)	75. (a)	76. (b)	77. (a)	78. (c)	79. (c)	80. (a)
81. (b)	82. (b)	83. (c)	84. (a)	85. (b)	86. 10	87. 630	88. (b)	89. (d)	90. (d)
91. (d)	92. (d)	93. (d)	94. (d)	95. (b)	96. (b)	97. (d)	98. (a)	99. 750	100. (b)
101. (c)	102. (c)	103. (c)	104. (d)						

04 YDSE: Film, Medium & Two Wavelengths

105. (d)	106. (d)	107. (b)	108. (a)	109. (d)	110. (b)	111. (b)	112. (c)	113. (b)	114. (a)
115. (d)	116. (a)	117. (b)	118. (c)	119. (b)	120. 4				

05 Biprism, Thin Films & Other Devices

121. (d)	122. (c)	123. (b)	124. (b)	125. (a)	126. (b)	127. (a)	128. (d)	129. (c)	

06 Diffraction at a Single Slit

130. (c)	131. (d)	132. (c)	133. (c)	134. (d)	135. (c)	136. (b)	137. 6	138. 275	139. 30
140. (c)	141. (c)	142. (c)	143. (b)	144. (b)	145. (b)	146. (a)	147. (c)	148. (d)	149. (b)
150. (c)	151. (c)	152. (d)	153. 36	154. (d)	155. (b)	156. (a)	157. (b)	158. (b)	159. (d)
160. (c)	161. (d)	162. (b)	163. (d)	164. (c)	165. (a)	166. (b)	167. (b)	168. (d)	169. (c)
170. (c)									

07 Resolving Power

171. (a)	172. (a)	173. (d)	174. (d)	175. (d)	176. (a)	177. (c)	178. (b)	179. 203	180. (c)
181. (d)	182. (d)	183. (b)	184. (d)	185. (b)	186. (c)	187. (c)	188. (d)		

08 Polarisation

189. (d)	190. (a)	191. (d)	192. (c)	193. (d)	194. (c)	195. (c)	196. (b)	197. (a)	198. (c)
199. (a)	200. (b)	201. (d)	202. (b)	203. (c)	204. (d)	205. (d)			

Note: *"Bonus" = no option is correct as the question is printed (dropped in the official key). Numerical questions show the numerical answer.*

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