QUESTIONS FROM COMPETITIVE EXAMS

1.0 Nature of Light

(MHT-CET 2003)

1. According to Newton's corpuscular theory
   a) velocity of light in denser medium is less than velocity of light in rarer medium
   b) velocity of light in denser medium is greater than velocity of light in rarer medium
   c) velocity of light in denser medium is equal to velocity of light in rarer medium
   d) velocity of light is independent of medium through which it travels

(MHT-CET 2006)

2. The wave theory of light does not explain
   a) interference
   b) refraction
   c) photoelectric effect
   d) diffraction

(MHT CET 2007)

3. Which of the following phenomena exhibits particle nature of light?
   a) interference
   b) diffraction
   c) polarisation
   d) photoelectric effect

1.1 Wavefront and Huygen's Principle

(MHT CET 2004)

4. As a plane wavefront propagates, its radius of curvature
   a) decreases
   b) increases
   c) first increases and then decreases
   d) remains infinite

(MHT CET 2006)

5. Which of the following generates a plane wavefront ?
   a) α-rays
   b) β-rays
   c) γ-rays
   d) none of these

(MHT CET 2008)

6. Huygen's principle is used to
   a) obtain the new position of wavefront geometrically
   b) explain principle of superposition of waves
   c) explain interference of light
   d) explain polarisation of light

1.2 Reflection of a Plane Wavefront At a Plane Surface

(MH-CET 2014)

7. The phenomenon of bouncing back of the light energy from the surface of the mirror is
   a) reflection
   b) refraction
   c) diffraction
   d) interference

(MH-CET 2017)

8. When mirror is rotated through an angle θ, a reflected ray from it moves through an angle of
   a) 0°
   b) θ°
   c) $2\theta^\circ$
   d) $3\theta^\circ$

(MH-CET 2018)

9. The angle made by incident ray of light with the reflecting surface is called
a) glancing angle
b) angle of incidence
c) angle of deviation
d) angle of refraction

(MH-CET 2018)

10. A ray of light is incident on a plane mirror at an angle of 30°. The deviation produced in the ray is
a) 30°
b) 60°
c) 90°
d) 120°

1.3 Refraction of a Plane Wavefront At a Plane Surface

(MHT-CET 2014)

11. In vacuum, to travel distance 'd', light takes time 't' and in medium to travel distance '5d', it takes time 'T'. The critical angle of the medium is
a) $\sin^{-1}\left(\frac{5T}{t}\right)$
b) $\sin^{-1}\left(\frac{5t}{3T}\right)$
c) $\sin^{-1}\left(\frac{5t}{T}\right)$
d) $\sin^{-1}\left(\frac{3t}{5T}\right)$

(MH-CET 2015)

12. A light is travelling from air into a medium. Velocity of light in the medium is reduced to 0.75 times the velocity in air. Assume that angle of incidence 'i' is very small, the deviation of the ray is
a) i
b) $\frac{i}{3}$
c) $\frac{i}{4}$
d) $\frac{3i}{4}$

(MH-CET 2015)

13. For the same angle of incidence, angles of refraction in media 'P', 'Q', 'R' and 'S' are 50°, 40°, 30°, 20° respectively. The speed of light is minimum in medium
a) P
b) Q
c) R
d) S

(MH-CET 2016)

14. A ray of light travelling through rarer medium is incident at very small angle 'i' on a glass slab and after refraction its velocity is reduced by 20%. The angle of deviation is
a) $\frac{i}{8}$
b) $\frac{i}{5}$
c) $\frac{i}{2}$
d) $\frac{4i}{5}$

(MH-CET 2017)

15. When the same monochromatic ray of light travels through glass slab and through water, the number of waves in glass slab of thickness 6 cm is same as in water column of height 7 cm. If refractive index of glass is 1.5 then refractive index of water is
a) 1.258
b) 1.269
c) 1.286
d) 1.310

(MH-CET 2018)

16. A ray of light is incident normally on a glass slab of thickness 5 cm and refractive index 1.6. The time taken to travel by the ray from source to surface of slab is same as that taken to travel through glass slab. The distance of source from the surface is
a) 4 cm
b) 8 cm
c) 12 cm
d) 16 cm

1.4 Interference of Light

(MH-CET 2007)

17. Let a_1 and a_2 be the amplitudes of two light waves and α_1 and α_2 be their initial phases. The resultant amplitude due to superposition of the two light waves is

a) $R = \sqrt{a_1^2 + a_2^2 + 2a_1 a_2}$ b) $R = a_1 - a_2$

c) $R = \sqrt{a_1^2 + a_2^2 + 2a_1 a_2 \cos(\alpha_1 - \alpha_2)}$ d) $R = \sqrt{a_1^2 + a_2^2 - 2a_1 a_2}$

(MH-CET 2017)

18. The phenomenon of producing alternate points of maximum and minimum intensity due to the superposition of two light waves is

a) refraction of light b) reflection of light

c) interference of light d) diffraction of light

(MH-CET 2021)

19. If two light waves of same amplitude 'a' travelling through a medium arrive at a point in same phase then the resultant amplitude R at that point is

a) R = 4 a b) R = a c) R = 3a d) R = 2a

1.5 Steady Interference of Light

(MHT-CET 2002)

20. If two waves are not coherent, then ..... is obtained.

a) steady interference b) no interference

c) diffused interference d) diminished interference

(MHT-CET 2003)

21. What is a condition of phase difference for destructive interference ?

a) $0, 2\pi, 4\pi, 6\pi, \ldots$ b) $\frac{\pi}{2}, \frac{3\pi}{2}, \frac{5\pi}{2}, \frac{7\pi}{2}, \ldots$

c) $\pi, 3\pi, 5\pi, 7\pi, \ldots$ b) $\frac{\pi}{4}, \frac{\pi}{2}, \frac{3\pi}{4}, \pi, \ldots$

(MHT-CET 2004)

22. When destructive interference is obtained, the phase difference is

a) $0, 2\pi, 4\pi, \ldots$ b) $\pi, 3\pi, 5\pi, \ldots$ c) $\frac{\pi}{2}, \frac{3\pi}{2}, \frac{5\pi}{2}, \ldots$ b) $\frac{\pi}{4}, \frac{\pi}{2}, \frac{3\pi}{4}, \pi, \ldots$

(MHT-ECET 2004)

23. If path difference between two interfering waves is zero, then the point will be

a) dark b) bright

c) as it is d) either dark or bright

(MHT-CET 2006)

24. Two interfering waves are arriving at a point on a screen with a path difference of $120\,\lambda$. If path difference is 72 μm, then wavelength of light and nature of point will be

a) 6000 Å, bright b) 8640 Å, bright c) 8640 Å, dark d) 6000 Å, dark

(MHT-CET 2007)

25. If the amplitudes of the two interfering waves are not equal, then the dark point formed in the interference pattern will have ..... intensity
a) more b) less c) same d) zero

(MHT-CET 2008)

26. Monochromatic light means, light having
a) different wavelengths b) same wavelength
c) unidirectional d) coherent wavelengths

27. If the distances of a point on the screen from the two sources are 1.8×10^{-5} m and 1.23×10^{-5} m and wavelength of light used is 6000 Å, then it is
a) 9^{th} dark fringe b) 10^{th} dark fringe
c) 10^{th} bright fringe d) 11^{th} dark fringe

(MHT-CET 2009)

28. If a torch is used in place of monochromatic light in Young's experiment, what will happen ?
a) no fringe will appear
b) only bright fringe will appear
c) fringe will occur as from monochromatic source
d) fringe will appear for a moment and then it will disappear

(MHT-CET 2011)

29. For minimum intensity the phase difference between the two waves is
a) $2\pi n$ b) $(2n-1)\pi$ c) $(2n+3)\pi$ d) πn

30. Two waves of amplitudes A_1 and A_2 superimpose with each other such that $A_1 > A_2$. The difference between maximum and minimum amplitudes is
a) A_1 b) $2A_2$ c) $2A_1$ d) A_2

(MHT-CET 2012)

31. If path difference between waves is $\frac{11\lambda}{4}$ then the phase difference between two waves will be
a) $11\pi/2$ b) $5\pi/2$ c) $13\pi/2$ d) $7\pi/2$

32. In the experiment of interference, p is the number of bright bands for a light of wavelength λ_1. If source of light is replaced by λ_2 then the number of bright bands will be
a) $p\lambda_2/\lambda_1$ b) $p\lambda_1/\lambda_2$ c) $p\lambda_1$ d) $p\lambda_2$

(MH-CET 2015)

33. Two coherent monochromatic light beams of intensities '4 I' and '9 I' are superimposed. The maximum and minimum possible intensities in the resulting beam are
a) 3 I and 2 I b) 9 I and 5 I c) 16 I and 3 I d) 25 I and I

(MH-CET 2016)

34. Interference fringes are produced on a screen by using two light sources of intensities 'I' and '9 I'. The phase difference between the beams is $\frac{\pi}{2}$ at point P and π at point Q on the screen. The difference between the resultant intensities at points P and Q is
a) 2 I b) 4 I c) 6 I d) 8 I

(MH-CET 2018)

35. Two light waves of intensities 'I_1' and 'I_2' having same frequency pass through same medium at a time in same direction and interfere. The sum of the minimum and maxima intensities is

a) $(I_1 + I_2)$ b) $2(I_1 + I_2)$ c) $\left(\sqrt{I_1} + \sqrt{I_2}\right)$ d) $\left(\sqrt{I_1} - \sqrt{I_2}\right)$

(MHT-CET 2019)

36. For destructive interference to take place between two monochromatic light waves of wavelength 'λ', the path difference should be (where n = 1, 2, 3, ...)

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

(MHT-CET 2020)

37. The amplitude and frequency of two waves are same, which are from two different sources, overlapping at a point. The ratio of intensities when the two waves arrive $\left(\frac{\pi}{2}\right)^c$ out of phase to when they arrive in phase is

a) 3 : 2 b) 1 : 2 c) 2 : 1 d) 2 : 3

1.6 Young's Experiment and Theory of Interference Bands

(MHT-CET 2001)

38. In Biprism experiment the fringe width is 0.30 mm. If slits are covered by glass plate of thickness 0.04 mm and refractive index $\mu = 1.5$, then the fringe width is

a) 0.02 mm b) 0.1 mm c) 0.30 mm d) 0.2 mm

39. Two sources of light P and Q have wavelengths 6000 Å and 5500 Å respectively. In a Biprism experiment, if the source P is replaced by Q, then the seat of n^{th} bright band is occupied by $(n + 1)^{th}$ bright band. Then the value of n is

a) 5 b) 6 c) 10 d) 11

(MHT-CET 2002)

40. Distance between screen and source is decreased by 25 %. Then the percentage change in fringe width is

a) 20 % b) 31 % c) 75 % d) 25 %

(MHT-CET 2003)

41. To increase fringe width, by keeping distance between slit and screen constant we require

a) d increases, λ constant b) d increases, λ decreases

c) d decreases, λ decreases d) d decreases, λ increases

42. The n^{th} bright band of red light of wavelength 6750 Å is coincident with $(n + 1)^{th}$ bright band of green light of wavelength 5400 Å. Find the value of n.

a) 5 b) 4 c) 3 d) 6

43. Intensity ratio of two waves which produce interference is 100 : 1. The ratio of maximum and minimum intensities is

a) 121 : 81 b) 100 : 1 c) 101 : 99 d) 100 : 99