8. A ray of light is incident on a glass of refractive index 1.5. The angle between the reflected and refracted rays is 90°. What is the ratio of wavelength of reflected to refracted rays ?

a) 2.1 b) 1.5 c) 1.6 d) 1.7

(MHT-CET 2002)

9. A wave of light having frequency 4×10^{14} Hz and speed of light 3×10^8 m/s enters glass of R.I. 1.5. Change in wavelength is

a) 2.5×10^{-7} b) 2.5×10^{-6} c) 2.5×10^{-8} d) 2.5×10^{-9}

(MHT-CET 2003)

10. Light passes through glass of refractive index 1.5. What is time required for light to travel 4×10^8 m in glass ?

a) 4 sec b) 1/4 sec c) 1/2 sec d) 2 sec

(MHT-CET 2004)

11. The ratio of velocity of light in glass to that in water is (refractive index of glass = 1.5 and refractive index of water = 1.33)

a) 0.8803 : 1 b) 0.8989 : 1 c) 0.8867 : 1 d) 0.8504 : 1

(MHT-ECET 2005)

12. The change in wavelength of light of frequency 4×10^{14} Hz, when it passes from air to glass, is ($\mu_{glass} = 1.5$)

a) 2500 Å b) 3500 Å c) 3000 Å d) 2000 Å

13. Refractive index of glass with respect to medium is 4/3. If $v_m - v_g = 6.25 \times 10^7$, then velocity of light in medium is

a) 2.5×10^8 m/sec b) 1.5×10^7 m/sec c) 2.25×10^8 m/sec d) 4.5×10^7 m/sec

(MHT-CET 2006)

14. A light wave enters from air into a medium of refractive index 4/3. If wavelength of light in air is 6000 Å, then the wave number of light in medium is

a) 1.1×10^6 b) 4.4×10^6 c) 2.2×10^6 d) 6×10^6

(MHT-CET 2007)

15. Light enters from air into a medium of R.I. 1.5. Percentage change in its wavelength is

a) 66.66 % b) 50 % c) 33.33 % d) 25 %

16. Time taken by the light to travel through 5 cm of glass is same as that through x cm of air. R.I. of glass is 1.5, then x is

a) 7.5 cm b) 1.33 cm c) 9 cm d) 6 cm

(MHT-CET 2010)

17. A light of wavelength 6000 Å travels from rarer medium to denser medium of refractive index 1.5. If its frequency in rarer medium is 5×10^{14} Hz, then its frequency in denser medium will be

a) 3.3×10^{14} Hz b) 5×10^{14} Hz c) 2.5×10^7 Hz d) 7.5×10^{14} Hz

(MHT-CET 2011)

18. A ray of light passes from vacuum to a medium of R.I. μ. The angle of refraction is found to be half the angle of incidence. The angle of incidence is...

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

29. The critical angle for light travelling from medium P to medium Q is 'θ'. The speed of light in medium P is 'v'. Then the speed of light in medium Q is

a) $v.\cos\theta$ b) $v(1-\cos\theta)$ c) $\frac{v}{\cos\theta}$ d) $\frac{v}{\sin\theta}$

8.7 Refraction at a Spherical Surface and Lenses, Defects of Lenses

(MHT-CET 2018)

30. What is the focal length of a double convex lens for which the radius of curvature of each surface is 40 cm $[{}_a\mu_g = 1.5]$?

a) 50 cm b) 40 cm c) – 30 cm d) – 40 cm

(MHT-CET 2019)

31. A double convex lens of focal length 20 cm is made of glass of refractive index $\frac{3}{2}$. When placed completely in water $[{}_a\mu_w = 4/3]$, its focal length will be

a) 80 cm b) 22.5 cm c) 17.7 cm d) 15 cm

32. A convex lens of focal length 'f' is placed in contact with a concave lens of the same focal length. The equivalent focal length of the combination is

a) zero b) infinity c) f d) $\frac{f}{2}$

(MHT-CET 2020)

33. A thin lens of glass of refractive index 1.5 has focal length 24 cm in air. It is now immersed in a liquid of refractive index $\frac{9}{8}$. Its new focal length is

a) 36 cm b) 72 cm c) 18 cm d) 54 cm

(MHT-CET 2021)

34. Two identical equiconvex glass lenses ($\mu = 1.5$) each of focal length 'f' are kept in contact. The space between the two lenses is filled with water $\left(\mu = \frac{4}{3}\right)$. The focal length of the combination is

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

35. A convex lens of focal length 'F' produces a real image 'n' times the size of the object. The image distance is

a) F (n + 1) b) F (n – 1) c) $\frac{F}{(n+1)}$ d) $\frac{F}{(n-1)}$

(MHT-CET 2022)

36. Two thin lenses have a combined power of +9D. When they are separated by a distance of 20 cm, then their equivalent power becomes $+\frac{27}{5}$ D. Their individual powers (in diopter) are respectively

a) 3, 6 b) 1, 8 c) 2, 8 d) 4, 5

8.10 Optical Instruments

(MHT-CET 2018)

46. The focal length of the objective lens of compound microscope is
a) equal to the focal length of its eye-piece
b) less than the focal length of eye-piece
c) greater than the focal length of eye piece
d) exactly half the focal length of eye piece

(MHT-CET 2018)

47. In compound microscope, the focal length and aperture of the objective used are respectively
a) large and large
b) large and small
c) short and large
d) short and small

(MHT-CET 2021)

48. A compound microscope has magnification of 30. The focal length of eye-piece is 5 cm. Assuming the final image to be formed at the least distance of distinct vision (25 cm), the magnification produced by the objective is
a) + 5 b) – 5 c) + 6 d) – 6

(MHT-CET 2022)

49. When astronomical telescope is adjusted for normal adjustment, the final image is formed at
a) infinity
b) least distance of distinct vision
c) least distance of distinct vision from objective
d) focus of eye-piece

50. The magnifying power of a simple microscope is 6. The focal length of its lens in metres will be ..... if least distance of distinct vision is 25 cm.
a) 0.05 b) 0.06 c) 0.25 d) 0.12

LEVEL - II

51. Velocity of light in a liquid is 1.5×10^8 ms^{-1} and in air it is 3×10^8 ms^{-1}. If a ray of light passes from this liquid to air, the value of critical angle is
a) 30° b) 32° c) 35° d) 42°

52. A convexo-concave lens has faces of radii 3 cm and 4 cm rspectively and is made up of glass of refractive index 1.6. Its focal length is
a) + 40 cm b) – 40 cm c) + 20 cm d) – 20 cm

53. Two lenses are placed in contact with each other and the focal length of combination is 80 cm. If the focal length of one is 20 cm, then the power of the other will be
a) 1.66 D b) 4.00 D c) – 1.00 D d) – 3.75 D

54. Two thin lenses, when in contact, produce a combination of power + 10 dioptre. When they are 0.25 m apart, the power reduces to + 6 dioptres. The focal lengths of the two lenses are (f_1, f_2 are focal lengths)
a) $f_1 = 0.1$ m, $f_2 = 0.5$ m
b) $f_1 = 0.125$ m, $f_2 = 0.2$ m
c) $f_1 = 0.125$ m, $f_2 = 0.5$ m
d) $f_1 = 0.1$ m, $f_2 = 0.2$ m

64. A transparent sphere of refractive index 'μ' and radius of curvature 'R' is kept in air. A point object is placed at a distance 'd' from the surface of the sphere so that the real image is formed at the same distance 'd' from exactly opposite side of the sphere. The distance 'd' is **(MHT-CET 2024)**

a) $\frac{\mu}{R}$ b) $R(\mu - 1)$ c) $\frac{R}{(\mu - 1)}$ d) $\frac{R}{(\mu + 1)}$

65. In the formation of rainbow, which statement is 'WRONG'? **(MHT-CET 2024)**

a) In primary rainbow red arc is outside and violet arc inside.
b) In concentric secondary rainbow, violet arc is outside and red arc is inside
c) Total internal reflection is possible in formation of rainbow
d) Rainbow is seen only during mornings and evenings of rainy days.

66. The sun subtends an angle of 0.5° at the centre of curvature of a concave mirror of radius of curvature 12.6 m. The diameter of the image of the sun formed by the mirror is $\left[\text{Take } \pi = \frac{22}{7}\right]$ **(MHT-CET 2024)**

a) 6.3 cm b) 5.5 cm c) 3.5 cm d) 2.6 cm

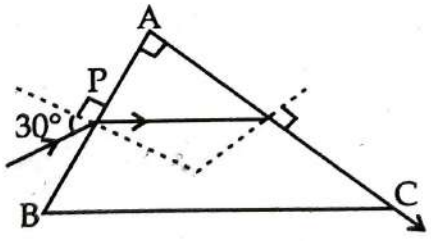
67. A concave mirror of focal length 'F' (in air) is immersed in water (refractive index = 4/3). The focal length of the mirror in water will be **(MHT-CET 2024)**

a) F b) $\frac{4F}{3}$ c) $\frac{3F}{4}$ d) $\frac{7F}{3}$

68. Some water is contained by a vessel of height 18 cm. If it is to appear half filled to the observer viewing from the top of the vessel, the height to which water should be filled in the vessel is [Refractive index of water = $\frac{4}{3}$] **(MHT-CET 2024)**

a) 6.0 cm b) 7.8 cm c) 9.0 cm d) 12.0 cm

69. A light ray enters through a right angled prism at point P with the angle of incidence 30° as shown in figure. It travels through the prism parallel to its base BC and emerges along the face AC. The refractive index of the prism is **(NEET 2024)**



a) $\frac{\sqrt{5}}{4}$ b) $\frac{\sqrt{5}}{2}$ c) $\frac{\sqrt{3}}{4}$ d) $\frac{\sqrt{3}}{2}$

70. A small telescope has an objective of focal length 140 cm and an eyepiece of focal length 5.0 cm. The magnifying power of telescope for viewing a distant object is **(NEET 2024)**

a) 34 b) 28 c) 17 d) 32

71. In the diagram given below, there are three lenses formed. Considering negligible thickness of each of them as compared to $[R_1]$ and $[R_2]$, i.e., the radii of curvature for upper and lower surfaces of the glass lens, the power of the combination is **[JEE Main - 2025]**