Choose the correct answers :

1. 'Wave theory' of light was given by Huygen. According to him light travels in the form of
   (1) longitudinal waves (2) transverse waves
   (3) photons (4) none of these

2. Two independent light sources do not behave as coherent sources, because
   (1) the intensities of light emitted by the two sources will always be different
   (2) there will be always phase difference in waves emitted by the two sources, in time as well as direction
   (3) both (1) & (2)
   (4) the two independent sources cannot be made of exactly same size

3. The phenomenon of interference is based on
   (1) conservation of momentum
   (2) conservation of momentum and energy
   (3) conservation of energy
   (4) quantum nature of light

4. The main difference in the phenomenon of interference and diffraction is that
   (1) diffraction is due to the interaction of light from the elements on the same wave-front whereas interference is the interaction of waves from two isolated sources.
   (2) diffraction is due to the interaction of light from the elements on the same wavefront, whereas the interference is the interaction of two waves derived from the same source
   (3) diffraction is due to interaction of waves derived from the same source, whereas the interference is the bending of light from the same wavefront
   (4) diffraction is caused by reflected waves from a source, whereas interference is caused due to refraction of waves from a surface

5. Dispersion occurs because of
   (1) wavelength of light
   (2) density of medium
   (3) property of the prism
   (4) none of these

6. The colour of light is determined by
   (1) velocity in the medium
   (2) amplitude
   (3) frequency
   (4) state of polarization

7. 'Dual nature of light' is based on the hypothesis suggested by
   (1) Huygen (2) Fresnel
   (3) Maxwell (4) Heisenberg

8. Which of the following pairs of e.m. waves constitute very similar additions ?
   (1) Infra-red rays and ultraviolet rays
   (2) Hard ultraviolet rays and hard X-rays
   (3) Soft ultraviolet rays and hard X-rays
   (4) Hard ultraviolet rays and soft X-rays

9. Velocity of electromagnetic waves through a medium depends upon
   (1) the speed of medium with respect to the source
   (2) amplitude of the waves
   (3) refractive index of the medium
   (4) all of these

10. If μ_0 and $\in_0$ are the relative permeability and the permitivity of the medium, then the refractive index of the medium is
   (1) $\frac{1}{\mu_0 \in_0}$ (2) $\frac{1}{\sqrt{\mu_0 \in_0}}$
   (3) $\mu_0 \in_0$ (4) $\sqrt{\mu_0 \in_0}$

11. The maximum intensities in case of interference of n identical waves, each of intensity I_0, if the interferences are (a) coherent, and (b) incoherent, are respectively
   (1) n^2I_0 and n^2I_0 (2) n^2I_0 and nI_0
   (3) nI_0 and n^2I_0 (4) nI_0 and nI_0

12. Time taken for light to travel depth of 45 km of water (${}^a\mu_w = 4/3$) is about
   (1) 0.45 ms (2) 0.40 ms
   (3) 0.30 ms (4) 0.20 ms

13. When light wave travelling in air suffers reflection at the interface between air and glass, the change of phase of the reflected wave is equal to
   (1) zero (2) $\pi/2$
   (3) π (4) 2π

14. A source emits electromagnetic waves of wavelength 3 m. One beam reaches the observer directly and the other after reflection from a water surface, travelling 1.5 m extra distance and with intensity reduced to 1/4 as compared to intensity due to the direct beam alone. The resultant intensity will be
   (1) (1/4) fold (2) (3/4) fold
   (3) (5/4) fold (4) (9/4) fold

15. A glass slab of thickness 4 cm contains the same number of waves as 5 cm of water when both are traversed by the same monochromatic light. If the refractive index of water is 4/3, what is the refractive index of glass ?
   (1) 5/3 (2) 5/4
   (3) 16/15 (4) 3/2

16. Air has refractive index 1.0003. What is the thickness of air column which will have one more wavelength of yellow light (6000 Å) than in the same thickness of vacuum ?
(1) 1.5 mm (2) 3 mm
(3) 2 mm (4) 1 mm

17. The ratio of intensity at maxima and minima in the interference pattern is 25 : 9. The ratio of the width of the two slits in Young's interference experiment should be
(1) 25 : 9 (2) 5 : 3
(3) 16 : 1 (4) 4 : 1

18. Intensity variation in the interference pattern obtained with the help of two coherent sources is 20% of the average intensity. The ratio of intensities of the two sources is
(1) 10 : 1 (2) 50 : 1
(3) 80 : 1 (4) 100 : 1

19. Two sources give out radiations of intensities in the ratio 9 : 4. In the interference pattern, the ratio of intensities at the two points, where the radiations meet with a phase difference of $\pi/3$ and $2\pi/3$, is
(1) 19 : 7 (2) 19 : 13
(3) 13 : 7 (4) 25 : 1

20. The fringe width in Young's double-slit experiment can be increased if we decrease
(1) separation of the slits
(2) distance between the source and the screen
(3) wavelength of the source
(4) all of these

21. If one of the two slits of a Young's double slit experiment is painted over so that it transmits half the light intensity of the other, then
(1) the fringe system would disappear
(2) the bright fringes will become more bright and dark fringes will become more dark
(3) the dark fringes will become brighter and bright fringes will become less bright
(4) bright as well as dark fringes would be darker

22. Fringe width in Young's double slit experiment does not depend upon
(1) distance between two slits
(2) wavelength
(3) distance between source and screen
(4) width of single slit

23. If in a Young's double slit experiment, mercury lamp is used instead of sodium lamp, then
(1) fringes involved disappear
(2) fringe width increases
(3) fringe width decreases
(4) only red fringes will appear on screen

24. A beam of light of two wavelengths 6500 Å and 5200 Å is used to obtain interference pattern on a screen 120 cm away from two slits, 2 mm apart, in Young's double slit experiment. The minimum distance from the central maximum, where the bright fringes due to both the waves coincide, will be
(1) 1.25 mm (2) 1.95 mm
(3) 1.56 mm (4) 2.50 mm

25. In a double-slit experiment, instead of taking slit of equal widths, one slit is made twice as wide as the other. Then, in the interference pattern
(1) the intensities of both the maxima and the minima increase
(2) the intensity of the maxima increases and the minima has zero intensity
(3) the intensity of the maxima decreases and that of the minima increases
(4) the intensity of the maxima decreases and the minima has zero intensity

26. For observing interference of light waves, the two sources taken are
(i) small and sharp
(ii) close
(iii) coherent
(iv) identical (though independent)
The necessary condition(s) for observing intereference is / are
(1) (ii) only (2) (i) & (iii) only
(3) (i), (ii) & (iii) only (4) all of these

27. In an interference pattern, at a point we observe the 16th order maximum for λ_1 = 6000 Å. What order will be visible here if the source is replaced by light of wavelength λ_2 = 4800 Å
(1) 20 (2) 13
(3) 15 (4) 24

28. In an experiment similar to Young's experiment, interference is observed using waves associated with electrons. The electrons are being produced in an electron gun. In order to increase the fringe width,
(1) electron gun voltage be increased
(2) electron gun voltage be decreased
(3) the slits be moved away from each other
(4) the screen be moved closer to interfering slits

29. Interference was observed in interference chamber, when air was present. Now the chamber is evacuated and if the same light is used, a careful observation will see

(1) no interference
(2) interference with bright bands
(3) interference with dark bands
(4) inerference in which breadth of the fringe will be slightly increased

30. In a two slit experiment with white light, a white fringe is observed on a screen kept behind the slits. When the screen is moved away by 0.05 m, this white fringe
(1) does not move at all
(2) gets displaced from its earlier position
(3) becomes coloured
(4) disappears

31. In the Young's double slit experiment, if the phase difference between the two waves interfering at a point is ϕ, the intensity at that point can be expressed by the expression (I_0 is intensity of each of the two coherent sources)
(1) $I = 2I_0 \cos^2(\phi/2)$ (2) $I = 4I_0 \cos^2(\phi/2)$
(3) $I = 4I_0 \cos^2\phi$ (4) $I = 4I_0 \sin^2(\phi/2)$

32. In a biprism experiment by using light of wavelength 5000 Å, 5 mm wide fringes are obtained on a screen 1.0 m away from the coherent sources. The separation between the two coherent sources is
(1) 1.0 mm (2) 0.1 mm
(3) 0.05 mm (4) 0.01 mm

33. In a Young's experiment when λ = 4000 Å, fringes observed have a width β. The light illuminating the set-up now has λ = 6000 Å, and the separation between the interfering sources is halved. What is the ratio of distances between the screen and interfering sources before and now, if the fringe width remains unaltered ?
(1) 2 : 1 (2) 3 : 2
(3) 3 : 1 (4) 4 : 3

34. Two slits separated by a distance of 1 mm are illuminated with an orange light of wavelength 6.5×10^{-7} m. The interference fringes are observed on a screen placed 1 m from the slits. The distance between the third dark fringe and the fifth bright fringe is equal to
(1) 0.65 mm (2) 1.63 mm
(3) 3.25 mm (4) 4.88 mm

35. In a Young's experiment the wavelength of red light is 7.6×10^{-5} cm and that of blue light is 5.1×10^{-5} cm. The value of n for which (n + 1)th blue bright band coincides with nth red bright band is
(1) 1 (2) 2
(3) 3 (4) 4

36. In a Young's double slit experiment, the angular width of a fringe formed on a distant screen is 1º. The wavelength of light used is 6000 Å. The spacing between the slits is approximately
(1) 1 mm (2) 0.05 mm
(3) 0.03 mm (4) 0.01 mm

37. In Young's double slit experiment, the interference pattern is found to have an intensity ratio, between bright and dark fringes, as 9. This implies that
(1) the intensities at the screen due to the two slits are 5 units and 4 units, respectively
(2) the intensities at the screen due to the two slits are 4 units and 1 unit, respectively
(3) the amplitude ratio of radiations from the two sources is 3
(4) the amplitude ratio of radiations from the two sources is 4

38. In Youngs's double slit experiment, carried out with light of wavelength λ = 5000 Å, the distance between the slits of 0.2 mm and the screen is at 200 cm from the slits. The third maximum (taking the central maximum as zeroth maximum) will be at x equal to
(1) 1.67 cm (2) 1.5 cm
(3) 0.5 cm (4) 5.0 cm

39. In Young's double slit experiment, the 7th maximum with wavelength λ_1 is at a distance d_1 and that with wavelength λ_2 is at a distance d_2. Then d_1/d_2 is
(1) λ_1/λ_2 (2) λ_2/λ_1
(3) λ_1^2/λ_2^2 (4) λ_2^2/λ_1^2

40. In a Young's double slit experiment, the fringes are displaced by a distance x when a glass plate of refractive index 1.5 is introduced in the path of one of the beams. When this plate in replaced by another plate of the same thickness, the shift of fringes is (3/2) x. The refractive index of the second plate is
(1) 1.75 (2) 1.50
(3) 1.25 (4) 2.10

41. Light of wavelength 5.0×10^{-7} m falls on a pair of narrow slits, separated by a distance d. The interference pattern on a screen placed 2.0 m away shows that there is darkness at the position exactly opposite to each slit. The separation between the slits should be
(1) 0.5 mm (2) 1.0 mm
(3) 2.0 mm (4) 5 mm

42. A Fresnel's biprism experiment is set with sodium light (λ = 5980 Å) and in the field of view of the eyepiece, 60 fringes are observed. How many fringes shall we get in the same field of view if we replace the source by mercury lamp using green filter (λ = 5520 Å)

(1) 57 (2) 73
(3) 65 (4) 49

43. A double slit arrangement produces interference fringes for sodium light (λ = 5890 Å) that are 0.40° apart. What is the angular fringe separation if the entire arrangement is immersed in water
(1) 0.53° (2) 0.30°
(3) 0.40° (4) 0.60°

44. A two slit Young's experiment is performed with monochromatic light of wavelength 6000 Å. The slits are 2 mm apart and the fringes are observed on a screen placed 10 cm away from the slits. Now a transparent plate of thickness 0.5 mm is placed in front of one of the slits and it is found that the interference pattern shifts by 5 mm. What is the refractive index of the transparent plate ?
(1) 1.2 (2) 1.5
(3) 1.43 (4) 1.67

45. In two slits experiment with monochromatic light, fringes are obtained on the screen placed at some distance from the slits. If the screen is moved by 6×10^{-2} m towards the slits, the change in fringe-width is 3.6×10^{-5} m. If the distance between the slits is 10^{-3} m, the wavelength of the light is
(1) 5600 Å (2) 4800 Å
(3) 6000 Å (4) 7200 Å

46. In Young's double slit arrangement, a source of wavelength 6000 Å is used. The screen is placed 1 m from the slits. Fringes formed on the screen are observed by a student sitting close to the slits. The student's eye can distinguish two neighbouring fringes if they subtend an angle more than 1 minute of arc. Calculate the maximum distance *d* between the slits so that the fringes are clearly visible.
(1) 0.206 cm (2) 0.346 cm
(3) 0.620 cm (4) 0.124 cm

47. In a Young's double slit experiment, the separation between slits is 2×10^{-3} m whereas the distance of screen from the plane of slits is 2.5 m. Light of wavelengths in the range 2000-7500Å is allowed to fall on the slits. Find the wavelengths in the visible region that will be present with large intensity, on the screen at 10^{-3} m from the central maxima.
(1) 4000 Å (2) 5600 Å
(3) 6000 Å (4) 7200 Å

48. In Young's double slit experiment, using monochromatic light, the fringe pattern shifts by a certain distance on the screen when a mica sheet of refractive index 1.6 and thickness 1.95 microns is introduced in the path of one of the interfering waves. The mica sheet is then removed and the distance between the plane of slits and the screen is doubled. It is found that the distance between successive maxima (or minima) now is the same as the observed fringe shift upon the introduction of the mica sheet. The wavelength of the light is
(1) 7800 Å (2) 6825 Å
(3) 3240 Å (4) 5850 Å

49. In Young's experiment, the source is red light of wavelength 7×10^{-7} m. When a thin glass plate of refractive index 1.5 at this wavelength is put in the path of one of the interfering beams, the central bright fringe shifts by 10^{-3} m to the position previously occupied by the 5th bright fringe. The thickness of the plate is
(1) 5 μm (2) 6 μm
(3) 7 μm (4) 8 μm

50. In a double-slit experiment, the separation between the slits is d = 0.25 cm and the distance of the screen D = 120 cm from the slits. If the wavelength of light used is λ = 6000 Å and I_0 is the intensity of the central bright fringe, what is the intensity at a distance x = 4.8×10^{-5} m from the central maximum ?
(1) $I_0/2$ (2) $3I_0/4$
(3) $\sqrt{3}\, I_0/2$ (4) $I_0/4$

51. A slit of width 1.2 mm is used as a source to illuminate two point sources 0.1 mm apart on an opaque screen. The maximum permissible distance between the slit source and the screen for spatial coherence is (λ = 6000 Å)
(1) 10 cm (2) 20 cm
(3) 25 cm (4) 30 cm

52. A source slit of adjustable width is used to illuminate two point sources 0.1 mm apart (λ = 6000 Å). Initially, the slit is closed and then gradually, it is opened. The width at which the fringes on a screen D = 1 m apart will just disappear is
(1) 1 mrad (2) 2 mrad
(3) 6 mrad (4) 4 mrad

53. The maximum number of orders of spectrum, which can be obtained by a grating having 5000 lines/cm when monochromatic light of wavelength 600 nm is incident on it normally, is
(1) 3 (2) 4
(3) 2 (4) 5

54. If Young's experiment is performed using three separate identical sources of light instead of using two slits and one bulb, then

(1) the interference fringes will be darker
(2) the interference fringes will be brighter
(3) no fringes will be obtained
(4) the contrast between bright and dark fringes will increase

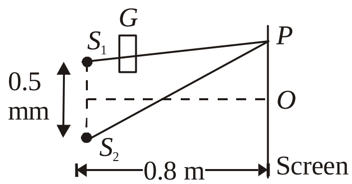
55. A wedge shaped air film is formed between two plane surfaces inclined at small angle. When the film is illuminated by a parallel beam of monochromatic light, we get
(1) uniform illumination
(2) concentric circular fringes
(3) equidistant alternate dark and bright straight line fringes
(4) alternate bright and dark fringes of different fringe widths

56. When white light is incident normally on an oil film of thickness 10^{-4} cm and refractive index 1.4, light of which wavelength will not be seen in the reflected system of light ?
(1) 7000 Å (2) 5600 Å
(3) 4000 Å (4) All of these

57. In the above question, light of which wavelength will be observed strongly ?
(1) 6222 Å (2) 5090 Å
(3) 4308 Å (4) All of the above

58. Light is incident normally on a diffraction grating through which the first order diffraction is seen at 32°. The second order diffraction will be seen at
(1) 48° (2) 64°
(3) 80°
(4) there is no second order diffraction in this case

59. S_1 and S_2 are two coherent light sources in a Young's two slit experiment. When a thin parallel sided glass plate G of thickness 3.6 μm is placed near S_1, the centre of fringe system moves from O to P. Calculate OP, if $\lambda = 6.0 \times 10^{-7}$ m and $n_g = 1.5$.



(1) 2.0 mm (2) 2.9 mm
(3) 3.2 mm (4) 3.8 mm

60. A glass plate 12×10^{-4} mm thick is placed in the path of one of the interfering beams in a bisrism arrangement using monochromatic light of wavelength 6000 Å. If the central band shifts a distance equal to the width of the bands, find the refractive index of the glass.
(1) 1.2 (2) 1.5
(3) 1.8 (4) 1.75

61. A thin film of a material with refractive index 1.5 is introduced in one of the paths of a Young's double slit experiment. If the wavelength is 5000 Å and the fringes shift by 100 fringes, then the thickness of the film should be
(1) 50 micron (2) 5000 angstrom
(3) 100 micron (4) 10000 angstrom

62. Which of the following undergo maximum diffraction ?
(1) α-rays (2) γ-rays
(3) Light waves (4) Radiowaves

63. A parallel beam of sodium light of wavelength 5880 Å is incident on a thin glass plate of refractive index 1.5, such that the angle of refraction in the plate is 60°. The smallest thickness of the plate, which will make it dark by reflection, would be
(1) 3560° (2) 3290 Å
(3) 3920 Å (4) 3840 Å

64. A laser operates at a frequency of 3×10^{14} Hz and has an aperture of 10^{-2} m. The angular spread of laser beam is
(1) 3×10^{-4} rad (2) 2×10^{-3} rad
(3) 8×10^{-5} rad (4) 10×10^{-5} rad

65. Calculate the distance that a beam of light of wavelength 500 nm can travel without significant broadening, if the diffracting aperture is 3 mm wide
(1) 18 m (2) 24 m
(3) 12 m (4) 20 m

66. A diffraction grating has 5000 rulings per cm. What is the second order diffraction angle for violet light ? (λ = 500 nm)
(1) $\sin^{-1}$ (0.4) (2) $\sin^{-1}$ (0.5)
(3) $\sin^{-1}$ (0.6) (4) $\sin^{-1}$ (10.2)

67. A screen is placed at a distance of 1 metre from a narrow slit. The slit is illuminated by light of wavelength 5000 Å. If the first minimum on either side of the central maximum is at a distance of 5 mm from it, the width of the slit is
(1) 0.2 mm (2) 0.1 mm
(3) 0.4 mm (4) 0.5 mm

68. What should be the order of magnitude of an obstacle for the diffraction of light to be observed ?
(1) 10^{-3} m (2) 10^{-2} m
(3) 10^{-5} m (4) 10^{-7} m

69. What should be the size of the aperture of the objective of a telescope which can just resolve two stars of angular width of 10^{-3} degree, by light of wavelength 500 nm ?

(1) 35 cm (2) 3.5 cm
(3) 50 cm (4) 5.0 cm

70. A microwave beam of frequency 3 GHz is diffracted through an angle of 30° when incident normally on a metallic grill. The spacing of the bars of the grill
(1) must be 10 cm apart
(2) must be 20 cm apart
(3) must be 30 cm apart
(4) must be 20, 40, 60 ……….. cm apart

71. Resolving power of the telescope can be increased by increasing
(1) the wavelength of radiations used
(2) the diameter of its objective
(3) the diameter of its eyepiece
(4) the focal length of its eyepiece

72. A slit of width *d* is illuminated by light of wavelength 6500 Å. For what value of *d* will the first minimum fall at an angle of diffraction of 30° ?
(1) 1.95 μm (2) 2.60 μm
(3) 1.30 μm (4) 1.625 μm

73. Microwaves of frequency 3×10^4 MHz and ultrasonic waves of wavelength 1 cm are passed through a slit of width 2 cm. Then, the
(1) diffraction will occur only in the microwaves
(2) diffraction will occur only in the ultrasonic waves
(3) diffraction will occur in both, but the diffraction patterns will be different
(4) diffraction will occur in both and the diffraction patterns will be identical

74. Angular-width of central maximum in the Fraunhofer diffraction pattern of a slit is measured. The slit is illuminated by light of wavelength 6000 Å. When the slit is illuminated by light of another wavelength, the angular width decreases by 30%. Calculate the wavelength of this light.
(1) 4200 Å (2) 4800 Å
(3) 5200 Å (4) 5600 Å

75. Eye is most sensitive to 5550 Å and the diameter of pupil is about 2 mm. The angular limit of resolution of the eye is nearly
(1) 1 minute (2) 0.1°
(3) 2 minutes (4) 0.5 minute

76. The condition for observing Fraunhofer diffraction from a single slit is that the light wavefront incident on the slit should be
(1) spherical (2) cylindrical
(3) plane (4) elliptical

77. A parallel monochromatic beam of light 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 first minimum of the diffraction pattern, the phase difference between the rays coming from the two edges of the slit is
(1) zero (2) $\pi/2$
(3) π (4) 2π

78. Red light of wavelength 750 nm from a distant source falls on a slit, 0.5 mm wide and the diffraction produced is observed on a screen at a distance of 1.6 m away. Distance between the two dark bands on each side of the central bright band would be
(1) 3.2 mm (2) 2.4 mm
(3) 3.6 mm (4) 4.8 mm

79. In propagation of light waves, the angle between the plane of vibration and the plane of polarisation is
(1) 0° (2) 90°
(3) 45° (4) 18°

80. Slit width is 5 mm. The minimum distance between the slit and the screen, to observe the diffraction of monochromatic waves of wavelength 600 nm on the screen, should be
(1) 41.7 m
(2) 25 cm, distance of distinct vision
(3) any distance, depending upon focussing
(4) 17.4 m

81. A beam of light of wavelength 600 nm from a distant source falls on a single slit 1.00 mm wide and the resulting diffraction pattern is observed on a screen 2 m away. The distance between the first dark fringes on either side of the central bright fringe is
(1) 1.2 cm (2) 1.2 mm
(3) 2.4 cm (4) 2.4 mm

82. Diameter of human eye lens is 2 mm. What will be the minimum distance between two points, situated at a distance of 50 m from the eye, to be resolved ? The wavelength of light is 5000 Å.
(1) 2.32 m (2) 4.28 mm
(3) 1.52 cm (4) 12.48 cm

83. A telescope has an aperture of 4 cm. It is used to observe a mountain 2 km away, in day light. The minimum distance between two points, which can be resolved, is
(1) 2.0 cm (2) 6.36 cm
(3) 7.32 cm (4) 3.66 cm

84. Ordinary light incident on a glass slab at the polarising angle, suffers a deviation of 22°. The value of angle of refraction in glass in this case is

(1) 34º (2) 22º
(3) 56º (4) 68º

85. The refractive index of a medium is $\sqrt{3}$. If light is incident on the surface of this medium at polarizing angle, then the angle of refraction of light in the medium would be
(1) 60º (2) 45º
(3) 30º (4) 90º

86. A ray of polarised light is incident on the surface of a glass plate of refractive index 1.54, at the polarising angle. If 1.54 = tan 57º, then the anlge of refraction of ray in the glass plate is
(1) 0º (2) 24º
(3) 33º (4) 43º

87. A ray of light strikes a glass plate at an angle 50º. If the reflected and refracted rays are perpendicular to each other, the angle of deviation produced in the refracted ray is
(1) 0º (2) 10º
(3) 15º (4) 25º

88. A beam of light is incident on a glass plate at an angle of incidence 60º. The reflected ray is polarised. What is the angle of refraction in the glass plate when angle of incidence on it is 45º.
(1) $\sin^{-1}(\sqrt{3}/2)$ (2) $\cos^{-1}(\sqrt{3}/2)$
(3) $\sin^{-1}(1/\sqrt{6})$ (4) $\sin^{-1}(1/\sqrt{3})$

89. If θ_C is the critical angle and θ_P is the polarising angle, then
(1) $\sin\theta_C = \tan\theta_P$ (2) $\operatorname{cosec}\theta_C = \cot\theta_P$
(3) $\operatorname{cosec}\theta_C = \tan\theta_P$ (4) none of these

90. A beam of plane polarised light falls normally on a polariser (cross-sectional area = 3×10^{-4}m^2) which rotates about the axis of the ray with an angular velocity of 31.4 rad/sec. Find the energy of light passing through the polariser per revolution, if flux of energy of the incident ray is 10^{-3} W.
(1) 2×10^{-4} J (2) 3×10^{-4} J
(3) 5×10^{-4} J (4) 10^{-4} J

91. Unpolarised light of intensity 32 Wm^{-2} passes through three polarisers such that the transmission axis of the last polariser is crossed with that of the first. If the intensity of the emerging light is 3 W m^{-2}, what is the angle between the transmission axes of the first two polarisers ?
(1) 60º (2) 45º
(3) 30º (4) None of these

92. Two polaroids are oriented with their planes perpendicular to incident light and transmission axis, making an angle of 30° with each other. The percentage of light transmitted is
(1) 75% (2) 37.5%
(3) 86.6% (4) 43.3%

93. Unpolarised beam of light of intensity I is incident on two polarisers in contact. The angle between the axes of the two polarisers is θ. Intensity of the light finally emerging from the combination is
(1) $I\cos^2\theta$ (2) $(I/2)\cos^2\theta$
(3) $I\cos^4\theta$ (4) I

94. Waves are received from a moving source. It is observed that their wavelength decreases by 0.02%. The speed of the source along the direction of observation should be
(1) 60 km/sec away from the observer
(2) 60 km/sec towards the observer
(3) 120 km/sec towards the observer
(4) 6000 km/sec towards the observer

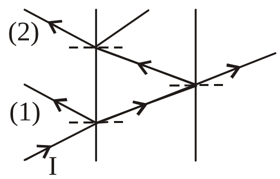
95. A radar is emitting waves of frequency 8×10^{14} Hz. After reflection on the surface of a moving object, the waves are received back by the detector of the radar. On analysis, it is found that there is variation of frequency of 4×10^8 Hz on lower side. The speed of the moving object is
(1) 150 ms^{-1} away from the radar
(2) 75 ms^{-1} away from the radar
(3) 300 ms^{-1} away from the radar
(4) 120 ms^{-1} towards the radar

96. If P is the power of source of radiation and E is the energy of a photon, then number of photons emitted per second is
(1) P/E (2) E/P
(3) PE (4) P^2/E

97. The number of photons crossing unit area normally per sec is called photon-flux. If I is energy flux (or energy intensity) and E is energy of each photon, then photon-flux is equal to
(1) E/I (2) I/E
(3) IE (4) I^2/E

98. Assume that the entire surface of a burning log of wood is at the same temperature. Some small spots on the wood appear brighter than the rest of the surface. At such a spot,
(1) the colour of the surface is different from the rest of the log
(2) there is a small cavity in the wood
(3) there is a small hump (convex portion) in the wood
(4) less ash has formed than on the rest of the wood

99. A narrow monochromatic beam of light of intensity I is incident on a glass plate as shown in fig. Another identical glass plate is kept close to the first one and parallel to it. Each glass plate reflects 25 percent of the light incident on it and transmits the remaining. Find the ratio of the minimum and the maximum intensities in the interference pattern formed by the two beams obtained after one reflection at each plate



(1) 9 : 16 (2) 1 : 49
(3) 1 : 64 (4) 1 : 81

100. A wedge air film is formed by placing aluminium foil between two glass slides at a distance of 75 mm from the line of contact of the slides. When the air wedge is illuminated normally by light of wavelength 560 nm, interference fringes are produced parallel to the line of contact which have a separation of 1.20 mm. The angle of the wedge and the thickness of the foil are, respectively

(1) 2.3×10^{-3} rad and 1.75×10^{-3} m
(2) 2.3×10^{-4} rad and 1.75×10^{-5} m
(3) 3.2×10^{-4} rad and 1.75×10^{-3} m
(4) 3.2×10^{-4} rad and 1.75×10^{-5} m

Choose the correct answers :

1. Ray optics is valid, when characteristic dimensions are
   (1) of the same order as the wavelength of light
   (2) much smaller than the wavelength of light
   (3) of the order of one millimetre
   (4) much larger than the wavelength of light

2. The three primary colours are
   (1) red, yellow and blue
   (2) red, green and blue
   (3) red, yellow and green
   (4) red, green and violet

3. A train is approaching towards a stationary person with a velocity v. The train emits a light signal. The signal will reach the stationary person with a velocity
   (1) c (2) $c + v$
   (3) $c - v$ (4) $\sqrt{c^2 + v^2}$

4. Process of seeing an object by the eye, uses
   (1) wave nature of light
   (2) particle nature of light
   (3) both wave as well as particle nature of light
   (4) any of the two, depending on whether the light is bright or dim

5. Dimensions of luminous flux are
   (1) ML^2T^{-3} (2) $ML^{-1}T^{-3}$
   (3) $ML^{-1}T^{-2}$ (4) no dimensions

6. Which of the following is the infrared wavelength ?
   (1) 10^{-4} cm (2) 10^{-5} cm
   (3) 10^{-6} cm (4) 10^{-7} cm

7. Two converging rays fall on the surface of a plane mirror. After reflection, these rays
   (1) appear to meet at virtual point
   (2) meet at real point
   (3) meet at a point which may be real or virtual, depending on the source
   (4) none of these

8. A ray of light is incident on a plane mirror at an angle of incidence of 30º. The deviation produced by the mirror is
   (1) 30º (2) 60º
   (3) 90º (4) 120º

9. A boy 1.50 m tall, with his eye-level at 1.38 m, stands before a mirror, fixed on a wall. The minimum height of the lower edge of the mirror from the ground, so that he can see his full image, should be
   (1) 0.75 m (2) 0.69 m
   (3) 0.81 m (4) any convenient

10. A person 1.6 m tall is standing at the centre between two walls three metre high. What is the minimum size of a plane mirror fixed on the wall infront of him, if he is to see the full image of the wall behind him ?
   (1) 0.8 m (2) 1 m
   (3) 1.5 m (4) 2.3 m

11. In a room, there are plane mirrors covering its two adjacent walls and the ceiling. A person is standing at the centre of the room. The number of images formed by these 3 mirrors will be
   (1) 6 (2) 7
   (3) 10 (4) 11

12. It is necessary to illuminate the bottom of a well by reflected solar beam, when the light is incident at an angle α = 40º to the vertical. At what angle to the horizontal should a plane mirror be placed in order to do this?
   (1) 70º (2) 20º
   (3) 50º (4) 40º

13. If two mirrors make an angle θ and if a ray, incident on one mirror and after reflections on both the mirrors, is finally reflected then the angle of deviation between the incident ray and finally reflected ray is
   (1) 1.5 θ (2) 2 θ
   (3) 360º – θ (4) 90º + θ

14. An isotropic point souce of light is suspended h metres vertically above the centre of a circular table of radius r metres. Then the ratio of illuminances at the centre to that at the edge of the table is
   (1) $1+\frac{r^2}{h^2}$ (2) $1+\frac{h^2}{r^2}$
   (3) $\left\{1+\frac{r^2}{h^2}\right\}^{3/2}$ (4) $\left\{1+\frac{h^2}{r^2}\right\}^{3/2}$

15. A lamp is hanging along the axis of a circular table of radius r. At what height should the lamp be placed above the table, so that the illuminance at the edge of the table is 1/8 of that at its center ?
   (1) $r/2$ (2) $r/\sqrt{2}$
   (3) $r/3$ (4) $r/\sqrt{3}$

16. In a grease spot photometer, light from a lamp with dirty chimney is exactly balanced by a point source distant 10 cm from the grease spot. With clean chimney, the point source is moved 2 cm to obtain a balance again. Then, the percentage of light transmitted by the dirty chimney is nearly
   (1) 36 % (2) 64 %
   (3) 44 % (4) 56 %

17. A 100 candela lamp is placed at 2 m from a screen. How far from the screen and on the same side as the first lamp must an additional 50 candela lamp be placed in order to double illuminance on the screen?
(1) 2 m (2) 1/2 m
(3) $1/\sqrt{2}$ m (4) $\sqrt{2}$ m

18. In a movie hall, the distance between the screen and the projector is increased by 1%. What nearly is the percentage decrease in the illumination on the screen?
(1) 1% (2) 2%
(3) 3% (4) 4%

19. When sunlight falls normally on earth, a luminous flux of 1.57×10^5 lumen/m^2 is produced on earth. The distance of the earth from the sun is 1.5×10^8 km. The luminous intensity and luminous flux of sun are, respectively
(1) 3.53×10^{27} candela and 4.43×10^{28} lumen
(2) 4.35×10^{20} candela and 4.25×10^{26} lumen
(3) 2.35×10^{27} candela and 3.25×10^{25} lumen
(4) 3.65×10^{25} candela and 4.25×10^{26} lumen

20. The illuminance at a point on the plane surface at a distance of 2 m from the bulb is 5×10^{-4} lumen/cm^2. The line joining the point to the bulb makes an angle of 60º with the normal at that point on the surface. The luminous intensity of the bulb in candela is
(1) $40\sqrt{3}$ (2) 40
(3) 20 (4) 40×10^{-4}

21. A glass slab of thickness 4 cm contains the same number of waves as 5 cm of water, when both are traversed by the same monochromatic light. If the refractive index of water is 4/3, what is that of glass?
(1) 5/3 (2) 5/4
(3) 16/15 (4) 1.5

22. A point source of light *S* is placed at the bottom of a vessel containing a liquid of refractive index 5/3. A person is viewing the source from above the surface. There is an opaque disc of radius 1 cm floating on the surface. The centre of the disc lies vertically above the source *S*. The liquid from the vessel is gradually drained out through a tap. What is the maximum height of the liquid for which the source cannot at all be seen from above ?
(1) 5/3 cm (2) 4/3 cm
(3) 5/4 cm (4) 3/2 cm

23. A plane glass slab is placed over various coloured letters. The letter which appears to be raised maximum is of colour
(1) red (2) blue
(3) green (4) yellow

24. A transparent cube of unknown material has each side of 8 cm and one of its faces is silvered. When a point source *S* is placed at a distance of 7 cm in front of the face, facing the silvered surface, then the the virtual image of the source *S* is found to be formed at a distance of 12 cm from the silvered surface. The refractive index of the material of the cube is
(1) 1.5 (2) 1.6
(3) 1.4 (4) 1.75

25. The base of a vessel contains glass of thickness *d* and refractive index 2.0. On this, a liquid *A* of thickness *d* and refractive index 1.8 is poured. Over this liquid, another immiscible liquid *B* of thickness *d* and refractive index 1.5 is poured. The average refractive index of the three media is
(1) 53/30 (2) 54/31
(3) 52/29 (4) 55/32

26. When a beam of ligh is converging towards a point *P* on the screen, a parallel plate of glass of thickness *t* and refractive index μ, is introduced in the path of the beam. Convergence point would be shifted
(1) $t\left[1-\frac{1}{\mu}\right]$ away (2) $t\left[1+\frac{1}{\mu}\right]$ away
(3) $t\left[1-\frac{1}{\mu}\right]$ nearer (4) $t\left[1+\frac{1}{\mu}\right]$ nearer

27. A bird is diving vertically downward with a speed of 12 ms^{-1}, towards a fish in a pond of water of refractive index 4/3. The speed of bird as observed by the fish would be
(1) 12 ms^{-1} (2) 16 ms^{-1}
(3) 9 ms^{-1} (4) 13.5 ms^{-1}

28. If eye is kept at a depth *h* inside water of refractive index μ and viewed outside, then the diameter of the circle through which the outer objects become visible, will be
(1) $\frac{h}{\sqrt{\mu^2-1}}$ (2) $\frac{2h}{\sqrt{\mu^2+1}}$
(3) $\frac{2h}{\sqrt{\mu^2-1}}$ (4) $\frac{2h}{\mu^2-1}$

29. One cannot see through fog because
   (1) fog absorbs light
   (2) the refractive index of fog is infinity
   (3) light suffers total internal reflection at the droplets in a fog
   (4) light is scattered by the droplets in fog

30. The time of persistence of vision for normal eye is
   (1) 0.2 sec (2) 0.1 sec
   (3) 0.16 sec (4) 0.5 sec

31. Laser is
   (1) a recently discovered strange heavy particle
   (2) the name of a US space ship
   (3) a device used for the production of very low temperature near absolute zero
   (4) a device that produces an intense and highly parallel beam of coherent light

32. An object is placed at a distance of 1.5 f from the concave mirror of focal length f. The magnification of the image is
   (1) + 2 (2) – 2
   (3) + 3 (4) – 3

33. A plane mirror is placed 22.5 cm in front of a concave mirror of focal length 10 cm. Find where an object can be placed from the concave mirror and between the two mirrors, so that the first images in both the mirrors coincide?
   (1) 10 cm (2) 15 cm
   (3) 5 cm (4) 7.5 cm

34. A plane mirror is at distance of 5 cm from a convex mirror of focal length 20 cm. At what distance from a convex lens should a thin object be placed so that the images formed by the two mirrors coincide?
   (1) 30 cm (2) 25 cm
   (3) 20 cm (4) 15 cm

35. A plane mirror is at a distance of 20 cm from a concave mirror of focal length 7.5 cm, both facing each other. At what distance from the concave mirror should a thin object be placed so that the images formed by the two mirrors coincide?
   (1) 5 cm (2) 10 cm
   (3) 15 cm (4) 20 cm

36. Two transparent media A and B are separated by a plane boundary. The speed of light in medium A is 2.0×10^8 ms^{-1} and in medium B is 2.5×10^8 ms^{-1}. The critical angle for which a ray of light going from A to B is totally internally reflected is
   (1) $\sin^{-1}(1/2)$ (2) $\sin^{-1}(2/5)$
   (3) $\sin^{-1}(4/5)$ (4) $\sin^{-1}(1/2)$

37. What causes chromatic aberration in a lens ?
   (1) Marginal rays (2) Central rays
   (3) Difference in radii of curvature of its surfaces
   (4) Variation of focal length of lens with colour

38. The image of square hole in a screen illuminated by light is obtained on another screen with the help of a converging lens. The distance of the illuminated square from the lens is 40 cm. The area of the image is nine times that of the square hole.The focal length of the lens is
   (1) 60 cm (2) 75 cm
   (3) 40 cm (4) 30 cm

39. For similar exposure of a film, the time of exposure should be proportional to
   (1) (f-number) (2) (f-number)$^{-1}$
   (3) (f-number)^2 (4) (f-number)$^{-2}$

40. The sun subtends an angle of 0.5° at the earth. The image of the sun is obtained on a screen using a converging lens of focal length 1 m. The diameter of the image will be nearly
   (1) 6 mm (2) 9 mm
   (3) 12 mm (4) 5 mm

41. A movie projector projects an image of length 3.5 m of a 35 mm movie film on a screen. Neglecting absorption of light by the film and the air, the ratio of the illumination on the screen to that on the film is
   (1) 100 : 1 (2) $10^4 : 1$
   (3) 1 : 100 (4) $1 : 10^4$

42. How does refractive index (μ) of a material vary with respect to wavelength (λ)? A and B are constants,
   (1) $\mu = A + \frac{B}{\lambda^2}$ (2) $\mu = A + B\lambda^2$
   (3) $\mu = A + \frac{B}{\lambda}$ (4) $m = A + B\lambda$

43. An object is placed at a distance of f/2 from a convex lens. The image will be
   (1) at one of the foci, virtual and double its size
   (2) at 3f/2, real and inverted
   (3) at 2 f, virtual and erect
   (4) at f, real and inverted

44. A concave lens of focal length f produces an image of (1/x) of the size of the object. The distance of the object from the lens is
   (1) (x–1) f (2) (x + 1) f
   (3) {(x–1)/x} f (4) {(x + 1)/x} f

45. The focal length of a convex lens is f. An object is placed at a distance x from its first focal point. The ratio of the size of the real image to that of the object is equal to

(1) f/x^2 (2) x^2/f
(3) f/x (4) x/f

46. In a concave mirror if x_1 and x_2 are the distances of object and its image, respectively, from the focus, then the focal length of the mirror is
(1) $\sqrt{x_1^2 + x_2^2}$ (2) $\sqrt{x_1 x_2}$
(3) $(x_1 + x_2)/2$ (4) $x_1x_2/(x_1 + x_2)$

47. A convex lens of focal length x and a concave lens of focal length y are placed in contact. The focal length of the combination is
(1) $(x + y)$ (2) $(x - y)$
(3) $\frac{xy}{y-x}$ (4) $\frac{xy}{x+y}$

48. A convex lens forms a real image of a point object at a distance of 50 cm from the convex lens. A concave lens is placed 10 cm behind the convex lens on the image side. On placing a plane mirror on the image side and facing the concave lens, it is observed that the final image now coincides with the object itself. The focal length of the concave lens is
(1) 50 cm (2) 20 cm
(3) 25 cm (4) 40 cm

49. The distance between object and the screen is D. Real images of an object are formed on the screen for two positions of a lens separated by a distance d. The ratio between the sizes of two images will be :
(1) D/d (2) D^2/d^2
(3) $(D-d)^2/(D+d)^2$ (4) $\sqrt{D/d}$

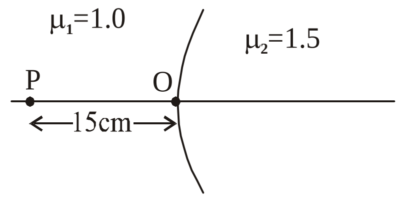
50. A concave mirror of focal length f produces an image n times the size of the object. If the image is real, then the distance of the object from the mirror is
(1) $(n-1)f$ (2) $\{(n-1)/n\}f$
(3) $\{(n+1)/n\}f$ (4) $(n+1)f$

51. A convex mirror has a focal length f. A real object is placed at a distance f in front of it from the pole. It produces an image at
(1) infinity (2) f
(3) $f/2$ (4) $2f$

52. If S_O is the speed of the point object towards the lens along the principal axis and S_i is the speed of the image, when instant distances of the object and the image are, respectively, u and v, then S_i/S_O =
(1) v/u (2) u/v
(3) $(u/v)^2$ (4) $(v/u)^2$

53. An achromatic combination is to be obtained using a convex and a concave lens. The two lenses chosen should have
(1) their refractive indices equal
(2) their dispersive powers equal
(3) the product of their focal lengths and dispersive powers as equal
(4) the product of their powers and dispersive powers equal

54. A convex surface of radius of curvature 30 cm separates the two media as shown. If a point object P lies at 15 cm on the principal axis of the curved surface, then where is located the position of the image from point O ?



(1) $v = -30$ cm (2) $v = -45$ cm
(3) $v = 30$ cm (4) $v = 45$ cm

55. In a glass ($\mu = 1.5$) sphere of radius 10 cm, there is a small air bubble at a distance of 5 cm from its surface. When seen from the closest distance, its apparent distance from the surface will be
(1) 5 cm (2) 4 cm
(3) 5.6 cm (4) 3.6 cm

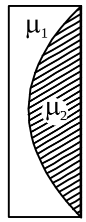
56. In the above question, what will be the apparent distance of the air bubble when eye is close to the sphere but at the maximum distance from the air bubble?
(1) 15.0 cm (2) 17.5 cm
(3) 20.0 cm (4) 25.0 cm

57. A lens of refractive index n is put in a liquid of refractive index n'. If focal length of lens in air is f, its focal lengthi n liquid will be
(1) $-\frac{fn'(n-1)}{n'-n}$ (2) $-\frac{f(n'-n)}{n'(n-1)}$
(3) $-f\frac{n(n'-1)}{n'-n}$ (4) $\frac{fn'n}{n-n'}$

58. When an object is at 10 cm from a convex lens, it forms a magnified image on the screen. When the lens is removed further by 20 cm away from the object, the image is again formed on the screen but image is diminished in size. The focal length of the lens is
(1) 8 cm (2) 7.5 cm
(3) 6 cm (4) 5 cm

59. A concave lens of glass of refractive index 1.5 has both surfaces of same radius of curvature R. On immersion in a medium of refractive index 1.75, it will behave as a
(1) convergent lens of focal length 3.5 R
(2) convergent lens of focal length 3.0 R
(3) divergent lens of focal length 3.5 R
(4) divergent lens of focal length 3.0 R

60. A plano-convex lens fits exactly into a plano-concave lens with their plane surfaces parallel to each other as shown in figure. The lenses are made of different materials. Calculate the combined focal length if radius of curved surface is R



(1) $\frac{R}{\mu_2 - \mu_1}$ (2) $\frac{R}{\mu_2 + \mu_1}$

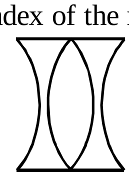
(3) $\sqrt{\mu_2 \mu_1}\, R$ (4) $\frac{\mu_2}{\mu_1} R$

61. A spherical surface of radius of curvature R separates air (refractive index 1.0) from glass (refractive index 1.5). The centre of curvature is in the glass. A point object P placed in air is found to have a real image Q in the glass. The line PQ cuts the surface at a point O, and $PO = OQ$. The distance PO is equal to

(1) 3 R (2) 5 R

(3) 2 R (4) 1.5 R

62. The combination of two concave lenses enclosing a convex lens has zero power. If the radius of curvature of each surface is same, and the refractive index of material of each concave lens is 1.5, then the refractive index of the material of the convex lens is



(1) 1.75 (2) 1.50

(3) 2.0 (4) 3.0

63. A bulb is located on a wall. Its image is to be obtained on a parallel wall with the help of a convex lens. The lens is placed at distance d ahead of the second wall. Then required focal length of the lens is

(1) only $d/4$

(2) only $d/2$

(3) more than $d/4$ but less than $d/2$

(4) less than $d/4$

64. A thin equiconvex glass lens of refractive index 1.5 has power of 5 D. When the lens is immersed in a liquid of refractive index n, it acts as a divergent lens of focal length 100 cm. The value of n of liquid is

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

(3) 5/3 (4) 8/3

65. The plane faces of two thin identical plano-convex lenses, each having focal length of 40 cms, are placed against each other to form a usual convex lens. The distance from this lens at which an object must be placed to obtain a real, inverted image with magnification one is

(1) 80 cm (2) 40 cm

(3) 20 cm (4) 160 cm

66. If in a plano-convex lens, radius of curvature of convex surface is 10 cm and the focal length of lens is 30 cm, the refractive index of the material of the lens will be

(1) 1.5 (2) 1.66

(3) 1.33 (4) 3

67. If the curved face of a planoconvex lens of refractive index μ is silvered and R be the radius of curvature of its curved portion, then the combination behaves like a concave mirror of radius of curvature

(1) R/μ (2) $R/(\mu+1)$

(3) $R\mu$ (4) $R(\mu - 1)$

68. The focal length of a planoconvex glass lens is 20 cm ($n_g = 1.5$). The plane face of it is silvered. An illuminating object is placed at a distance of 60 cm from the lens on its axis along the convex side. Then the distance (in cm) of the image is

(1) 20 (2) 30

(3) 40 (4) 12

69. The diameter of aperture of a plano-convex lens is 6 cm and its maximum thickness is 3 mm. If velocity of light in the material of the lens is 2×10^8 m/s, then its focal length is nearly

(1) 10 cm (2) 15 cm

(3) 30 cm (4) 60 cm

70. The radius of curvature of each surface of a biconvex lens is 16 cm and refractive index of its material is 1.5. If the lens is immersed in a liquid of refractive index 4/3, its focal length would be

(1) 16 cm (2) 64/3 cm

(3) 60 cm (4) 64 cm

71. Two thin convex lenses are of focal lengths 40 cm and 25 cm. In order to have a power of 5.5 dioptre from their combination, separation between the lenses should be

(1) 5.5 cm (2) 11 cm

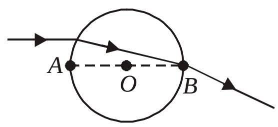
(3) 10 cm (4) 15 cm

72. A glass sphere of radius 5 cm has a small air bubble 2 cm from its centre. The bubble is viewed along a diameter of the sphere from the side on which the bubble lies. If refractive index of glass is 1.5, the bubble will appear from the surface of the sphere, at a distance of

(1) 1.5 cm (2) 2.5 cm

(3) 1.67 cm (4) 3 cm

73. A transparent sphere of radius r is placed in air. A ray of light strikes the sphere parallel to and close to the diameter AB and passed out from B. The refractive index of the material of the sphere is



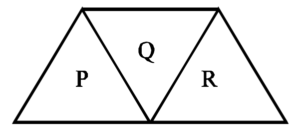
(1) 1.4 (2) 1.6
(3) 2.0 (4) 1.8

74. When a pencil of white light, which is parallel to principal axis, is refracted by a converging lens then the rays converage on the principal axis, the focus point being spread out over a short range along the principal axis. If a screen is put perpendicular to the principal at the farthest focus point, the image on the screen is
(1) a sharp white or violet point
(2) a sharp red point
(3) a circular dispersed patch, red at the centre and violet at the border
(4) a circular dispersed patch, violet at the centre and red at the border

75. If the plane face of a plano-convex lens of focal length 20 cm is silvered, then the lens behaves as (μ_g = 1.5)
(1) a concave lens of focal length 20 cm
(2) a concave mirror of focal length 20 cm
(3) a concave mirror of focal length 10 cm
(4) a concave lens of focal length 10 cm

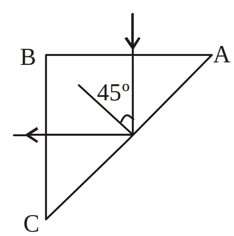
76. f_B and f_R are focal lengths of a convex lens for blue and red light respectively and F_B and F_R are focal lengths of a concave lens for blue and red light respectively. So, we must then have
(1) $f_B > f_R$ and $F_B < F_R$
(2) $f_B < f_R$ and $F_B > F_R$
(3) $f_B > f_R$ and $F_B > F_R$
(4) $f_B < f_R$ and $F_B < F_R$

77. A given ray of light suffers minimum deviation in an equilateral prism P. Additional prisms Q and R of identical shape and of the same material as P are now added as shown below. The ray will now suffer



(1) greater deviation (2) no deviation
(3) same deviation as before
(4) total internal reflection

78. A ray of light is incident normally on the face AB of of right angled prism ABC, made of glass (μ = 1.5). In order that this ray suffers total internal reflection on the face AC and falls normally on face BC, the angle BAC, should be equal to



(1) 30º (2) 45º
(3) 60º (4) 70º

79. A ray of light is incident normally on one of the faces of the prism of angle 30º and refractive index $\sqrt{2}$. The angle of deviation of the ray is
(1) 0º (2) 15º
(3) 30º (4) 45º

80. Angle of incidence of a ray is 30º on one of the sides of an equiangular prism. If the ray suffers a deviation of 40º, then the angle of emergence of the ray from the other side of the prism is

(1) 50º (2) 40º

(3) 60º (4) 70º

81. A prism of angle A has one surface silvered. Light rays, falling at an angle of incidence $2A$ on the first surface, returns back through the same path after suffering reflection at the second silvered surface. Refractive index of its material is

(1) $2 \sin A$ (2) $2 \cos A$

(3) $(1/2) \cos A$ (4) $\tan A$

82. A prism of refractive index of $\sqrt{2}$ has a refracting angle of 60º. At what angle must a ray be incident on it so that it suffers a minimum deviation ?

(1) 30º (2) 45º

(3) 60º (4) 75º

83. A thin prism A of angle of refraction 4º is made of glass of refractive index 1.76. It is combined with another prism B of different glass of refractive index 1.57. If the combination of the prisms produces dispersion without deviation, then angle of refraction of prism B is

(1) 3.0º (2) 5.33º

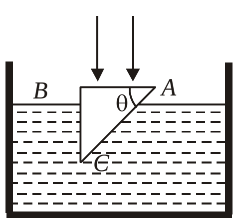
(3) $\frac{4^\circ \times 1.76}{1.57}$ (4) $\frac{4^\circ \times 1.57}{1.76}$

84. For a glass prism $(\mu = \sqrt{3})$, the angle of minimum deviation is equal to refracting angle of the prism. The refracting angle of the prism is

(1) 30º (2) 45º

(3) 60º (4) 90º

85. A glass prism of refractive index 1.5 is immersed in water of refractive index 4/3. A light ray incident normally on face AB is totally reflected at face AC if



(1) $\sin\theta > 8/9$ (2) $\sin\theta < 2/3$

(3) $\sin\theta = \sqrt{3/2}$ (4) $2/3 < \sin\theta > 8/9$

86. Exposure time of camera lens at $f/2.8$ setting is 1/200 s. The correct exporsure time at $f/5.6$ is

(1) 0.2 s (2) 0.04 s

(3) 0.02 s (4) 0.40 s

87. A telescope has an objective of focal length 45 cm and an eye-piece of focal length 5 cm. A distant object is focussed at position of distinct vision. The magnification of the telescope is

(1) 9 (2) 10.8

(3) 12 (4) 13.4

88. The dispersive powers of crown and flint glasses are 0.2 and 0.4, repectively. A lens of crown glass and that of flint glass are combined to form an achromatic doublet of focal length 20 cm. The focal lengths of the two lenses are

(1) 5 cm and – 10 cm (2) 4 cm and – 8 cm

(3) 5 cm and – 15 cm (4) 10 cm and – 20 cm

89. A person can see clearly only up to a distance of 25 cm. He wants to read a book placed at a distance of 50 cm. What kind of lens does he require for his spectacles and what must be its power ?

(1) Concave, – 1.0 D (2) Convex, + 1.5 D

(3) Concave, – 2.0 D (4) Convex, + 2.0 D

90. A microscope is focussed on a coin lying at the bottom of a beaker. The microscope is now raised up by 1 cm. To what depth should water be poured into the beaker so that the coin is again in focus ? The refractive index of water is 4/3.

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

(3) 3 cm (4) 4 cm

91. A camera objective has an aperture diameter d. If the aperture is reduced to diameter $d/2$, the exposure time under identical conditions of light should be made

(1) $(4)^{3/2}$ fold (2) 2 fold

(3) $2\sqrt{2}$ fold (4) 4 fold

92. A person can see objects lying between 25 cm and 10 m from his eye. His vision can be corrected by using lens of power

(1) –0.25 D (2) –0.1 D
(3) +0.40 D (4) +1.0 D

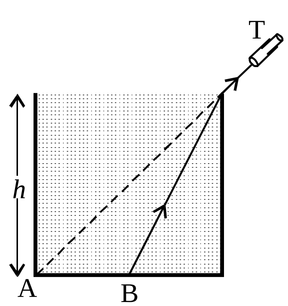
93. Two points separated by a distance of 0.1 mm can just be inspected in a microscope when light of wavelength 6000 Å is used. If light of wavelength 4800 Å is used, this limit of resolution will become

(1) 0.80 mm (2) 0.12 mm
(3) 0.10 mm (4) 0.08 mm

94. A telescope has an objective of focal length 100 cm and an eye-piece of focal length of 5 cm. What is the magnification produced by it, if the final image of a distant object is formed at the distance of distinct vision of a person ?

(1) 20 (2) 24
(3) 25 (4) 30

95. A person looking through the telescope T just sees the point A on the rim at the bottom of a cylindrical vessel when the vessel is empty. When the vessel is completely filled with a liquid of refractive index 1.5, he observes a mark at the centre B of the bottom, without moving the telescope or the vessel. The height of the vessel, if the diameter of its cross-section is 10 cm, is



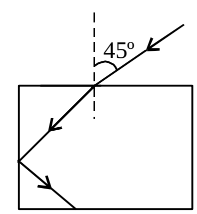
(1) $10\sqrt{2/3}$ cm (2) $10\sqrt{5/7}$ cm
(3) $10\sqrt{3/5}$ cm (4) $10\sqrt{2/5}$ cm

96. A beaker containing a liquid is placed on the table underneath a microscope which can be moved along a vertical scale. The microscope is focussed through the liquid onto a mark on the table and the reading on the scale is a. It is then focussed on the upper surface of the liquid and the reading is b. More liquid is then added and the observations are repeated. The corresponding readings are c and d. The refractive index of the liquid is

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

(3) $\frac{d-a}{a+d-b-c}$ (4) $\frac{d-b}{d+c-a-b}$

97. The given incident ray, as shown in figure, will suffer total internal reflection if the refractive index of the slab is greater than



(1) $\frac{\sqrt{3}+1}{2}$ (2) $\frac{\sqrt{2}+1}{2}$

(3) $\sqrt{3/2}$ (4) $\sqrt{7/6}$

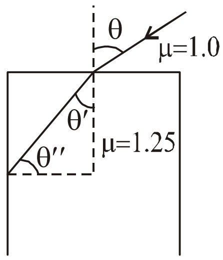
98. The reflecting surface is given by $y=\frac{10L}{\pi}\sin\left(\frac{\pi x}{5L}\right)$.

The co-ordinates of the point where a horizontal ray should fall on the reflecting surface so that it becomes vertical after reflection, are

(1) $\frac{3L}{5}, \frac{5\sqrt{3}L}{\pi}$ (2) $\left(\frac{5L}{3}, \frac{5\sqrt{3}L}{\pi}\right)$

(3) $\frac{5L}{3}, \frac{3\sqrt{5}L}{\pi}$ (4) $\frac{4L}{3}, \frac{5\sqrt{3}L}{\pi}$

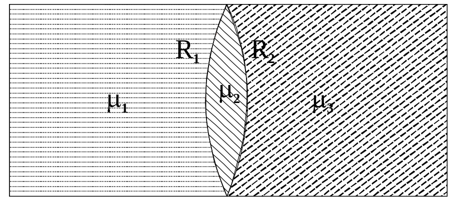
99. Consider the situation shown in figure. Find the maximum angle θ for which the light suffers total internal reflection at the vertical surface.



(1) $\theta = \sin^{-1}(4/5)$ (2) $\theta = \sin^{-1}(3/4)$

(3) $\theta = \sin^{-1}(2/3)$ (4) $\theta = \sin^{-1}(1/2)$

100. A double convex lens of radii R_1 and R_2 and of refractive index μ_2 is placed in a medium such that on its two sides, the refractive indices are different as shown in figure below. The focal length of the lens is



(1) $\dfrac{\mu_3}{\mu_1 f} = \dfrac{\mu_2-\mu_1}{R_1} - \dfrac{\mu_2-\mu_3}{R_2}$

(2) $\dfrac{\mu_3-\mu_1}{f} = \dfrac{\mu_2-\mu_1}{R_1} - \dfrac{\mu_2-\mu_3}{R_2}$

(3) $\dfrac{\mu_3}{f} = \dfrac{\mu_2-\mu_1}{R_1} - \dfrac{\mu_2-\mu_3}{R_2}$

(4) $\dfrac{\mu_1}{f} = \dfrac{\mu_2-\mu_1}{R_1} - \dfrac{\mu_2-\mu_3}{R_2}$

Assertion-Reason Type Questions (For AIIMS)

Each of the questions given below consists of two statements, an assertion (*A*) and reason (*R*). Darken the number corresponding to the appropriate alternative on the answer sheet as follows :

(1) If both ***A*** and ***R*** are true and ***R*** is the correct explanation of ***A***, then mark **1**

(2) If both ***A*** and ***R*** are true but ***R*** is not the correct explanation of ***A***, then mark **2**

(3) If ***A*** is true but ***R*** is false, then mark **3**

(4) If both ***A*** and ***R*** are false, then mark **4**

1. *A*. The shadow of a kite flying in the sky is not visible on the ground.
   R. Size of the kite is very small as compared to the size of the sun.

2. *A*. On a hot summer day, to a person driving a car there appears to be water on the surface of the road, (which actually does not exist). This deceptive appearance of water is called mirrage.
   R. This is due to reflection of rays from the surface of the road.

3. *A*. An achromatic lens is a combination of a convex lens and a concave lens in which focal length of convex lens is greater than that of the concave lens.
   R. When lenses are joined, the focal length of the combination is the sum of focal lengths of the individual lenses.

4. *A*. A boy had a candle and a lens in a dark room. In spite of his best efforts he could not get a real image of the candle, on the wall of the room, by placing a lens between the candle and the wall, at different positions.
   R. He always put the candle between the lens and its focus and the lens was a convex lens.

5. *A*. Magnification produced by an astronomical telescope is larger when the image formed by it is at infinity than when it is formed at distance of distinct vision from the eye.
   R. Larger the size of the image, larger is the magnification produced.

6. *A*. Same lens may have different focal lengths in air as well as in water.
   R. The focal length of a lens depends on the refractive index of its material as well as the refractive index of the medium in which it is used.

7. *A*. On the wall, there is a paper having parallel lines as on a graph paper. A student can see the vertical lines very clearly but to him the horizontal lines are not very clear.
   R. The defect in his eyes is presbyopia. **(Ans.3)**

8. *A*. By roughening the surface of a glass sheet its transparency can be reduced.
   R. Glass sheet with rough surface absorbs more light.

9. *A*. Diamond glitters brilliantly.
   R. Diamond does not absorb sunlight.

10. *A*. The resolving power of a telescope is more if the diameter of the objective lens is more.
    R. Objective lens of large diameter collects more light.

11. *A*. Diffraction produced by sound waves can be observed clearly but not by light waves.
    R. Wavelengths of sound waves are very large as compared to wavelengths of light waves.

12. *A*. Two small bright sources of light, lying at a large distance from the observer, do not appear to be distinct.
    R. This is due to interference of light waves from the two sources.

13. *A*. Resolving power of an electron microscope is about 1000 times larger than that of an ordinary microscope.
    R. Wavelength associated with electrons is very small as compared to that of light waves.

14. *A*. The clouds in sky generally appear to be whitish.
    R. Diffraction due to clouds is efficient in equal measure at all wavelengths.

ANSWERS TO ASSIGNMENT

WAVE OPTICS

1.	(1)	2.	(3)	3.	(3)	4.	(2)	5.	(1)
6.	(3)	7.	(4)	8.	(4)	9.	(3)	10.	(4)
11.	(2)	12.	(4)	13.	(3)	14.	(4)	15.	(1)
16.	(3)	17.	(3)	18.	(4)	19.	(1)	20.	(1)
21.	(3)	22.	(4)	23.	(1)	24.	(3)	25.	(1)
26.	(3)	27.	(1)	28.	(2)	29.	(4)	30.	(1)
31.	(2)	32.	(2)	33.	(3)	34.	(2)	35.	(2)
36.	(3)	37.	(2)	38.	(2)	39.	(1)	40.	(1)
41.	(2)	42.	(3)	43.	(2)	44.	(1)	45.	(3)
46.	(1)	47.	(1)	48.	(4)	49.	(3)	50.	(2)
51.	(2)	52.	(3)	53.	(1)	54.	(3)	55.	(3)
56.	(4)	57.	(4)	58.	(4)	59.	(2)	60.	(2)
61.	(3)	62.	(4)	63.	(3)	64.	(4)	65.	(1)
66.	(2)	67.	(2)	68.	(4)	69.	(2)	70.	(4)
71.	(2)	72.	(3)	73.	(4)	74.	(1)	75.	(1)
76.	(3)	77.	(4)	78.	(4)	79.	(2)	80.	(1)
81.	(4)	82.	(3)	83.	(4)	84.	(1)	85.	(3)
86.	(3)	87.	(2)	88.	(3)	89.	(3)	90.	(4)
91.	(3)	92.	(2)	93.	(2)	94.	(2)	95.	(2)
96.	(1)	97.	(2)	98.	(2)	99.	(2)	100.	(2)

RAY OPTICS & OPTICAL INSTRUMENTS

1.	(4)	2.	(2)	3.	(1)	4.	(3)	5.	(1)
6.	(1)	7.	(2)	8.	(4)	9.	(2)	10.	(2)
11.	(2)	12.	(1)	13.	(2)	14.	(3)	15.	(4)
16.	(2)	17.	(4)	18.	(2)	19.	(1)	20.	(2)
21.	(1)	22.	(2)	23.	(2)	24.	(2)	25.	(2)
26.	(1)	27.	(2)	28.	(3)	29.	(4)	30.	(2)
31.	(4)	32.	(2)	33.	(2)	34.	(3)	35.	(2)
36.	(3)	37.	(4)	38.	(4)	39.	(4)	40.	(2)
41.	(4)	42.	(1)	43.	(1)	44.	(1)	45.	(3)
46.	(2)	47.	(3)	48.	(4)	49.	(3)	50.	(3)
51.	(3)	52.	(4)	53.	(4)	54.	(1)	55.	(2)
56.	(3)	57.	(1)	58.	(2)	59.	(1)	60.	(1)
61.	(2)	62.	(3)	63.	(3)	64.	(3)	65.	(2)
66.	(3)	67.	(1)	68.	(4)	69.	(3)	70.	(4)
71.	(3)	72.	(2)	73.	(3)	74.	(3)	75.	(3)
76.	(4)	77.	(3)	78.	(2)	79.	(2)	80.	(4)
81.	(2)	82.	(2)	83.	(3)	84.	(3)	85.	(1)
86.	(3)	87.	(2)	88.	(4)	89.	(3)	90.	(4)
91.	(4)	92.	(2)	93.	(4)	94.	(2)	95.	(2)
96.	(1)	97.	(3)	98.	(2)	99.	(2)	100.	(3)

ASSERTION-REASON TYPE QUESTIONS (FOR AIIMS)

1.	(2)	2.	(3)	3.	(4)	4.	(3)	5.	(4)
6.	(1)	7.	(3)	8.	(3)	9.	(3)	10.	(2)
11.	(1)	12.	(3)	13.	(1)	14.	(3)		

CBSE – PMT

1. The primary and secondary coils of a transformer have 50 and 1500 turns respectively. If the magnetic flux ϕ linked with the primary coil is given by $\phi = \phi_0 + 4t$, where ϕ is in webers, t is time in seconds and ϕ_0 is a constant, the output voltage across the secondary coil is
(1) 120 volts (2) 220 volts
(3) 30 volts (4) 90 volts

2. The frequency of a light wave in a material is 2×10^{14} Hz and wavelength is 5000 Å. The refractive index of material will be
(1) 1.50 (2) 3.00
(3) 1.33 (4) 1.40

3. A transformer is used to light a 100 W and 110 V lamp from a 220 V mains. If the main current is 0.5 amp, the efficiency of the transformer is approximately
(1) 50% (2) 90%
(3) 10% (4) 30%

4. Monochromatic light of frequency 6.0×10^{14} Hz is produced by a laser. The power emitted is 2×10^{-3} W. The number of photons emitted, on the average, by the source per second is
(1) 5×10^{16} (2) 5×10^{17}
(3) 5×10^{14} (4) 5×10^{15}

5. What is the value of inductance L for which the current is a maximum in a series LCR circuit with C = 10 μF and ω = 1000 s^{-1} ?
(1) 1 mH
(2) cannot be calculated unless R is known
(3) 10 mH
(4) 100 mH

6. A microscope is focussed on a mark on a piece of paper and then a slab of glass of thickness 3 cm and refractive index 1.5 is placed over the mark. How should the microscope be moved to get the mark in focus again ?
(1) 1 cm downward (2) 2 cm upward
(3) 1 cm upward (4) 4.5 cm downward

7. The core of a transformer is laminated because
(1) rusting of the core may be prevented
(2) ratio of voltage in primary and secondary may be increased
(3) energy losses due to eddy currents may be minimised
(4) the weight of the transformer may be reduced

8. In a circuit L, C and R are connected in series with an alternating voltage source of frequency f. The current leads the voltage by 45º. The value of C is
(1) $\frac{1}{2\pi f(2\pi fL - R)}$ (2) $\frac{1}{2\pi f(2\pi fL + R)}$
(3) $\frac{1}{\pi f(2\pi fL - R)}$ (4) $\frac{1}{\pi f(2\pi fL + R)}$

9. The angular resolution of a 10 cm diameter telescope at a wavelength of 5000 Å is of the order of
(1) 10^{-4} rad (2) 10^{-6} rad
(3) 10^{6} rad (4) 10^{-2} rad

10. In India electricity is supplied for domestic use at 220 V. It is supplied at 110 V in USA. If the resistance of a 60 W bulb for use in India is R, the resistance of a 60 W bulb for use in USA will be
(1) $R/2$ (2) R
(3) $2R$ (4) $R/4$

11. The refractive index of the material of a prism is $\sqrt{2}$ and its refracting angle is 30º. One of the refracting surfaces of the prism is made a mirror inwards. A beam of monochromatic light entering the prism from the other face will retrace its path after reflection from the mirrored surface if its angle of incidence on the prism is
(1) 30º (2) 45º
(3) 60º (4) 0º

12. A telescope has an objective lens of 10 cm diameter and is situated at a distance of one kilometre from two objects. The minimum distance between these two objects, which can be resolved by the telescope, when the mean wavelength of light is 5000 Å, is of the order of
(1) 5 cm (2) 0.5 m
(3) 5 m (4) 5 mm

DPMT

1. The radiation pressure (in N/m^2) of the visible light is of the order of
(1) 10^{-2} (2) 10^{-4}
(3) 10^{-6} (4) 10^{-8}

2. The critical angle for total internal reflection in diamond is 24.5°. The refractive index of the diamond is
(1) 2.41 (2) 1.41
(3) 2.59 (4) 1.59

3. When a glass lens with $n = 1.47$ is immersed in a trough of liquid, it looks to be disappeared. The liquid in the trough could be
(1) water (2) kerosene
(3) glycerin (4) alcohol

4. In Young's double slit experiment, two slits are made 5 mm apart and the screen is placed 2 m away. What is the fringe separation when light of wavelength 500 nm is used
(1) 0.002 mm (2) 0.02 mm
(3) 0.2 mm (4) 2 mm

5. For what distance is ray optics a good approximation when the aperture is 4 mm wide and the wavelength is 500 nm?
(1) 32 m (2) 64 m
(3) 16 m (4) 8 m

6. Series *AC* circuit has inductance *L*, resistance *R* and angular frequency ω, the quality factor *Q* is
(1) $\left(\frac{\omega L}{R}\right)^2$ (2) $\frac{\omega L}{R}$
(3) $\frac{R}{\omega L}$ (4) $\left(\frac{R}{\omega L}\right)^2$

7. For a wave to under go total internal reflection (i_C is critical angle and i incidence angle)
(1) light moves from rarer to denser medium and $i > i_C$
(2) light moves from denser to rarer medium and $i > i_C$
(3) light moves from rarer to denser medium and $i < i_C$
(4) light moves from denser to rarer medium and $i < i_C$

8. When a waves enters in a medium which does not change
(1) frequency (2) wavelength
(3) velocity (4) amplitude

9. Air bubble in water behaves as
(1) sometimes concave, sometimes convex lens
(2) concave lens
(3) convex lens
(4) always refracting surface

10. In a transformer loss due to eddy currents is minimized by
(1) laminating the core
(2) laminating the core of steel
(3) increasing the no. of turns of primary coil
(4) lubricating the core

11. A telescope has focal length of objective and eyepiece are 200 cms and 5 cms respectively. What is magnification of telescope
(1) 40 (2) 80
(3) 50 (4) 0.01

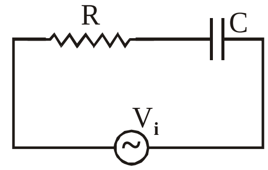
AIIMS

1. In refraction, light waves are bent on passing from one medium to the second medium, because, in the second medium
(1) The frequency is different
(2) The coefficient of elasticity is different
(3) The speed is different
(4) The amplitude is smaller

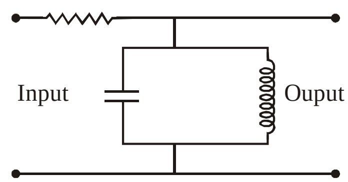
2. A wire mesh consisting of very small squares is viewed at a distance of 8 cm through a magnifying converging lens of focal length 10 cm, kept close to the eye. The magnification produced by the lens is
(1) 5 (2) 8
(3) 10 (4) 20

3. A lens is made of flint glass (refractive index = 1.5). When the lens is immersed in a liquid of refractive index 1.25, the focal length
(1) increases by a factor of 1.25
(2) increases by a factor of 2.5
(3) increases by a factor of 1.2
(4) decreases by a factor of 1.2

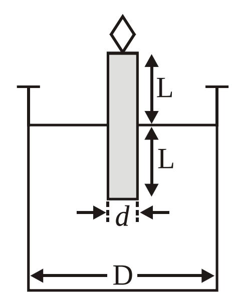
4. Flash light equipped with a new set of batteries, produces bright white light. As the batteries wear out
   (1) The light intensity gets reduced with no change in its colour
   (2) Light colour changes first to yellow and then red with no change in intensity
   (3) It stops working suddenly while giving white light
   (4) Colour changes to red and also intensity gets reduced
5. For a wave propagating in a medium, identify the property that is independent of the others.
   (1) Velocity
   (2) Wavelength
   (3) Frequency
   (4) All these depend on each other
6. A leaf which contains only green pigments, is illuminated by a laser light of wavelength 0.6328 μm. It would appear to be
   (1) Brown (2) Black
   (3) Red (4) Green
7. What should be the maximum acceptance angle at the air-core interface of an optical fibre if n_1 and n_2 are the refractive indices of the core and the cladding, respectively?
   (1) $\sin^{-1}\left(\frac{n_2}{n_1}\right)$ (2) $\sin^{-1}\sqrt{n_1^2 - n_2^2}$
   (3) $\left(\tan^{-1}\frac{n_2}{n_1}\right)$ (4) $\left(\tan^{-1}\frac{n_1}{n_2}\right)$
8. A telescope has an objective lens of focal length 200 cm and an eye piece with focal length 2 cm. If this telescope is used to see 50 meter tall building at a distance of 2 km what is the height of the image of the building formed by the objective lens
   (1) 5 cm (2) 10 cm
   (3) 1 cm (4) 2 cm
9. When exposed to sunlight, thin films of oil on water often exhibit brilliant colors due to the phenomenon of
   (1) interference (2) diffraction
   (3) dispersion (4) polarisation
10. A 50 Hz a.c. source of 20 volts is connected across R and C as shown in figure below. The voltage across R is 12 volts. The voltage across C is



   (1) 8 V
   (2) 16 V
   (3) 10 V
   (4) not possible to determine unless values of R and C are given
11. The pressure exerted by an electromagnetic wave of intensity I (watts/m^2) on a non-reflecting surface is [c is the velocity of light]
   (1) Ic (2) Ic^2
   (3) I/c (4) I/c^2
12. In case of linearly polarized light, the magnitude of the electric field vector
   (1) does not change with time
   (2) varies periodically with time
   (3) increases and decreases linearly with time
   (4) is parallel to the direction of propagation
13. The circuit shown below acts as



   (1) tuned filter (2) low pass filter
   (3) high pass filter (4) rectifier
14. A candle of diameter d is floating on a liquid in a cylindrical container of diameter D (D >> d) as shown in figure. If it is burning at the rate of 2 cm/hour then the top of the candle will

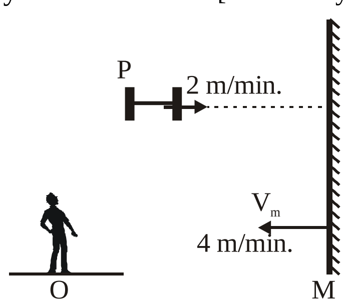


   (1) remain at the same height
   (2) fall at the rate of 1 cm/hour
   (3) fall at the rate of 2 cm/hour
   (4) go up at the rate of 1 cm/hour

15. In an ideal parallel LC circuit, the capacitor is charged by connecting it to a dc source which is then disconnected. The current in the circuit
    (1) becomes zero instantaneously
    (2) grows monotonically
    (3) decays monotonically
    (4) oscillates instantaneously
16. When a beam of light is used to determine the position of an object, the maximum accuracy is achieved if the light is
    (1) polarised
    (2) of longer wavelength
    (3) of shorter wavelength
    (4) of high intensity
17. A double slit experiment is performed with light of wavelength 500 nm. A thin film of thickness 2 μm and refractive index 1.5 is introduced in the part of the upper beam. The location of the central maximum will
    (1) remain unshifted
    (2) shift downward by nearly two fringes
    (3) shift upward by nearly two fringes
    (4) shift downward by 10 fringes

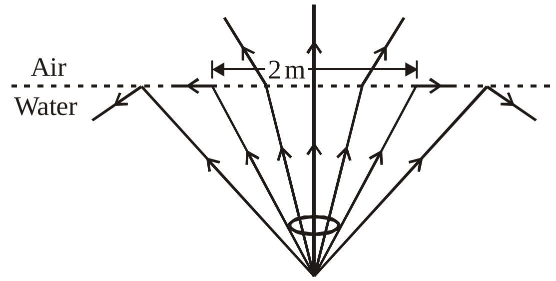
Science Olympiad

1. In the shown figure, an insect P, moves towards plane mirror on with velocity 2 m/min and mirror is also moving towards insect with velocity V_m = 4 m/min. The velocity of the image of insect as seen by a stationary observer O is [Science Olympiad 2007]



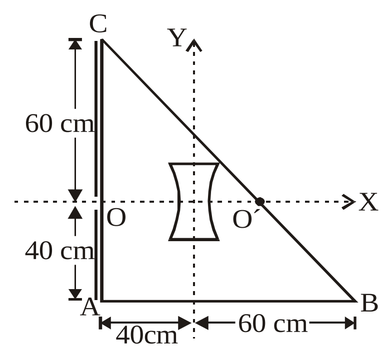
(1) 4 m/min. (2) 12 m/min.
(3) 10 m/min (4) 6 m/min.

2. A point source of light is placed at the depth of $\sqrt{3}$ m inside the water. It is found light is coming out of water through a circular region of radius (r) = 1 m. The refractive index of water is



(1) 4/3 (2) 2
(3) $\sqrt{2}$ (4) $\sqrt{3}$

3. ABC is right angle prism of transparent material having refractive index 4/3. A cavity of equiconcave lens of radius of curvature 20 cm is carved in the prism. An opaque screen having small hole O in it is placed in front of AC. Rays parallel to x-axis are falling on face AC, the distance of final image from O′ is



(1) 15 cm (2) 30 cm
(3) 20 cm (4) 40 cm

4. A ray is moving along +ve x-axis and strikes a reflecting surface $x^2 + y^2 - 10x = 0$ ($x \geq 0$, $y \geq 0$). Ray after reflecting from surface becomes vertical. The co-ordinates of point at which ray is incident is

(1) $\frac{5}{\sqrt{2}}, \frac{5}{\sqrt{2}}$ (2) $5\sqrt{2}, 5\sqrt{2}$

(3) $\frac{5}{\sqrt{2}}, 5 - \frac{5}{\sqrt{2}}$ (4) $5 - \frac{5}{\sqrt{2}}, \frac{5}{\sqrt{2}}$

* * * * *

ANSWERS :

QUESTIONS FROM COMPETITIVE EXAMS

CBSE

1.	(1)	2.	(2)	3.	(2)	4.	(4)	5.	(4)
6.	(3)	7.	(3)	8.	(2)	9.	(2)	10.	(4)
11.	(2)	12.	(4)						

DPMT

1.	(3)	2.	(1)	3.	(3)	4.	(3)	5.	(3)
6.	(2)	7.	(2)	8.	(1)	9.	(2)	10.	(1)
11.	(1)								

AIIMS

1.	(3)	2.	(1)	3.	(2)	4.	(4)	5.	(3)
6.	(2)	7.	(2)	8.	(1)	9.	(1)	10.	(2)
11.	(3)	12.	(1)	13.	(1)	14.	(2)	15.	(3)
16.	(3)	17.	(3)						

SCIENCE OLYMPIAD

1.	(2)	2.	(2)	3.	(3)	4.	(4)