B. Sc. I Year Physics (Semester-II)

(Geometrical and Physical Optics)

Course Code – phy105

Paper – V

Questions:

1. Discuss the Cardinal points of a Co-axial lens system. Explain Focus Points, Focal Planes, Principle Points, Principle planes and Nodal Points, Nodal Planes.

2. Derive an expression for equivalent focal length of two thin co-axial lenses separated by finite distance. Hence obtain formula for distances of Principle Points from lenses.

3. Give the construction and working of Huygen's eye piece and calculate the positions of the cardinal points, indicate in a diagram.

4. Explain construction and working of Ramsden's eye piece. How are chromatic and spherical aberrations minimised in this eye piece? Calculate the positions of cardinal points and indicate in a diagram.

5. Two thin convex lenses having focal lengths 5 cm and 2 cm are co-axial and separated by a distance of 3 cm. Find the equivalent focal length and position of principle points. Show diagrammatically cardinal points. (Ans: 2.5 cm, 3.75 cm, -1.5 cm)

6. Two thin convex lenses of focal lengths 20 cm and 5 cm are placed 10 cm apart. Calculate the positions of principle points of this combination. (Ans: 6.67 cm, 13.33 cm, -3.33 cm)

7. Two thin converging lenses of powers 5 diopter and 4 diopter are placed 10 cm apart. Find the focal length of combination. (Ans: 14.29 cm)

8. Two identical thin convex lenses of focal length 8 cm each are co-axial and 4 cm apart. Find the equivalent focal length and position of principle points. Also find the position of object for which, image is formed at infinity. (Ans: 5.33 cm, 2.66 cm, -2.66 cm, -2.66 cm)

9. Two thin converging lenses of focal lengths 20 cm and 40 cm are placed co-axially 20 cm apart. An object is placed 48 cm from the first lens Find the (i) position of image (ii) position of principle points (iii) position of focal points. (Ans: 24 cm, 12 cm, -16 cm, 24 cm)

10. Two lenses of focal lengths 8 cm and 4 cm are placed certain distance apart. What should be separation for combination to be achromatic and free from spherical aberration? (Ans: 6 cm, 2 cm)

11. What is interference of light? Explain interference in thin film due to reflected light.

12. Explain the interference of light in thin film due to transmitted light. How wedge shaped thin film forms? Explain interference in such film due to reflected light. Obtain expression for fringe width.

13. Give necessary theory of Newton's rings by reflected light and describe the method for the determination of the wavelength of monochromatic light.

14. Describe the construction and working of Michelson interferometer. How would you use it to measure wavelength of a spectral line and difference in wavelength of spectral lines?

15. A parallel beam of light λ =5890x10^{-8} cm is incident on a thin glass plate (μ =1.5) such that the angle of refraction into the plate is 60^{0}. Calculate the smallest thickness of the glass plate which will appear dark by reflection. (Ans: 3.926x10^{-5} cm)

16. A soap film 5x10^{-5} cm thick is viewed at an angle of 35^{0} to the normal. Find the wavelength of light used to appear film dark in first order due to reflected light. R.I. of soap solution is 1.33. (Ans: 12x10^{-5} cm)

17. A soap film of R.I. 4/3 and of thickness 1.5x10^{-4} cm is illuminated by white light incident at an angle of 60^{0}. The light reflected by it is examined by a spectroscope in which it is found a dark band corresponding to a wavelength of 5x10^{-5} cm. Calculate the order of interference of the dark band. (Ans: n=6)

18. Two glass plates enclose a wedge shaped air film, touching at one edge and are separated by a wire of 0.005 cm diameter at a distance of 15 cm from the edge. Calculate the fringe width, monochromatic light of wavelength 6000 A^{0} falls normally on the film. (Ans: 0.09 cm)

19. A glass wedge of angle 0.01 radian is illuminated by monochromatic light of 600 A^{0} falling normally on it. At what distance from the edge of the wedge, will be 10th fringe be observed by reflected light. (Ans: 0.03 cm)

20. In Newton's ring experiment the diameter of 15th ring was found to be 0.590 cm and that of 5 th ring was o.336 cm. If the radius of the Plano convex lens is 100 cm, calculate the wavelength of light used. (Ans: 5880 A^{0})

21. In Newton's ring experiment, the diameter of 5th ring was 0.336 cm and that of 15 th ring = o.590 cm. Find the radius of curvature of the plano- convex lens if the light of wavelength of 5890 A^{0} is used. (Ans: 99.82 cm)

22. In Newton's ring experiment, find the radius of curvature of the lens surface in contact with the glass plate, when light of wavelength 5890 A^{0} is incident, the diameter of third dark ring is 3.2 mm. (Ans: 144.9 cm)

23. In moving one mirror in a Michelson interferometer through a distance of 0.1474 mm, 500 fringes cross the centre of the field of view. What is wavelength of light? (Ans: 5896A^{0})

24. Fringes of equal inclination are observed in a Michelson interferometer. As one of the mirrors is moved back by 1 mm, 3663 fringes move out from the centre of the pattern. Calculate wavelength of light. (Ans: 5460 A^{0})

25. A shift of 100 circular fringes is observed when the movable mirror of the Michelson interferometer is shifted by 0.0295 mm. Calculate the wavelength of light. (Ans: 5900 A^0)

26. Calculate the distance through which the mirror of the Michelson interferometer has to be displaced between two consecutive positions of maximum distinctness of D_1 and D_2 lines of sodium of wavelengths 5890 and 5896 A^0. (Ans: 0.2894 mm)

27. What is diffraction of light? Discuss Fresnel's explanation of rectilinear Propagation of light.

28. Explain diffraction of light at a thin wire. Derive necessary formulae.

29. Describe and Explain Fraunhofer diffraction at double slit. Obtain expression for maxima and minima of interference and diffraction. Discuss intensity distribution in this case.

30. Give theory of Plane transmission diffraction grating. Explain the determination of wavelength of light by using grating.

31. What do you mean by Resolving Power of optical instrument? State and explain Rayleigh's criterion for resolution of optical instrument.

32. Define resolving power of Prism. Obtain an expression for resolving power of Prism.

33. What is resolving power of grating? Derive formula for resolving power of grating.

34. How many half period elements are there in a circular portion of radius 10^{-2} m radius of a plane wave front given that the wavelength is $6x10^{-7}$ m and the distance of the point of observation of the wave front is 1 m? (Ans: 166.7)

35. A plane wave front of light of wavelength $5x10^{-7}$ m falls on an aperture and the diffraction pattern is observed in an eye piece at a distance of 1 m from the aperture. Find the radius of the 100^{th} half period element and its area. (Ans: 0.0070 m; $1.57x10^{-6}$ m)

36. If a diameter of a wire be $2x10^{-4}$ m, calculate the separation between the fringes formed on a screen placed at 0.5 m from the wire. The light source used has a wavelength of $5x10^{-7}$ m and is placed at a finite distance from the wire. (Ans: $1.25x10^{-3}$ m)

37. Light of wavelength 500 nm is incident normally on a plane transmission grating, second order spectral line is observed at an angle of 30^0. Calculate the number of lines per metre on the grating. (Ans: $5x10^5$)

38. What is the highest order spectrum which can be seen with monochromatic light of wavelength 600 nm by using a diffraction grating with 5000 lines/cm? (Ans: 3.33)

39. What will be angular separation between the two sodium lines of wavelengths 589 n and 589.6 nm, when a parallel beam of light is incident normally at a plane transmission grating of $6x10^5$ lines per metre in the second order spectrum? (Ans: 44^0 59')

40. Calculate the minimum thickness of the base of a prism which will just resolve the D_1 and D_2 lines of sodium. Given R.I. for wavelength 656.3 nm = 1.6545 and for wavelength 527 nm = 1.6635. (Ans: 0.0141m)

41. Examine D_1 and D_2 lines of sodium will be clearly separated in the (i) first order (b) second order by 1" grating having 300 lines/cm. Wavelengths of sodium lines are 589.6 and 589 nm respectively. (Ans: In second order sodium lines are resolved)

42. Explain the phenomenon of Polarisation of light.

43. State and explain Malus law of Polarisation.

44. What is meant by 'double refraction'? Give Huygens' theory of double refraction in uniaxial crystal.

45. Describe construction and working of Nicol Prism. Explain its use as analyser.

46. What is optical activity? Describe Fresnel's explanation for optical activity.

47. What is specific rotatory power? Describe Laurent's half-shade polarimeter method of determining the specific rotation of sugar solution.

48. A glucose solution of unknown concentration is contained in a 12 cm long tube and seen to rotate linearly polarised light by 2.5^0. If the specific rotation of glucose is 52^0, what is the concentration? (Ans: 0.0401 gm/cc)

49. A 30 cm long tube containing sugar solution rotates the plane of polarisation by 12^0. If the specific rotation of sugar is 68^0, calculate the strength of solution. (Ans: 0.06 gm/cc)

50. Two polarising sheets have their polarising directions parallel so that the intensity of the transmitted light is maximum. Through what angle must either sheet be turned if the intensity is to be drop one half the maximum?

(Ans: 45^0 or 135^0) (Hint: $I_m/2 = I_m \cos^2\theta$)

Multiple Choice Questions (MCQ's):

1. The number of cardinal points of a lens system is:

(a) 2	(b) 4
(c) 6	(d) 8

2. The points having unit lateral magnification in a lens system is called:

(a) Principal foci	(b) Nodal points
(c) Principal points	(d) Cardinal points

3. In a Ramsden's eyepiece the lenses used are:

(a) Two plano convex lenses with convex surfaces facing each other

(b) Two plano convex lenses with convex and plane surface facing each other.

(c) One convex and other plano convex lens with convex surfaces facing.

(d) Two plano concave lenses with concave surfaces facing each other.

4. In a Ramsden's eyepiece the final image from the eye lens is formed:
(a) At a distance of distinct vision
(b) In between the objective and eye lens
(c) At infinity
(d) In front of objective at f/2 distance, where f is the focal length of each objective and eye lens
5. Huygen's eyepiece is useful where we want to:
(a) Eliminate spherical as well as chromatic aberration
(b) Eliminate chromatic aberration
(c) Eliminate coma
(d) Eliminate distortion
6. In a Ramsden's eyepiece the distance between the lenses is:
(a) Half the focal length of either lens
(b) Twice the focal length of either lens
(c) $\frac{2}{3}$ times the focal length of either lens
(d) $\frac{3}{2}$ times the focal length of either lens
7. In Huygen's eyepiece the possible position of the cross wire is:
(a) In front of the field lens (b) in between field lens and eye lens
(c) Behind the eye lens (d) at infinity
8. To place the cross wire arrangement in the eyepiece is useful:
(a) Ramsden's (b) Huygen's
(c) Any one (d) none of the above
9. Huygen's eyepiece is relatively free from:
(a) Chromatic aberration and has minimum spherical aberration
(a) Chromatic aberration as well as spherical aberration
(c) Coma and astigmatism
(d) None of the above

10. Two convex lenses of equal focal length f are placed at a distance d from each other, then the focal length of the combination is:

(a) $\frac{f}{f-d}$ (b) $\frac{f^2}{f-d}$
(c) $\frac{f^2}{2f-d}$ (d) $\frac{f}{2f-d}$
11. In Huygen's eyepiece:
(a) Focal length of eye lens is three times the focal length of field lens
(b) Focal length of eye lens is one-third the focal length of field lens
(c) Focal length of eye lens is two times the focal length of field lens
(d) Focal length of eye lens is equal to the focal length of field lens

12. In Huygen's eyepiece:
(a) Distance between the two lenses is equal to the difference of focal lengths.
(b) Distance between the two lenses is equal to twice the focal lengths of eye lens
(c) Distance between the two lenses is equal to two third the focal length of field lens
(d) Both (a) and (b)
13. In Ramsden's eyepiece:
(a) Focal lengths of two lenses are in the ratio of 3:1
(b) Focal lengths of two lenses are equal
(c) Focal lengths of two lenses are in the ratio 2:3.
(d) Both (b) and (c)
14. In Huygen's eye piece, if f is the focal length of eye lens then its equivalent focal length is:
(a) $\frac{3f}{2}$ (b) $\frac{2f}{3}$
(c) $\frac{3f}{4}$ (d) $\frac{4f}{3}$
15. In Huygen's eye piece, if focal length of eye lens is f then the distance between the two lenses is:
(a) $\frac{2f}{3}$ (b) $\frac{3f}{2}$
(c) $\frac{f}{2}$ (d) $2f$
16. In Ramsden's eye piece, if f is the focal length of eye lens then the distance between the two lenses is:
(a) $\frac{3f}{2}$ (b) $\frac{2f}{3}$
(c) $2f$ (d) $\frac{f}{2}$
17. In Ramsden's eye piece, if f is the focal length of eye lens then its equivalent focal length is:
(a) $\frac{3f}{2}$ (b) $\frac{2f}{3}$
(c) $\frac{3f}{4}$ (d) $\frac{4f}{3}$
18. In Huygen's eyepiece, if f is the focal length of eye lens then:
(a) First principal point is at a distance of 3f from the field lens
(b) Second principal point is at a distance of f from eye lens
(c) Focal length of equivalent lens is $\frac{3f}{2}$
(d) All the above

19. In Huygen's eye piece, if f is the focal length of eye lens then the distance between the two lenses is:

(a) f (b) $2f$

(c) $3f$ (d) $\frac{3f}{2}$

20. In Huygen's eye piece, if the focal length of eye lens is 4 cm then its equivalent focal length is:

(a) 6 cm (b) 8 cm

(c) 10 cm (d) 12 cm

21. In Ramsden's eye piece, if the focal length of eye lens is 12 cm then its equivalent focal length is:

(a) 9 cm (b) 10 cm

(c) 12 cm (d) 14 cm

22. Two lenses of focal length f1 and f2 are separated by a distance d then distance of first principal point from first lens is:

(a) $\frac{fd}{f1}$ (b) $-\frac{fd}{f1}$

(c) $\frac{fd}{f2}$ (d) $-\frac{fd}{f2}$

23. Two lenses of focal length f1 and f2 are separated by a distance d then distance of second principal point from second lens is:

(a) $\frac{fd}{f1}$ (b) $-\frac{fd}{f1}$

(c) $\frac{fd}{f2}$ (d) $-\frac{fd}{f2}$

24. In Huygen's eye piece, focal length of eye lens is 5 cm then distance between the two lenses is:

(a) 5 cm (b) 10 cm

(c) 15 cm (d) 20 cm

25. In Ramsden's eye piece, if the focal length of eye lens is 12 cm then distance between the two lenses is:

(a) 8 cm (b) 10 cm

(c) 12 cm (d) 14 cm

26. If μ is RI, t is thickness of thin film and r is the angle of refraction then, in case of interference in thin film due to reflected light, condition for brightness is:

(a) $2\mu t\, cosr = (2n+1)\frac{\lambda}{2}$ (b) $\mu t\, cosr = (2n+1)\frac{\lambda}{2}$

(c) $2\mu t\, cosr = (2n+1)\lambda$ (d) $\mu t\, cosr = (2n+1)\lambda$

27. If μ is RI, t is thickness of thin film and r is the angle of refraction then, in case of interference in thin film due to reflected light, condition for darkness is:

(a) $\mu\ t\ cosr = n\lambda$ (b) $\mu\ t\ cosr = n\frac{\lambda}{2}$

(c) $2\ \mu\ t\ cosr = n\lambda$ (d) $2\ \mu\ t\ cosr = n\frac{\lambda}{2}$

28. If μ is RI, t is thickness of thin film and r is the angle of refraction then, in case of interference in thin film due to transmitted light, condition for brightness is:

(a) $2\ \mu\ t\ cosr = n\lambda$ (b) $\mu\ t\ cosr = (2\ n + 1)\frac{\lambda}{2}$

(c) $2\ \mu\ t\ cosr = (2\ n + 1)\lambda$ (d) $\mu\ t\ cosr = (2\ n + 1)\lambda$

29. If μ is RI, t is thickness of thin film and r is the angle of refraction then, in case of interference in thin film due to transmitted light, condition for darkness is:

(a) $\mu\ t\ cosr = (2\ n + 1)\frac{\lambda}{2}$ (b) $2\ \mu\ t\ cosr = (2\ n + 1)\frac{\lambda}{2}$

(c) $2\ \mu\ t\ cosr = (2\ n + 1)\lambda$ (d) $\mu\ t\ cosr = (2\ n + 1)\lambda$

30. If θis the angle of wedge, then fringe width due to interference in wedge shaped air film is:

(a) $\frac{\lambda}{\theta}$ (b) $\frac{\lambda}{2\ \theta}$

(c) $\frac{\theta}{\lambda}$ (d) $\frac{2\ \theta}{\lambda}$

31. If θis the angle of wedge, then fringe width due to interference in wedge shaped film of RI μ is:

(a) $\frac{\lambda}{\mu\ \theta}$ (b) $\frac{\mu\ \theta}{\lambda}$

(c) $\frac{2\ \mu\ \theta}{\lambda}$ (d) $\frac{\lambda}{2\ \mu\ \theta}$

32. If R is the radius of curvature of Plano convex lens then radius of Newton's 4th dark ring is:

(a) $2\sqrt{4\lambda R}$ (b) $3\ \sqrt{2\ \lambda\ R}$

(c) $\sqrt{2\ \lambda\ R}$ (d) $2\ \sqrt{2\ \lambda\ R}$

33. In Michelson's interferometer, if two mirrors are mutually perpendicular, then the types of fringes observed are:

(a) Circular (b) Straight

(c) White light (d) Both (a) and (b)

34. In Michelson's interferometer, if d is the distance through which movable mirror is moved and n is the number of fringes crossing the centre of field of view then the wavelength of light is:

(a) $\frac{n}{d}$ (b) $\frac{n}{2\ d}$

(c) $\frac{d}{n}$ (d) $\frac{2\ d}{n}$

35. In Michelson's interferometer, if d is the distance through which movable mirror is moved between two consecutive maximum distinctness and λ is mean of two wavelengths then difference in wavelengths is:

(a) $\frac{2d}{\lambda^2}$ (b) $\frac{d}{\lambda^2}$

(c) $\frac{\lambda^2}{d}$ (d) $\frac{\lambda^2}{2d}$

36. Newton's rings are observed in reflected light of wavelength 4×10^{-5} cm. The radius of 10^{th} dark ring is 0.2 cm. Then radius of curvature of lens is:

(a) 50 cm (b) 100 cm

(c) 150 cm (d) 200 cm

37. In Newton's ring experiment 10^{th} dark ring is observed in reflected light of wavelength 4×10^{-5} cm. Then thickness of air film is:

(a) 10^{-4} cm (b) 10^{-3} cm

(c) 4×10^{-4} cm (d) 2×10^{-4} cm

38. If movable mirror of Michelson's interferometer is moved through 5×10^{-4} cm, a shift of 100 fringes is observed, then the wavelength of light used is:

(a) 10^{-4} cm (b) 10^{-3} cm

(c) 10^{-5} cm (d) 10^{-6} cm

39. Interference of two light waves can be observed with the help of a:

(a) Spectrometer (b) Photometer

(c) Prism (d) Michelson's interferometer

40. The interference of two light waves is constructive if:

(a) Two waves are in same phase (b) Two waves are in opposite phase

(c) Two waves are perpendicular to each other

(d) Two waves are obtained from two different sources

41. When a soap film or oil film on water is observed in daylight, it exhibits beautiful colours due to:

(a) Interference (b) Dispersion

(c) Reflection (d) Refraction

42. A thin film of air between a plane glass plate and a convex lens is irradiated with parallel beam of monochromatic light and is observed under a microscope, you will see:

(a) Uniform brightness (b) Complete darkness

(c) Field crossed over by concentric bright and dark circular fringes

(d) Field crossed over by parallel bright and dark fringes

43. Colours of thin films result from:

(a) Dispersion of light (b) Interference of light

(c) Absorption of light (d) Scattering of light

44. When white light is used in Newton's rings experiment, then:

(a) All fringes are black (b) All fringes are white

(c) All fringes are coloured (d) No fringes are observed

45. The points having unit lateral magnification in a lens system is called:

(a) Focal points (b) Nodal points

(c) Principle points (d) none of above

46. The bending of light waves around corners and their encroachment in geometrical shadow region is called:

(a) Interference (b) Refraction

(c) Reflection (d) diffraction

47. What principle is responsible for spreading of light as it passes through a narrow slit?

(a) Interference (b) Refraction

(c) Reflection (d) diffraction

48. In case of Fresnel's diffraction either the source or screen or both are at distances from diffracting obstacle.

(a) Infinite (b) finite

(c) close (d) none of above

49. In case of Fraunhofer diffraction either the source or screen or both are at distances from diffracting obstacle.

(a) Infinite (b) finite

(c) close (d) none of above

50. The radius of Fresnel's half period zone is-

(a) $\sqrt{b\lambda}$ (b) $\sqrt{n\lambda}$

(c) $\sqrt{nb\lambda}$ (d) none of above

51. The area of each half period zone is given as-

(a) $n\,b\,\lambda$ (b) $\pi\,b\,\lambda$

(c) $\sqrt{nb\lambda}$ (d) none of above

52. In case of diffraction at a thin wire, fringe width of interference band observed in geometrical shadow region is

(a) $\beta = \frac{nD\lambda}{d}$ (b) $\beta = \frac{D\lambda}{n\,d}$

(c) $\beta = \frac{D\lambda}{d}$ (d) $\beta = \frac{d\lambda}{D}$

53. A thin wire is placed at a distance of 0.5 m from screen and a light of wavelength 5000 A^0 is used by keeping source at a finite distance from wire, is obtained. What is the diameter of wire?

(a) $2x10^{-4}$ m (b) $2x10^{-4}$ cm

(c) $2x10^{-4}$ mm (d) none of above

54. Number of parallel slits of equal width and separated from one another by equal opaque surfaces is

(a) Diffraction grating (b) Concave grating

(c) Eagle mounting (d) none of above

55. The grating element or grating constant is

(a) Width of each slit (b) width of each opaque portion

(c) width of each slit & opaque portion (d) none of above

56. In case of plane transmission grating for maximum intensity path difference must be:

(a) (a+b) sinθ = n λ (b) (a+b) sinθ = (2n+1) λ

(c) (a+b) sinθ = (n+1) λ (d) (a+b) sinθ = n λ/2

57. In case of plane transmission grating for minimum intensity path difference must be:

(a) (a+b) $\sin\theta$ = nλ (b) (a+b) $\sin\theta$ = (2n+1)λ/2

(c) (a+b) $\sin\theta$ = (n+1)λ (d) (a+b) $\sin\theta$ = nλ/2

58. Resolving power of a prism is

(a) Inversly proportional to base width (b) directly proportional to $\frac{d\mu}{d\lambda}$

(c) Inversly proportional to $\frac{d\mu}{d\lambda}$ (d) none of above

59. Resolving power of a plane transmission grating increases with

(a) Increase in order of spectrum (b) decrease in order of spectrum

(c) decrease in number of lines on grating (d) none of above

60. A grating has 0.15 m of surface ruled with 6×10^5 lines/m. What is its Resolving power in the first order?

(a) 9×10^4 (b) 9×10^6

(c) 9×10^3 (d) 9×10^5

61. A diffraction grating has 4000 lines/cm, angle between central maximum and third order maximum is 36^0. What is the wavelength of light used?

(a) 240 nm (b) 490 nm

(c) 620 nm (d) 570 nm

61. The Polarisation of light shows that light is made up of

(a) Waves (b) longitudinal waves

(c) transverse waves (d) electromagnetic radiation

62. What principle is responsible for the fact that the sunglasses can reduce glare from reflected surfaces?

(a) Refraction (b) total internal reflection

(c) Polarisation (d) diffraction.

63. A plane passing through the direction of propagation and containing no vibrations is called as

(a) Plane of polarisation (b) plane of vibration

(c) plane of propagation (d) plane of vibration and polarisation

64. Equation related with Malus law of polarisation is

(a) $I\theta = I_0 \cos^2\theta$ (b) $I\theta = I_0 \cos\theta$

(c) $I\theta = I_0 \cos^3\theta$ (d) $I = I_0 \cos^2\theta$

65. In case of double refraction refractive index of ordinary ray is

(a) $\mu = \frac{\sin i}{\sin r_1}$ (b) $\mu = \frac{\sin i}{\sin r_2}$

(c) $\mu = \frac{\sin i}{\sin r}$ (d) $\mu = \frac{\sin r}{\sin i}$

66. In case of double refraction refractive index of extra-ordinary ray is

(a) $\mu = \dfrac{\sin i}{\sin r_1}$ (b) $\mu = \dfrac{\sin i}{\sin r_2}$

(c) $\mu = \dfrac{\sin i}{\sin r}$ (d) $\mu = \dfrac{\sin r}{\sin i}$

67. Example of negative uniaxial crystal is
(a) Tourmaline (b) Cacite
(c) Quartz (d) rock salt

68. Example of positive uniaxial crystal is
(a) Tourmaline (b) Cacite
(c) Quartz (d) rock salt

69. Working of Nicol Prism is based on phenomenon of
(a) Polarisation (b) refraction
(c) diffraction (d) double refraction

70. In Nicol Prism ordinary rays are absorbed by blackened sides of prism as it suffers
(a) Total internal reflection (b) refraction
(c) double refraction (d) polarisation

Answer key:

1. (c) 2. (a) 3. (a) 4. (c) 5. (a) 6. (c) 7. (b) 8. (a) 9. (a) 10. (c)
11. (b) 12. (a) 13. (b) 14. (a) 15. (d) 16. (b) 17. (c) 18. (c) 19. (b) 20. (a)
21. (a) 22. (c) 23. (b) 24. (b) 25. (a) 26. (a) 27. (c) 28. (a) 29. (b) 30. (b)
31. (d) 32. (a) 33. (a) 34. (d) 35. (d) 36. (b) 37. (d) 38. (c) 39. (d) 40. (a)
41. (a) 42. (c) 43. (b) 44. (c) 45. (b) 46. (d) 47. (d) 48. (b) 49. (a) 50. (c)
51. (b) 52. (c) 53. (a) 54. (a) 55. (c) 56. (a) 57. (b) 58. (b) 59. (a) 60. (a)
61. (d) 62. (c) 63. (a) 64. (a) 65. (a) 66. (b) 67. (b) 68. (c) 69. (d) 70. (a)