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Department- Physics

Question Bank

Class: S.Y.B.Sc. **Subject: Physics –II** **Semester- IV - OPtics**

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Chapter- 1 Geometrical Optics

Question for 1 Marks

1. Write the lens Maker's formula.
2. Determine the focal length of convex lens of power 20 diopter.
3. Define the term linear magnification.
4. Define power of the lens and state its unit.
5. What do you mean by principal points?
6. Write the lens formula for a thin lens.
7. State the names of cardinal points in optical system.
8. Define the term : optical centre, principal axis, centre of curvature, and radius of curvature.
9. Define principal foci and focal planes.
10. What nodal points and nodal planes?
11. What do you mean by an equivalent lens?
12. What do you mean by power of the lens?

Question for 5 Marks

1. What do you mean by an equivalent lens? Derive the formula for equivalent focal length of combination of two co-axial lenses kept apart by finite distance.
2. Show that the deviation produced by a thin lens is independent of position of object.
3. Show that the distance of first principal plane from the first lens of an optical system is given by $\alpha = xf/f2$ where f is equivalent focal length of two lenses kept apart by distance x
4. Derive lens maker's formula for a thin lens.
5. Explain cardinal points for an optical system in detail.
6. Show that the distance of second principal plane from the second lens of an optical system is given by $\beta = -xf/f1$ where f is equivalent focal length of two lenses kept apart by distance x
7. Derive lens maker's equation for single curved surface.

Chapter- 2 Lens Aberrations

Question for 1 Marks

1. State the cause of spherical aberration.
2. What is chromatic aberration?
3. State the types of monochromatic aberration.
4. What do you mean by crossed lens?
5. State the cause of chromatic aberration.
6. State the cause of astigmatism.
7. What means by spherical aberration?
8. What is monochromatic aberration?
9. What is coma?
10. What is the cause of comatic aberration?
11. What is an Aplantic lens?
12. What is means Astigmatism?
13. What means by curvature of field?
14. State the cause of curvature of field.
15. What is Distortion?
16. What is the Cause of Distortion?
17. State the types of chromatic aberration.
18. What is meant by circle of least confusion?
19. What is Achromatic doublet?

Question for 5 Marks

1. Show that longitudinal chromatic aberration is equal to product of dispersive power and mean focal length.
2. What do you mean by achromatism? Derive the condition for the achromatism of two co-axial thin lenses separated from each other.
3. What do you mean by spherical aberration? Explain how it is reduced using plano-convex lens.
4. What do you mean by achromatism? Derive the condition for the achromatism of two lenses in contact.
5. What is Distortion? State the cause and explain how it is reduced to minimum.
6. What is curvature of field? Explain how it is reduced.
7. What do you mean by spherical aberration? Derive the condition of minimum spherical aberration where two planoconvex lenses are separated by finite distance.
8. What do you mean by spherical aberration? Explain how it is reduced using suitable combination of concave and convex lenses.
9. What is means Astigmatism? Explain how it is reduced.
10. What is coma? Explain how it is reduced.

Chapter- 3 Optical Instruments

Question for 1 Marks

1. What is an eyepiece?
2. Why Huygens eyepiece is called negative eyepiece?
3. Why cross wires cannot be used in the Huygens eyepiece?
4. Define the magnifying power of compound microscope.
5. What is the range of vision of normal eye?
6. Define the magnifying power of simple microscope.
7. State the magnifying power of simple microscope and sketch the raydiagram of simple microscope.

Question for 5 Marks

1. Describe the construction of Huygens eyepiece and its action. Can a cross- wire be used in a Huygens eyepiece?
2. Distinguish between Huygens eyepiece and Ramsden's eyepiece.
3. Draw ray diagram of Ramsden eyepiece and explain the principal point.
4. Obtain an expression for magnifying power of a compound microscope.
5. Obtain an expression for magnifying power of a simple microscope when image is formed at infinity.
6. Draw ray diagram of Ramsden's eyepiece and explain image formation. Obtain the expressions of principal points of Ramsden's eyepiece.

Chapter- 4 Interference and Diffraction

Question for 1 Marks

1. What do you mean by R. P. of an optical instrument.
2. What means by division of amplitude?
3. Define the term grating element.
4. What is plan diffraction grating?
5. What is Haidinger fringes?
6. Define the term diffraction of light.
7. Give any two distinguishing points between interference and diffraction.
8. What is Rayleigh's criterion?
9. Why center of Newton's rings dark?
10. Give any two distinguishing points between Fresnel and Fraunhoffer type diffraction.
11. Why the Newton's are rings circular?
12. What is interference?
13. what means by FECO type of fringes?

Questions for 5 marks :-

1. Give theory of plane transmission grating and derive the intensity equation $I = I_0 \left(\frac{\sin\alpha}{\alpha}\right)^2 \frac{\sin^2(N\beta)}{\sin^2\beta}$

2.

Question for 5 Marks

1. Discuss the formation of interference fringes due to a wedge-shaped thin film. Obtain the formula for the path difference.
2. Discuss the phase change on reflection of light from boundary of denser medium on the basis of stokes's treatment.
3. Distinguish between interference and diffraction.
4. Derive the formula for the fringe width in case of fringes of equal thickness due to interference of wedge shaped thin film.
5. Distinguish between Fresnel and Fraunhoffer type diffraction.
6. ~~Obtain an expression for path difference between two successive rays in transmitted system from a parallel sided film~~.

6. Show that the radii of the dark rings are directly proportion to the square root of natured numbers.

Chapter- 5 Polarization

Question for 1 Marks

1. State the Law of Malus.
2. What do you mean by Negative crystal?
3. What do you mean by positive crystal?
4. State the Brewsters law?
5. What is double refraction?
6. Define Uniaxial crystal.
7. What are the uses of Polaroid?
8. What are the types of anisotropic crystals?
9. Draw figure of E-ray and O-ray wave fronts in the calcite crystal.
10. Define linearly polarized light.
11. What is polarization?
12. Define plane of vibration and plane of polarization.
13. State any two applications of Nicol prism.

Question for 5 Marks

1. State and explain law of Malus.
2. State and explain Brewster law.
3. Describe briefly Huygens explanation of double refraction.
4. Describe the construction and working of Nicol prism.
5. Distinguish between negative and positive crystals with examples.