

GOVERNMENT DEGREE COLLEGE - NANDIKOTKUR

DEPARTMENT OF PHYSICS -QUESTIONBANK

SEMESTER-III :COURSE-2:OPTICS (MINOR)

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Unit-I Aberrations

Long Answer Questions

1. Explain spherical aberration in a lens. Briefly describe the methods to minimise spherical aberration.
2. Distinguish between lateral and longitudinal spherical aberration. Mention two methods of minimising spherical aberration.
3. What is chromatic aberration ? Obtain an expression for the chromatic aberration of a lens.
4. What is an achromatic doublet ? How is chromatic aberration eliminated in it ?
5. What is chromatic aberration ? Derive the condition for achromatism when two lenses are :
 - a) In contact .
 - b) Separated by a distance.

Short Answer Questions

1. Discuss the different monochromatic aberrations.
2. Explain how the defect coma arises in a lens by a diagram. How is it eliminated?
3. write a note on astigmatism.

Unit-II Interference

Long Answer Questions

1. Describe about Fresnel's biprism experiment.
2. What is a wedge shaped film ? Describe an interference experiment to determine of a wire of an extremely small diameter.

3. Describe the arrangement to observe Newton's rings by reflected light. Explain the determination of wavelength of light using these rings.
4. Describe the principle, construction and working of a Michelson's interferometer. Explain how the wavelength of light is determined with it?

Short Answer Questions

1. What is interference of light ? Discuss the conditions for interference of light.
2. Discuss briefly two methods of obtaining two coherent sources of light by wavefront splitting and amplitude splitting .
3. Obtain the conditions for the interference of light reflected by a thin parallel film.
4. Explain the colours in thin films.

Unit-III Diffraction

Long Answer Questions

1. Discuss Fraunhofer diffraction due to a single slit. Explain the distribution of intensity of light in the diffraction pattern.
2. Give the theory of diffraction grating . Explain the determination of the wavelength of light in normal incidence method using diffraction grating
3. What are Fresnel half period zones? Explain the rectilinear propagation of light by Fresnel's half period zones.
4. What is a zone plate? Explain the construction and working of a zone plate.

Short Answer Questions

1. Explain what is meant by diffraction of light.
2. Distinguish between the Fresnel and the Fraunhofer classes of diffraction.
3. Show that a zone plate has multiple foci. Compare the zone plate with a convex lens.

Unit-IV Polarisation

Long Answer Questions

1. Describe the various methods of producing plane polarised light. Mention a few of its uses.

2. Describe the construction of Nicol prism and show how it can be used as a polariser and an analyser. Mention its uses.
3. Explain plane, circularly and elliptically polarised light. How they are produced and detected?
4. Define specific rotation. Describe the construction and working of Laurent's half shade polarimeter.

Short Answer Questions

1. What do you understand by the term polarisation of light? Distinguish clearly polarised light from ordinary light.
2. Explain Brewster's law.
3. Write a short note on the law of Malus.
4. Explain what is meant by half wave plate and quarter wave plate? Derive an expression for its thickness.
5. What is meant by optical activity?

Unit-V Lasers and Holography

Long Answer Questions

1. What do you mean by lasers? Define spontaneous and stimulated emission.
2. Define Einstein coefficients of absorption, spontaneous emission and induced emission. Obtain relationship between them.
3. Describe the construction and working of He-Ne laser with energy diagrams.
4. Describe the construction and working of Ruby laser.
5. What is Holography? Describe the basic principle of Holography.
6. Explain about Gabor hologram and its limitations.

Short Answer Questions

1. Explain population inversion. How it is achieved through pumping?
2. Explain the laser principle.
3. Describe different types of lasers.
4. What are the applications of lasers?
5. Discuss the applications of holography.

