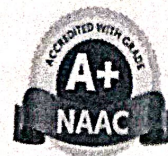


SHRI GNANAMBICA DEGREE COLLEGE: MADANAPALLE



(AUTONOMOUS)
COURSE-2: OPTICS
SEMESTER III
(W.E.F.2024-2025)

Program: B.Sc., BCA Honors



Hours per week: 4

Credits: 3

COURSE OBJECTIVE:

The course on Optics aims to provide students with a fundamental understanding of the behaviour and properties of light and its interaction with matter.

LEARNING OUTCOMES:

On successful completion of this course, the student will be able to:

1. Explain about the different aberrations in lenses and discuss the methods of minimizing them
2. Understand the phenomenon of interference of light and its formation in (i) Lloyd's single mirror due to division of wave front and (ii) Thin films, Newton's rings and Michelson interferometer due to division of amplitude.
3. Distinguish between Fresnel's diffraction and Fraunhofer diffraction and observe the diffraction patterns in the case of single slit and the diffraction grating and to describe the construction and working of zone plate and make the comparison of zone plate with convex lens
4. Explain the various methods of production of plane, circularly and polarized light and their detection and the concept of optical activity.
5. Comprehend the basic principle of laser, the working of He-Ne laser and Ruby lasers and their applications in different fields. To understand the basic principles of fibre optic communication and explore the field of Holography and Nonlinear optics and their applications.

UNIT-I Aberrations

9Hrs

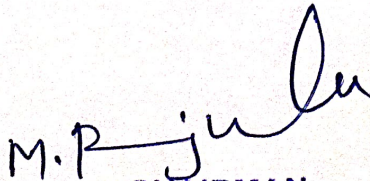
Introduction – monochromatic aberrations, spherical aberration, methods of minimizing spherical aberration, coma, astigmatism and curvature of field, distortion. Chromatic aberration-the achromatic doublet. Achromatism for two lenses (i) in contact and (ii) separated by a distance.

UNIT-II Interference

9Hrs

Principle of superposition – coherence Conditions for interference of light. Fresnel's biprism determination of wavelength of light –change of phase on reflection. Oblique incidence of a plane wave on a thin film due to reflected light (cosine law) –colors of thin films-, Newton's rings in reflected light. Determination of wavelength of monochromatic light using Newton's rings and Michelson Interferometer.




CHAIRMAN
BOARD OF STUDIES
Shri Gnanambica Degree College (A)

UNIT-III Diffraction

9Hrs

Introduction, distinction between Fresnel and Fraunhofer diffraction, Fraunhofer diffraction – Diffraction due to single slit-Fraunhofer. Resolving power of grating, Determination of wavelength of light in normal incidence using diffraction grating. Fresnel's half period zones-area of the half period zones-zone plate-comparison of zone plate with convex lens-difference between interference and diffraction.

UNIT-IV Polarisation

9Hrs

Polarized light: methods of polarization by reflection, refraction, double refraction, Brewster's law- Maule's law-Nicol prism polarizer and analyser, Quarter wave plate, half wave plate-optical activity, determination of specific rotation by Laurent's half shade Polarimeter. Idea of elliptical and circular polarization

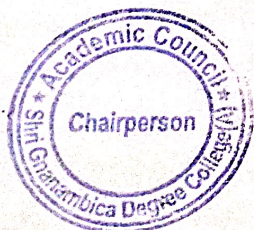
UNIT-V Lasers and Holography

9Hrs

Lasers: introduction, spontaneous emission, stimulated emission. Population Inversion, Laser principle-Einstein Coefficients-Types of lasers-He-Ne laser, Ruby laser- Applications of lasers. Holography: Basic principle of holography-Gabor hologram and its limitations, Applications of holography.

REFERENCEBOOKS:

1. BSc Physics, Vol.2, Telugu Academy, Hyderabad
2. A Text Book of Optics-N Subramanyam, LBrijlal, S.Chand & Co.
3. Unified Physics Vol. II Optics & Thermodynamics-Jai Prakash Nath & Co. Ltd., Meerut
4. Optics, F.A. Jenkins and H.G. White, McGraw-Hill
5. Optics, Ajay Ghatak, Tata McGraw-Hill.
6. Introduction of Lasers-Avadhanulu, S.Chand & Co.
7. Principles of Optics-BK Mathur, Gopala Printing Press, 1995



M. P. Jula
CHAIRMAN
(A) BOARD OF STUDIES
Shri Gyanambica Degree College (A)
MADANAPALLE-517 325

SHRI GNANAMBICA DEGREE COLLEGE: MADANAPALLE

(AUTONOMOUS)

THIRD SEMESTER -MINOR

PART - II : PHYSICS

PAPER-2:OPTICS

(W.E.F.2024-2025)

Program: B.Sc, BCA Honors

Blue Print

Time: 3hrs

Max. Marks: 70

Section-A

Answer any Four of the following questions. Each question carries equal marks .

4X5=20M

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

SECTION -B

Answer ALL questions. Each question carries equal marks.

10X5=50M

1.a) .

(OR)

b).

2. a)

(OR)

b)

3. a)

(OR)

b)

4. a)

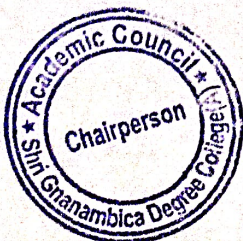
(OR)

b)

5. a)

(OR)

b)



M. R. Jula
CHAIRMAN
BOARD OF STUDIES
Shri Gnanambica Degree College (A)
MADANAPALLE - 517 325

**SHRI GNANAMBICA DEGREE COLLEGE:
MADANAPALLE**

(AUTONOMOUS)
COURSE-2: OPTICS
SEMESTER III
(W.E.F.2025-2026)

Program: B.Sc., BCA Honors
Question Paper

Time : 3 Hrs

Max Marks: 70

SECTION-A

Answers any **FOUR** of the following

1. Write conditions of Interference
2. Write Short notes on a stigmatism
3. Explain coma
4. Write a short note on color's in thin films
5. Derive expression for the resolving power of grating
6. Write a short note on Malus law
7. Write a short note on Brewster's law
8. Distinguish between spontaneous and stimulate demission

SECTION-B

Answers **ALL** of the following questions. Each question carries 10marks.

(5X10=50)

- 9a. Explain chromatic aberration. Derive an expression for the distance between two thin lenses to eliminate chromatic aberration.

(or)

- b. what is spherical aberration. Explain methods for minimization of spherical aberration.
- 10a. Explain the formation of rings in Newton rings experiment and the determination of wavelength of monochromatic light with necessary Theory.

(Or)

- b. Explain the construction and working of Michelson interferometer-determine the wavelength of monochromatic source of radiation.

- 11a. what is a zone plate. Explain its construction and working. Write the difference between zone plate and Convex Lens

(or)



MCHIRMAN
BOARD OF STUDIES
Shri Gnanambica Degree College (A)

b. Explain the Theory of diffraction grating. How do you use it in the normal incidence method to measure the wavelength of spectral lines in the spectrum?

12a. Describe the construction and working of Nicol's prism. Explain how it is used as a polarizer and Analyser

(or)

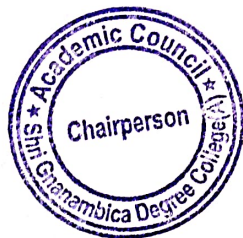
b. Define specific rotation. Explain in detail the principle and working of Laurent's half shade polarimeter.

13 a. Explain description and working of He-Ne Laser

(or)

b. What is holography? Explain principle of Holography.

M. P. J.



CHAIRMAN
BOARD OF STUDIES
Shri Gnanambica Degree College (A)
MADANAPALLE - 517 325