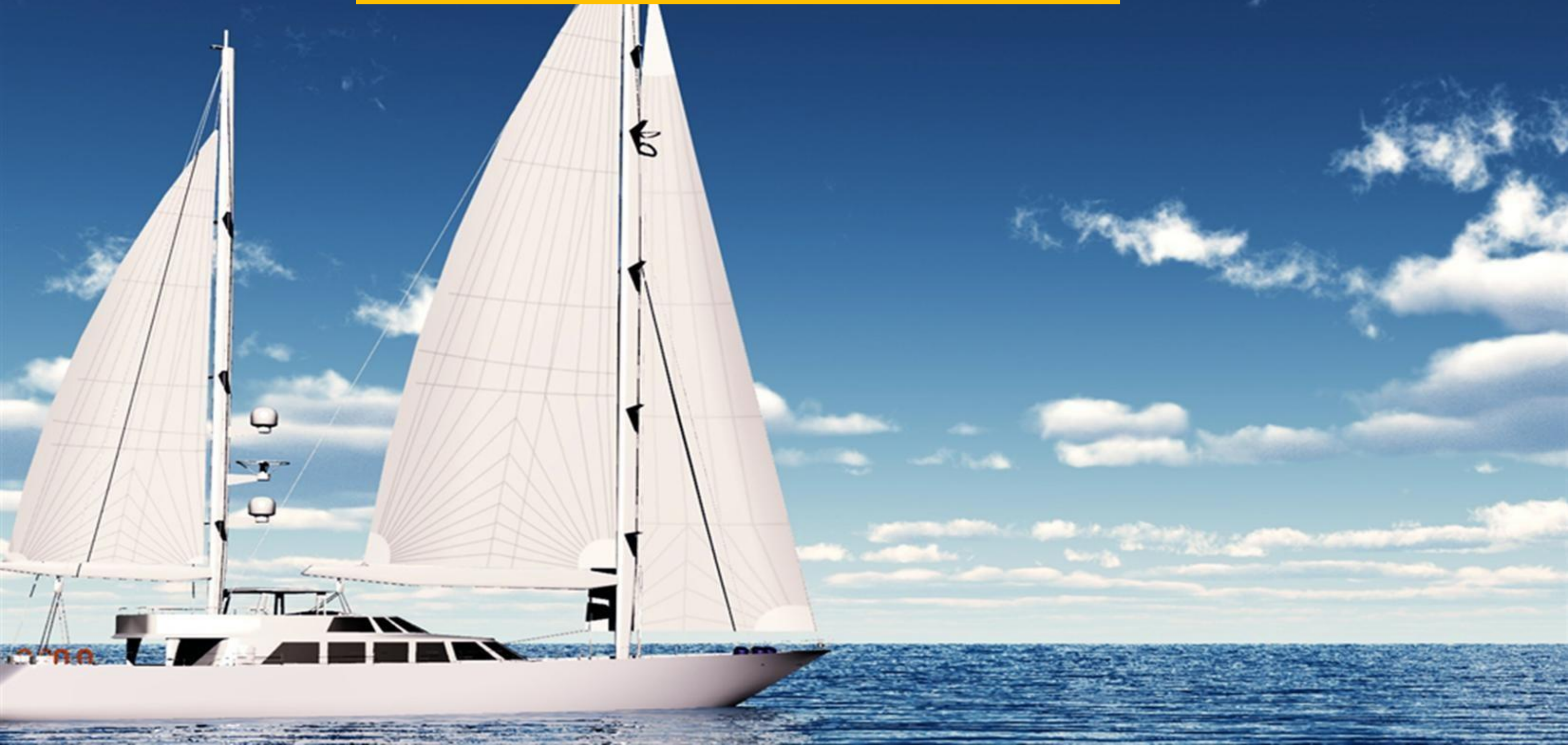
WELCOME

DEPARTMENT OF PHYSICS

SAGARDIGHI K K S MAHAVIDHYALAYA

ADD-ON COURSE:

OPTICS OF REFRACTING SYSTEMS



OPTICS OF REFRACTING SYSTEMS

PROGRAMME OUTCOME →

By the end of this course, participants will have a well-rounded understanding of geometrical optics, encompassing the matrix method, aberration correction, cardinal points, camera optics, microscopes, telescopes, and various optical instruments. This knowledge will prepare them for careers in optical design, research, and related fields.

COURSE CONTENT →

Theory:

SL NO	TOPIC	DURATION
1	**Aberration phenomena for Light:** **Seidel aberration : (only qualitative discussion) Nature and cause of different Seidel aberrations, methods of reducing these. Chromatic Aberration**	6 HOURS
2	**Fermat's Principle:** **Explaining light in context of Euler Lagrange Equation and Least** **action Principle. Application**	4 HOURS
3	**Concept of Thin Lenses.**	2 HOURS
4	**Cardinal points of an optical system:** **two thin lenses separated by a distance, equivalent lens, introduction to matrix methods in paraxial optics – simpleapplication**	4 HOURS
5	**Optical instruments:**	4 HOURS

	Field of view, entrance and exit pupil microscope, telescope, Human Eye and Development of Camera	

Practical: 10 HOURS

Verification of Len's formulas and demonstration/measurement of Aberration.

Assignment:

Thought provoking Reading project

COURSE OUTCOMES

- Understanding the lens maker's equation. Analyse image formation through thin lenses using ray diagrams and equations, giving the concepts of focal length and magnification, and applying the lens formula in various optical systems.
- Define and explain the concept of cardinal points and their significance in optical design. Apply cardinal points to analyse and optimize optical systems, including those in cameras and other instruments.
- Identify and categorize aberrations in optical systems. Develop strategies for minimizing and correcting aberrations to enhance optical performance.
- Explore the optics of cameras, including lens characteristics, image formation, and factors affecting image quality. Understand how camera optics contribute to the design and functionality of imaging systems.
- Gain insights into the optical principles underlying microscope, telescope functionality. Analyse their configurations, magnification, and resolution for various applications in astronomy and other fields.
- Design optical systems for various instruments, considering specific requirements and constraints. Integrate theoretical knowledge with practical considerations for optimal instrument performance.
- Apply learned concepts to real-world scenarios in scientific research, medical imaging, and other practical applications. Demonstrate an understanding of how geometrical optics is crucial in various industries.
- Engage in laboratory experiments to reinforce theoretical concepts. Gain practical experience in using and aligning optical instruments.
- Recognize the interdisciplinary nature of optics and its integration with physics, engineering, and other scientific disciplines. Explore how optical principles are applied in diverse fields, from healthcareto astronomy.
- Effectively communicate complex optical concepts and solutions. Present findings and analyses in a clear and articulate manner, both in writing and orally.

Details of the course -

1) Advanced Excel and Dashboarding

Duration - 30 hours.

Credits - 2

Exam pattern:

PARTICULARS	***MARKS***
Assessment 1	60 Marks
Total	60 Marks

Course Co-ordinator -***MR. SUDIPTA CHAKRABORTY (Head of the Department)***

Reference Books:

1. **Fundamentals of Optics - F. A. Jenkins and H. E. White (Mc Graw Hill, Kogakusha).**
2. **Geometrical and Physical Optics - B. S. Longhurst (Orient Longmans).**
3. **Optics – A. K. Ghatak (Tata Mc Graw Hill).**