DIPLOMA IN APPLIED PHYSICS

Programme: *Diploma in Applied Physics*	**Year: II**	**Semester: IV Paper-I**

Subject: Physics

Course Code:	**Course Title: Geometrical Optics**

Course Outcomes:

1. Study of Fermat's Principle of Extremum Path and understand fundamental physics behind reflection and refraction of light.
2. Understand the theory of image formation by an optical system.
3. Study of different types of optical Aberrations and techniques for their reduction.
4. Study of different types of optical instruments used in industry and research

Credits: 04	**Core Compulsory**
Max. Marks: 100 **External Exam: 75** **Internal Assessment: 25**	**Min. Passing Marks: 33**

Total No. of Lectures-Tutorials-Practical (in hours per week): 4-0-0

Unit	Topic	No. of Lectures
Unit I	**Fermat's Principle and its application**: Basics of Geometrical optics, Fermat's principle of extremum path and its application to deduce laws of reflection and refraction, Fermat's principle and refraction at concave surface, Principal foci, Lateral and longitudinal magnifications, Aplanatic points and planes of spherical surface.	**10**
Unit II	**Theory of image formation**: Gauss's general theory of image formation, Coaxial symmetrical system, Thick and Thin lens, lens combinations, Newton's formula, Coaxial lens system, Lagrange's equation of magnification, Refraction through a thick lens. Matrix theory of image formation: Translation, refraction and system matrix, System matrix for thick lens, System matrix for a combination of two thin lenses.	**15**
Unit III	**Cardinal Points and Eyepieces**: Cardinal points and planes of an optical system, Construction of the image using cardinal points, Cardinal points of a thick Lens, Construction of Eyepiece, Its advantages over single lens, Types of Eyepieces: Kellner's, Ramsden, Huygens and Gaussian eyepieces, their comparison. Cardinal points of different types of eyepieces.	**15**
Unit IV	**Optical Aberrations**: Theory of Dispersion, angular dispersion, dispersive power, Monochromatic aberrations: Spherical aberration, Coma, Astigmatism, Curvature of field, Distortion, Techniques for the reduction of monochromatic aberrations, Chromatic aberration, Condition of achromatism, Achromatic combination of lenses in contact and separated lenses, Circle of least chromatic aberration, corrector plates.	**10**
Unit V	**Related Instruments:** Nodal Slide, Astronomical telescopes, Types of telescopes, Reflecting and refracting telescope, Different types of telescopes: Gregory, Cassegrain, Coude , Plate scale of a telescope, Resolution of telescope, Compound microscope: principle and types, Spectrometer and its uses, Oil immersion objectives meniscus lens.	**10**

Suggested Reading

1. D.P. Khandelwaland : Optics and Atomic Physics
2. Jenkins and White : Fundamentals of Optics
3. A.K. Ghatak : Physical Optics
4. Brijlal and Subrahmanyam : Optics
5. K.D. Moltev : Optics
6. B. K. Mathur : Optics
7. B. D. Guenther : Modern Optics, Oxford Press
8. E. Hecht: Optics, Pearson.

Suggested Online Link:

1. MIT Open Learning - Massachusetts Institute of Technology, https://openlearning.mit.edu/
2. National Programme on Technology Enhanced Learning (NPTEL), https://www.youtube.com/user/nptelhrd
3. SwayamPrabha - DTH Channel, https://www.swayamprabha.gov.in/index.php/program/current_he/8

Suggested equivalent online courses:

Suggested Continuous Evaluation (25 Marks):

Continuous internal evaluation shall be based on allotted assignment and class tests. The marks shall be as follows:

Assignment (05 marks)

Class Test/Assignment (25 marks)

Course Prerequisite: As per the university ordinance.

DIPLOMA IN APPLIED PHYSICS		
Programme: ***Diploma in Applied Physics***	**Year: II**	**Semester: IV Practical**
Subject: Physics (Practical)		
CourseCode:	**Course Title:** Demonstrative Aspects of Geometrical Optics (Practical)	

Course Outcomes:

1. Experimental physics has the most striking impact on the industry wherever the instruments are used tostudy and determine the optical properties.

2. Measurement precision and perfection is achieved through Lab Experiments.

Credits: 02	**Core Compulsory**
Max. Marks: 50 **Internal (Record File): 15** **External Practical Exam: 20** **External Viva Voce: 15**	**Min. Passing Marks:17**

Total No. of Lectures-Tutorials-Practical (in hours per week): 0-0-4

Unit	Topic	No. of Lectures
	Lab Experiment List	
	1. Nodal slide assembly, Location of cardinal points of lens system. 2. Newton's formula. 3. Dispersive power of prism. 4. Resolving power of a telescope. 5. To determine the Resolving Power of a Prism. 6. To verify the Cauchy's dispersion formula. 7. To find the thickness of the wire using optical bench. 8. To determine the thickness of mica-sheet by using Biprism	**60**

Suggested Readings:

1. B.L. Worsnop, H.T. Flint, "Advanced Practical Physics for Students", Methuen & Co., Ltd., London, 1962.
2. S. Panigrahi, B. Mallick, "Engineering Practical Physics", Cengage Learning India Pvt. Ltd., 2015.
3. Indu Prakash, Practical Physics
4. S.L. Gupta, V. Kumar, "Practical Physics", PragatiPrakashan, Meerut, 2014.