AMITY UNIVERSITY
UTTAR PRADESH

Course Title: Optical Component and Basic Instrumentation

L	T	P/S	SW/FW	TOTAL CREDIT UNITS
3	1	0	0	4

Credit Units:4

Course Level:PG **Course Code: TELE715**

Course Objectives: Aim of this course is to trained the students in fundamental and advance optical component and basic instrumentation.

Pre-requisites: Optics and Lasers.

Course Contents/Syllabus:

	Weightage (%)
Module I: Basics of Optics	**20**
Generation of light: Thermal, non-thermal and semiconductor light sources. Measurement of light; photometry, colorimetry and instrumentation, Properties and propagation of light; The Ray Optics, Wave Optics, and Electromagnetic Optics; Basics of interference, diffraction and polarization of light.	
Module II: Reflecting and Refracting Optical Components	**20**
Reflecting components, plane, spherical, paraboloidal, phase conjugated, dielectric multilayer and digital micro mirrors, AR-coatings, total internal reflection. Refracting components; Converging, diverging and combination of lenses, Design analysis and image formation by lenses, and micro-lenses, Eyepices: Huygens, Ramsden, and special eyepieces; Prisms.	
Module III: Diffracting and Polarization Optical Components	**20**
Diffracting components; diffraction by single/ multiple/openings, types of gratings and fabrication techniques, gratings produced by acousto-optics, and electro-optics, and diffractive optical elements, Polarizing components; Polarization by reflection, and double refraction, birefringence crystals, and polarization based liquid-crystal optical devices. Wavefront aberrations; Monochromatic (Seidel), and chromatic aberrations, optical and modulation transfer function.	
Module IV: Optical Instruments	**40**
Optical instruments: Microscopes; simple, compound phase contrast and confocal microscopes. Telescopes; Refracting, reflecting, interferometric telescopes. Interferometers; two- beam, multiple-beam, and shearing interferometers, Spectrum measuring instruments; Spectrometers/ monochromators, Spectrophometers, and Spectro-radiometers, and Fourier transform spectrometers (FTIR-spectrometers), Detectors: Photodetectors, photo-multiplier tubes, multi-channel plates, image intensifiers, CCD and CMOS detectors, IR-detectors.	

Student Learning Outcomes: After completion of course, students will be able:

- To explain the fundamentals of instruments based on optical phenomenon.
- To describe the working of optical components in various instruments.

To explain the applications of various types of optical components in instruments.

Pedagogy for Course Delivery: Delivery of lectures with class notes followed by presentations and uploading course material on Amizone

Lab/ Practicals details, if applicable: NA

Assessment/ Examination Scheme:

Theory L/T (%)	**Lab/Practical/Studio (%)**	**Total**
100%	NA	100

Theory Assessment (L&T):

Continuous Assessment/Internal Assessment					**End Term Examination**
Components (Drop down)	Class Test	Home Assignment	S/V/Q	Attendance	End Term Examination
Weightage (%)	**Weightage (%)**	10%	10%	5%	5%

Text Reading & References:

1. Ghatak & Thyagarajan, Optical Electronics, Cambridge University Press.

2. A. Yariv Saunders , Quantum Electronics, (Wiley).

3. S. Nagabhushana & N. Sathyanarayana, Lasers and Optical Instrumentation, I. K. International Pvt Ltd.

4. Benjamin King Johnson, Optics and Optical Instruments, Courier Dover Publications.