



**Course Title:** Laser based Instrumentation

**Credit Units:**4

**Course Level:** PG

**Course Code:** TELE705

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

**Course Objectives:** To teach the fundamentals of laser based instruments and their applications in various field

**Pre-requisites:** Optics and Lasers

**Course Contents/Syllabus:**

	<b>Weightage (%)</b>
<b>Module I: Fundamentals of laser instruments</b>	<b>20</b>
Fundamental characteristics of laser, three level and four level lasers, properties of lasers, laser modes, resonator configuration, Q-switching and mode locking, cavity dumping types of Laser-gas laser, solid laser, liquid laser, semi conductor laser.	
<b>Module II: Lasers in measurements and testing</b>	<b>20</b>
Laser for measurement of distance, length, velocity, acceleration, current, voltage, and atmospheric effect , Laser application in Spatial Frequency Filtering Holography :Basic principle; methods; Holographic interferometry and applications; Holography for non-destructive testing-Holographic components.	
<b>Module III: Industrial Application</b>	<b>20</b>
Lasers in Industry-Applications in Material processing, Laser Welding, Hole drilling, Laser Cutting, Laser Tracking, Medical applications of lasers :Medical applications of lasers; laser and tissue interaction-Laser instruments for surgery.	
<b>Module IV: Laser Speckle</b>	<b>20</b>
Applications of laser speckles, Lengths, displacement and shape measurement; laserheterodyne, two-wavelength or multiplewavelength and phaseshifting interferometry, Velocity measurement.	
<b>Module V: LIDAR</b>	<b>20</b>
Laser Doppler and particle image velocimetry, Laser remote sensing: Different types of LIDARs (Light Detection And	

Ranging), and Applications; Laser alignment, gaging inspection and Laser machine vision, Industrial laser systems and instrumentation, beam delivery systems; and applications Temperature measurement techniques	
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**Student Learning Outcomes:**

After completion of course, students will be able:

- To explain the fundamentals of instruments based on lasers.
- To describe the working of lasers in measurements and instruments.
- To explain the working principle of various types of lasers in different field.

To participate in the group discussion of different applications of laser 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 (%)	10%	10%	5%	5%	70%

**Text Reading:**

1. John and Harry, Industrial lasers and their applications, McGraw Hill,
2. John F Ready, Industrial applications of lasers. Academic press, 1978.
3. Jasprit Singh, Semi conductor Optoelectronics, McGraw Hill, 1995.