Course Number and Name

BEE022 & Fiber Optics and Laser Instrumentation

Credits and Contact Hours

3 & 45

Course Coordinator's Name

Mr.Uma Mageshwaran

Text Books and References

- 1. J.M. Senior, "Optical Fiber Communication Principles and Practice", Prentice Hall of India,1 st edition,1985.
- 2. J. Wilson and J.F.B. Hawkes, 'Introduction to Opto Electronics', Prentice Hall of India, 2ndEdition,2001.

Course Description

To contribute to the knowledge of Fiber optics and Laser Instrumentation and its Industrial and Medical Application.

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Prerequisites	Co-requisites
Control System	Nil
required, elective, or selected elective (as per Table 5-1)	
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Required

Course Outcomes (COs)

CO1: To expose the students to the basic concepts of optical fibers and their properties

CO2: To provide adequate knowledge about the Industrial applications of optical fibers

CO3: To expose the students to the Laser fundamentals

CO4: To provide adequate knowledge about Industrial application of lasers.

CO5: To provide adequate knowledge about holography and Medical applications of Lasers.

Student Outcomes (SOs) from Criterion 3 covered by this Course COs/ i k 1 j g **POs** Η L L CO₁ Н M M Η M M M CO₂ Η Η L L M M Η Η M M CO3 Н L Η M Η M Н L M CO4 Η M Η Η M Η L L M CO₅ Н Η Η Н L L M M M M

List of Topics Covered

UNIT I OPTICAL FIBRES AND THEIR PROPERTIES

Principles of light propagation through a fiber - Different types of fibers and their properties, fiber Characteristics - Absorption losses - Scattering losses - Dispersion - Connectors and splices - Fiber termination - Optical sources - Optical detectors.

UNIT II INDUSTRIAL APPLICATION OF OPTICAL FIBRES 9

Fiber optic sensors – Fiber optic instrumentation system – Different types of modulators – Interferometric method of measurement of length – Moire fringes – Measurement of pressure, temperature, current, voltage, liquid level and strain.

UNIT III LASER FUNDAMENTALS

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Fundamental characteristics of lasers – Three level and four level lasers – Properties of laser – Laser modes – Resonator configuration – Q-switching and mode locking – Cavity damping – Types of lasers – Gas lasers, solid lasers, liquid lasers, semiconductor lasers.

UNIT IV INDUSTRIAL APPLICATION OF LASERS

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Laser for measurement of distance, length, velocity, acceleration, current, voltage and Atmospheric effect – Material processing – Laser heating, welding, melting and trimming of material – Removal and vaporization.

UNIT V HOLOGRAM AND MEDICAL APPLICATIONS

Holography – Basic principle - Methods – Holographic interferometry and application, Holography for non-destructive testing – Holographic components – Medical applications of lasers, laser and tissue interactive – Laser instruments for surgery, removal of tumors of vocal cards, brain surgery, plastic surgery, gynecology and oncology.