U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

January / February 2025 Semester End Main Examinations

Programme: B.E. **Semester: VI**

Branch: Electronics and Instrumentation Engineering **Duration: 3 hrs.**

Course Code: 22EI6PCLOI **Max Marks: 100**

Course: Laser and Optical Instrumentation

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

			MODULE - I	CO	PO	Marks
1	a)		Discuss any four special characteristics of Laser.	CO1	PO1	**04**
	b)		With help of energy level diagram, explain the construction and working of Ruby Laser.	CO1	PO1	**08**
	c)		What is Mode Locking? Explain about active mode locking and passive mode locking.	CO1	PO1	**08**
			OR			
2	a)		Explain the construction and working of a He-Ne laser.	CO1	PO1	**10**
	b)		What is Q-Switching? Discuss in detail any one Q-switching Technique.	CO1	PO1	**06**
	c)		Differentiate between spontaneous and stimulated emission.	CO1	PO1	**04**
			MODULE - II			
3	a)		With necessary block diagram and equations, explain distance measurement using Pulse Echo Technique (Time - of flight).	CO2	PO2	**10**
	b)		Write a short note on the following: i) Laser welding ii) Laser machining.	CO2	PO2	**10**
			OR			
4	a)		Define Holography. Holography used to store the 3D images in hologram. Justify the statement.	CO2	PO2	**10**
	b)		With relevant diagram discuss the Laser Doppler velocimetry to measure velocity of fluid.	CO2	PO2	**10**
			MODULE - III			
5	a)		Briefly explain the basic principle of Optical Fibre? Also explain its types in detail.	CO2	PO1	**10**

		b)	Write a note on the following: i) Low dispersive fiber losses ii) Intermodal dispersion in optical fibers	*CO2*	*PO1*	**10**
			OR			
	6	a)	Explain graded – index fiber. Discuss how intermodal dispersion is reduced in graded – index fiber.	*CO2*	*PO2*	**10**
		b)	Discuss the following types of losses in optical fibers i) Scattering losses ii) Absorption losses	*CO2*	*PO1*	**10**
			MODULE - IV			
	7	a)	Discuss in detail the working principle of the following fiber optic sensors: i) Photo elastic pressure sensors ii) Fluro-optic temperature sensors	*CO3*	*PO1*	**10**
		b)	With a suitable diagram, explain the working principle of phase modulated fiber optic sensors.	*CO3*	*PO1*	**10**
			OR			
	8	a)	With neat diagram and equation explain Polarimetric fiber optic sensor used to measure the temperature.	*CO3*	*PO1*	**10**
		b)	Discuss the measurement of current using fiber optic sensor.	*CO3*	*PO1*	**10**
			MODULE - V			
	9	a)	Discuss the fiber optic Interferometric method used to measure the length.	*CO4*	*PO1, PO6*	**10**
		b)	With a neat diagram explain the working principle of Fiber optic Gyroscope used to measure the angular rotation.	*CO4*	*PO1, PO6*	**10**
			OR			
	10	a)	What are Fiber Bragg gratings? Explain how FBG sensors are used to measure the strain with relevant diagrams.	*CO4*	*PO1, PO6*	**10**
		b)	Describe the measurement of liquid level using fiber optic sensor.	*CO4*	*PO1, PO6*	**10**

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