U.S.N.										

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

Autonomous Institute Affiliated to VTU

April 2024 Semester End Main Examinations

Programme: B.E. **Semester: III**
Branch: Electronics and Instrumentation Engineering **Duration: 3 hrs.**
Course Code: 23EI3ESLOI **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.

			UNIT - I	*CO*	*PO*	Marks
1	a)		With a neat schematic and energy level diagram, explain the construction and working of Nd-YAG LASER.	*CO1*	*PO2*	**08**
	b)		What is Mode Locking? Explain about active mode locking and passive mode locking.	*CO1*	*PO2*	**08**
	c)		Calculate the pulse duration and pulse separation of a mode-locked laser which has a line width of **2×10^{11} Hz**. The length of the laser is 1m.	*CO1*	*PO2*	**04**
			OR			
2	a)		Discuss about construction and working of CO2 laser.	*CO1*	*PO2*	**08**
	b)		Describe how frequency stabilization is achieved in a laser diode.	*CO1*	*PO2*	**06**
	c)		Explain the rotating-mirror type Q-switching with a neat sketch.	*CO1*	*PO2*	**06**
			UNIT - II			
3	a)		With necessary block diagram, explain how an unknown distance can be measured using beam modulation telemetry technique.	*CO2*	*PO2*	**10**
	b)		Elaborate about the working principle of holography and also write a brief note on holographic computer memory.	*CO2*	*PO2*	**10**
			UNIT - III			
4	a)		Classify optical fibers based on modes and refractive index with relevant diagrams.	*CO2*	*PO1*	**08**
	b)		What is intermodal dispersion? Derive a formula for Δt_{max} , the maximum intermodal dispersion.	*CO2*	*PO2*	**07**
	c)		Explain the types of losses due to scattering in optical fibers.	*CO2*	*PO1*	**05**

			UNIT - IV			
	5	a)	Discuss the working principle of optimal gyroscope & hence derive an expression for phase shift with the aid of relevant diagram.	*CO3*	*PO1*	**10**
		b)	Discuss the working principle of the following fiber optic sensors: i) Intensity modulated sensors ii) Micro bend sensor	*CO3*	*PO2*	**10**
			OR			
	6	a)	With the help of neat diagram discus how Fiber-optics can be used in liquid-level Measurement.	*CO3*	*PO2*	**10**
		b)	Explain the principle of operation of Bragg Gratings (FBG). Sensors. With a neat diagram, explain how FBG sensors are used for strain measurements.	*CO3*	*PO2*	**10**
			UNIT - V			
	7	a)	With a neat sketch discuss the working of Mach-Zehnder optical fiber interferometer.	*CO4*	*PO2*	**10**
		b)	With an aid of diagram, discuss how temperature is measured using Michelson interferometer.	*CO4*	*PO2*	**10**

****