U.S.N.										

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

Autonomous Institute Affiliated to VTU

September / October 2023 Supplementary Examinations

Programme: B.E. **Semester: III**
Branch: Electronics and Instrumentation Engineering **Duration: 3 hrs.**
Course Code: 19EI3PCLOI **Max Marks: 100**
Course: Laser and optical Instrumentation **Date: 21.09.2023**

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

UNIT - I

1	a)	With the help of neat diagram, explain the construction and working principle of Ruby Laser with relevant energy level diagrams.	**10**
	b)	Illustrate Q-switching technique and how it's implemented in rotating mirror type.	**10**

OR

2	a)	With the help of neat diagram, explain the construction and working principle of He-Ne Laser with relevant energy level diagrams.	**10**
	b)	Discuss the need of mode locking and the method of mode locking using EO switch method.	**10**

UNIT - II

3	a)	"Holography is a technique that records the light scattered from an object and subsequently at a later time, reconstructs the object's image", justify this statement using relevant diagrams.	**10**
	b)	Write a note on various laser machining process and also high light the main advantages of laser machining methods.	**10**

UNIT - III

4	a)	Discuss the basic optical communication system and mention advantages of optical communication system over conventional communication system.	**05**
	b)	Calculate the number of allowed modes in a fibre which has a core refractive index of 1.53 and cladding refractive index of 1.50. Vacuum wavelength of incident ray is 1.3μm. Core has diameter of 200μm.	**04**
	c)	Discuss the working of P-N junction Photo detector with the help of its characteristics and equivalent circuit diagram.	**05**
	d)	Discuss absorption losses and bending losses mechanism in optical fibre.	**06**

UNIT - IV

5	a)	Discuss the passive multimode mode fibre optic sensor to measure displacement.	**06**
	b)	With a neat diagram explain the basic operation of the fluro-optic temperature sensor.	**06**
	c)	Explain how strain measurement is done using fibre Bragg grating sensor.	**08**

OR

6	a)	Distinguish between plane polarization, elliptical polarization and circular polarization.	**06**
	b)	Discuss the basic principle of measuring temperature based on variation of wavelength and black body radiation using fibre optic temperature sensor.	**06**
	c)	Illustrate how pressure can be measured using Fabry-Perot interferometer setup with an aid of relevant diagrams.	**08**

UNIT - V

7	a)	"Industry frequently needs to measure liquid levels in tanks and other large containers" using optic fibre for measuring liquid level has great advantages over other methods, - justify this statement and discuss the operating principle of measuring liquid level.	**06**
	b)	Explain the operating principle of fibre optic gyroscope. Derive an expression for phase shift and also mention its applications.	**08**
	c)	Discuss the measurement of temperature using Michelson Interferometer method.	**06**

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