

Model Question Paper -1 with effect from 2020-21(CBCS Scheme)

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Fifth Semester B.E. Degree Examination Laser and Optical Instrumentation

TIME: 03 Hours

Max. Marks: 100

- Note: 01. Answer any **FIVE** full questions, choosing at least **ONE** question from each **MODULE**.
02.
03.

Module – 1			
Q.1	(a)	What is population inversion? Explain about the attainment of population inversion.	10
	(b)	Derive an equation that establishes the relationship between the Einstein Coefficients	10
OR			
Q.2	(a)	Explain about the Axial mode and Transverse mode operation of LASER	10
	(b)	With a neat schematic and energy level diagram, explain the construction and working of Nd-YAG LASER	10
Module – 2			
Q.3	(a)	What is Mode Locking? Explain about active mode locking and passive mode locking	10
	(b)	With necessary block diagram, explain how an unknown distance can be measured using Beam Modulation Telemetry technique.	10
OR			
Q.4	(a)	With necessary block diagram, explain about distance measurement using Pulse Echo Technique	10
	(b)	With neat schematic diagrams, explain about the construction and reconstruction of hologram using interference method.	10
Module – 3			
Q.5	(a)	Mention the advantages of optical fibers over copper wires	5
	(b)	With a neat schematic explain about the key elements of optical fiber systems	10
	(c)	Explain the concept of Wavelength Division Multiplexing [WDM]	5
OR			
Q.6	(a)	Explain about the basic laws of Reflection and Refraction	4
	(b)	With necessary sketches and equations, Illustrate the wave representation in a Dielectric Slab Waveguide	6
	(c)	Define single mode and multimode fibers? Explain. List the advantages of multimode fibers over single mode fibers. Distinguish between step index and graded index fibers.	10
Module – 4			
Q.7	(a)	Explain about the glass and plastic fiber materials	8
	(b)	With a neat schematic diagram, explain about general configuration of the fiber structure	6
	(c)	With a neat schematic diagram, explain the construction and working of Fiber drawing apparatus	6

OR			
Q.8	(a)	Define amplifier noise. Explain about various system applications of optical amplifiers	10
	(b)	With necessary schematic diagram explain about the construction and operation of Raman Amplifiers	10
Module – 5			
Q.9	(a)	Discuss application of fiber optic laser system in cardiology.	10
	(b)	Discuss about the ophthalmological application of laser-fiber systems.	10
OR			
Q.10	(a)	Explain the applications of fiberoptic laser systems in orthopedics	10
	(b)	Explain the flowchart diagrams for clinical applications of laser-fiber systems	10

Table showing the Bloom's Taxonomy Level, Course Outcome and Programme Outcome				
Question		Bloom's Taxonomy Level attached	Course Outcome	Programme Outcome
Q.1	(a)	L1, L2	CO1	PO1, PO2 & PO12
	(b)	L2	CO1	PO1, PO2 & PO12
Q.2	(a)	L2	CO1	PO1, PO2 & PO12
	(b)	L2	CO1	PO1, PO2 & PO12
Q.3	(a)	L1, L2	CO2	PO1, PO2 & PO12
	(b)	L2	CO2	PO1, PO2 & PO12
Q.4	(a)	L2	CO2	PO1, PO2 & PO12
	(b)	L2	CO2	PO1, PO2 & PO12
Q.5	(a)	L1	CO3	PO1, PO2 & PO12
	(b)	L2	CO3	PO1, PO2 & PO12
	(c)	L2	CO3	PO1, PO2 & PO12
Q.6	(a)	L2	CO3	PO1, PO2 & PO12
	(b)	L2	CO3	PO1, PO2 & PO12
	(c)	L1, L2	CO3	PO1, PO2 & PO12
Q.7	(a)	L2	CO4	PO1, PO2 & PO12
	(b)	L2	CO4	PO1, PO2 & PO12
	(c)	L2	CO4	PO1, PO2 & PO12
Q.8	(a)	L1, L2	CO4	PO1, PO2 & PO12
	(b)	L2	CO4	PO1, PO2 & PO12
Q.9	(a)	L2	CO5	PO1, PO2 & PO12
	(b)	L2	CO5	PO1, PO2 & PO12
Q.10	(a)	L2	CO5	PO1, PO2 & PO12
	(b)	L2	CO5	PO1, PO2 & PO12
Lower order thinking skills				
Bloom's Taxonomy Levels	Remembering (knowledge): L_1		Understanding Comprehension): L_2	Applying (Application): L_3
	Higher order thinking skills			
	Analyzing (Analysis): L_4	Valuating (Evaluation): L_5	Creating (Synthesis): L_6	



Model Question Paper -2 with effect from 2020-21(CBCS Scheme)

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Fifth Semester B.E. Degree Examination Laser and Optical Instrumentation

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- Note: 01. Answer any **FIVE** full questions, choosing at least **ONE** question from each **MODULE**.
02.
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Module – 1			
Q.1	(a)	Explain about the concept of Line shape Function	10
	(b)	Derive the equation for Pump Rate	10
OR			
Q.2	(a)	Explain the construction and energy level diagram of the He-Ne laser.	10
	(b)	With a neat energy level diagram, explain the construction and working of CO ₂ LASER	10
Module – 2			
Q.3	(a)	What is Q-Switching? Explain how electro optic modulators can be used as fast Q-switches.	10
	(b)	Explain about frequency stabilization of LASER	10
OR			
Q.4	(a)	With necessary schematic and equations, explain about distance measurement using Pulse Echo Technique	10
	(b)	With a neat schematic diagram, explain the application of holography in computer memories. Mention its advantages and disadvantages.	10
Module – 3			
Q.5	(a)	Mention the motivations for light wave communication.	3
	(b)	With a neat sketch, explain about the Electromagnetic spectrum	7
	(c)	List and explain the standards for Optical Fiber Communications	10
OR			
Q.6	(a)	Explain about the basic law of total internal reflection	6
	(b)	With necessary sketches, explain about the polarization sensitive materials	10
	(c)	Mention the set of Maxwells Equations	4
Module – 4			
Q.7	(a)	With necessary sketches, explain about the two types of Photonic Crystal Fibers [PCF]	10
	(b)	With a neat schematic diagram, explain about Vapor-Phase Axial Deposition	10

OR			
Q.8	(a)	With necessary schematic diagram explain about the construction and operation of Erbium Doped Fiber Amplifier [EDFA].	8
	(b)	Explain about Indoor and Outdoor cable designs	12
Module – 5			
Q.9	(a)	What is angioplasty? Explain about the fiber optic laser applications in Angioplasty.	10
	(b)	Explain about the Photodynamic therapy in Oncology	10
OR			
Q.10	(a)	Explain about the application of Endoscopic Nd:YAG Laser therapy in gastroenterology	10
	(b)	Explain about laser lithotripsy	10

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	(b)	L2	CO1	PO1, PO2 & PO12
Q.3	(a)	L1,L2	CO2	PO1, PO2 & PO12
	(b)	L2	CO2	PO1, PO2 & PO12
Q.4	(a)	L2	CO2	PO1, PO2 & PO12
	(b)	L2	CO2	PO1, PO2 & PO12
Q.5	(a)	L1	CO3	PO1, PO2 & PO12
	(b)	L2	CO3	PO1, PO2 & PO12
	(c)	L1, L2	CO3	PO1, PO2 & PO12
Q.6	(a)	L2	CO3	PO1, PO2 & PO12
	(b)	L2	CO3	PO1, PO2 & PO12
	(c)	L1, L2	CO3	PO1, PO2 & PO12
Q.7	(a)	L2	CO4	PO1, PO2 & PO12
	(b)	L2	CO4	PO1, PO2 & PO12
Q.8	(a)	L1, L2	CO4	PO1, PO2 & PO12
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