Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI (NEW) EXAMINATION – SUMMER 2022

Subject Code:3161005 Date:03/06/2022

Subject Name:Fiber Optic Communication

Time:10:30 AM TO 01:00 PM Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	Define: 1) Normalized frequency of fiber, 2) Mode volume for step index fiber, 3) Mode volume for graded index fiber.	**03**
	(b)	Describe Fiber structure with neat diagram.	**04**
	(c)	Draw and Explain block diagram of Optical fiber communication, and mention functions of each block.	**07**
Q.2	**(a)**	Discuss briefly numerical aperture.	**03**
	(b)	Give the comparison of S.I. and G.I. fibers.	**04**
	(c)	Draw the diagram of index profile, fiber cross-section and ray optics for the step index and graded index mono-mode and multi-mode wave propagation. Also indicate all dimensions of fiber cross-sections.	**07**
		OR	
	(c)	The radiative and non-radiative recombination life times of minority carriers in the active region of a double heterojunction LED are 60 ns, and 100 ns respectively. Determine the total carrier recombination life time and optical power generated internally, if the peak emission wavelength is 0.87 μm, and the drive current is 40 mA.	**07**
Q.3	**(a)**	Why graded index is less affected by dispersion than step index multi-mode optical fibers?	**03**
	(b)	Explain Modal noise.	**04**
	(c)	List the types of Light Emitting Diodes used in optical system and explain any one of them with required figure.	**07**
		OR	
Q.3	**(a)**	Define the following terms related to photo detector: 1) Responsivity 2) Quantum efficiency 3) Cut-off wavelength	**03**
	(b)	Discuss the following for optical fibers: 1) Absorption 2) Rayleigh Scattering	**04**
	(c)	What are bending losses in fiber optic communication? Describe: 1) Micro bending losses. 2) Macro bending losses.	**07**
Q.4	**(a)**	List the most common type of mechanical misalignment occurring between two joined fibers. Explain in brief anyone.	**03**
	(b)	Explain following terms: 1) Power launching 2) Coupling efficiency	**04**

	(c)	Differentiate between LED and Laser.	**07**
		OR	
Q.4	**(a)**	Give importance of DFB lasers used in optical transmitters.	**03**
	(b)	Differentiate between p-i-n and avalanche photodiodes.	**04**
	(c)	Discuss optical power loss model for a point-to-point link.	**07**
Q.5	**(a)**	Discuss limitations on BER in optical transmission systems.	**03**
	(b)	Describe the principle used in the photo detector.	**04**
	(c)	Discuss with the aid of a block diagram, the function of an optical fiber receiver in communication with its components.	**07**
		OR	
Q.5	**(a)**	Discuss the Wavelength division multiplexing in brief.	**03**
	(b)	Discuss the EYE pattern diagram in brief.	**04**
	(c)	Write short notes on Synchronous optical fiber networks (SONET).	**07**

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