GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER–VI (NEW) EXAMINATION – SUMMER 2023

Subject Code:3161005   **Date:06-07-2023**
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 following terms: (1) Refractive index (2) Snell's law (3) Critical Angle	**03**
	(b)	Briefly describe the block diagram of Optical communication systems.	**04**
	(c)	Using simple ray theory, describe the mechanism for the transmission of light Within an optical fiber and show how acceptance angle is related to the fiber numerical aperture.	**07**
Q.2	**(a)**	Give the comparison of S.I and G.I fibers.	**03**
	(b)	Describe briefly the losses in optical fibers.	**04**
	(c)	An optical signal at a specific wavelength has lost 55% of its power after traversing 3.5 km of fiber. What is the attenuation in dB/km of this fiber?	**07**
		OR	
	(c)	What is dispersion in optical fiber? Classify different dispersion with reasons. Explain its effect in optical communication. How to reduce the effect of dispersion?	**07**
Q.3	**(a)**	Calculate the optical power coupled into the fiber by an optical source with a bias current of 20 mA and a forward voltage of 1.5 V. Assume an internal efficiency of the source as 2% and the coupling efficiency of 30%.	**03**
	(b)	Discuss briefly the structure of surface emitting LED with neat sketch.	**04**
	(c)	What is splicing? Explain different techniques of splicing.	**07**
		OR	
Q.3	**(a)**	Define the following terms related to photo detector. (1) Responsivity (2) Quantum efficiency (3) Cut off wavelength	**03**
	(b)	A silicon APD has a quantum efficiency of 75% at a wavelength of 900 nm. If 0.5 mw of optical power produces a multiplied photo current of 10 mA, then what is avalanche gain for this device?	**04**
	(c)	Briefly discuss the possible sources of noise in optical receivers.	**07**
Q.4	**(a)**	Give the comparison between LED and LASER.	**03**
	(b)	Explain double crucible method of fiber fabrication.	**04**
	(c)	Discuss optical power loss model for a point to point link.	**07**
		OR	
Q.4	**(a)**	What is equilibrium numerical aperture? Give the significance of the same.	**03**
	(b)	Discuss the EYE pattern diagram in brief.	**04**
	(c)	Explain Erbium Drop Power amplifiers (EDFAs).	**07**

Q.5	**(a)**	What is population inversion?	**03**
	(b)	Explain the principle of operation of Wavelength division multiplexing.	**04**
	(c)	Explain Mach-Zehnder Interferometer (MZI) Multiplexer in detail.	**07**

OR

Q.5	**(a)**	Explain the 2 x 2 fiber coupler and its function.	**03**
	(b)	Explain OTDR method with its benefits over other techniques.	**04**
	(c)	Write short notes on Synchronous optical fiber networks (SONET).	**07**

****