Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME – SEMESTER I (NEW) – • EXAMINATION – SUMMER 2016

Subject Code: 2710503 **Date:20/05/2016**

Subject Name: Fiber Optic Communication

Time:02:30 pm to 05:00 pm **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1	**(a)**	Enlist Nonlinear effects in Fiber Optic Link.	**07**
	(b)	Compare Single mode and Multimode step index fiber with neat sketch.	**07**
Q.2	**(a)**	A graded index fiber has a core with a parabolic refractive index profile which has a diameter of 50 μm. The fiber has a numerical aperture of 0.2. Estimate the total number of guided modes propagating in the fiber when it is operating at a wavelength of 1 μm.	**07**
	(b)	A GaAs injection laser has an optical cavity of length 250 μm and width 100 μm. At normal operating temperature the gain factor $\overline{\beta}$ is 21 ×10-3 A /cm3 and the loss coefficient $\overline{\alpha}$ per cm is 10. Determine the threshold current density and hence the threshold current for the device. It may be assumed that the cleaved mirrors are uncoated and that the current is restricted to the optical cavity. The refractive index of GaAs may be taken as 3.6.	**07**
		OR	
	(b)	The radiative and nonradiative recombination lifetimes of the minority carriers in the active region of a double-heterojunction LED are 60 ns and 100 ns respectively. Determine the total carrier recombination lifetime and the power internally generated within the device when the peak emission wavelength is 0.87 μm at a drive current of 40 mA.	**07**
Q.3	**(a)**	Explain Fabry perot cavity lasers and its mode with appropriate diagram.	**07**
	(b)	A multimode graded index fiber exhibits total pulse broadening of 0.1 μs over a distance of 15 km. Estimate: (a) the maximum possible bandwidth on the link assuming no intersymbol interference; (b) the pulse dispersion per unit length; (c) the bandwidth–length product for the fiber	**07**
		OR	
Q.3	**(a)**	What is dispersion? Describe Need for Dispersion management.	**07**
	(b)	Explain RAPD with necessary diagram. List advantages of RAPD over APD.	**07**
Q.4	**(a)**	Write a Short Note on Erbium Doped Fiber Amplifier.	**07**
	(b)	Write a short note on dispersion compensating fiber with necessary diagram.	**07**
		OR	
Q.4	**(a)**	What is optical Amplifier? Explain its basics and types.	**07**
	(b)	Explain Rise time budget analysis and Its impact on system bandwidth.	**07**
Q.5	**(a)**	Write a short note on Optical Isolator and Circulator.	**07**
	(b)	Explain Optical Add/Drop multiplexer with necessary diagram.	**07**
		OR	
Q.5	**(a)**	Discuss simulated Brillouin scattering with necessary diagram.	**07**
	(b)	Explain (i) Cross Phase modulation (ii) Four Wave Mixing	**07**

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