Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME Semester –I Examination Feb. - 2012

Subject code: 710405N **Date: 18/02/2012**
Subject Name: Fiber optic communication
Time: 10.30 am – 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.**

Q.1	**(a)**	A 6 km optical link consists of multimode step index fiber with a core refractive index of 1.5 and a relative refractive index difference of 1%.Estimate, (i) The delay difference between the slowest and fastest modes at the fiber output. (ii) The rms pulse broadening due to intermodal dispersion on the link. (iii) The maximum bit rate that may be obtained without substantial errors on the link assuming only intermodal dispersion (iv) The bandwidth-length product corresponding to (3).	**07**
	(b)	A point source of light is 12cm below the surface of a large body of water (n = 1.33 for water). What is the radius of the largest circle on the water surface through which the light can emerge?	**04**
	(c)	List the advantage of optical communication.	**03**
Q.2	**(a)**	With neat diagram explain the outside vapor-phase oxidation (OVPO) process of fiber fabrication.	**07**
	(b)	Explain the working principle of surface-emitting LED with neat diagram.	**07**
		OR	
	(b)	Explain the working principle of edge-emitting double-hetrojunction LED with neat diagram.	**07**
Q.3	**(a)**	Consider an LED having a minority carrier lifetime of 5ns. Find the 3-dB optical Bandwidth and the 3-dB electrical bandwidth.	**04**
	(b)	Define: (i) Snell's law (ii) Acceptance angle (iii) Critical angle	**03**
	(c)	Explain the power penalties significance in link design with due to Chirping and chromatic dispersion.	**07**
		OR	
Q.3	**(a)**	A GaAs laser emitting at 800nm has a 400-µm cavity length with a refractive index n = 3.6. If the gain g exceeds the total loss α_t throughout the range 750nm < λ < 850 nm, how many modes will exist in the laser?	**04**
	(b)	List the difference between single mode fiber and multimode fiber.	**03**
	(c)	Derive rate equation for laser diode.	**07**
Q.4	**(a)**	Explain the amplification mechanism in EDFAs.	**07**
	(b)	Explain the physical principle of avalanche photodiode.	**07**
		OR	
Q.4	**(a)**	With diagram explain Optical Time Domain Reflectometry	**07**
	(b)	Write a short note on Raman amplifiers.	**07**

Q.5	**(a)**	Explain any one method for optical dispersion measurement.	**07**
	(b)	Write a short note on WDM.	**07**

OR

Q.5	**(a)**	Describe briefly the losses in optical fibers.	**07**
	(b)	What is Soliton? Explain Soliton transmitter in detail.	**07**

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