Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – II • EXAMINATION – WINTER • 2014

Subject code: 1710405 Date: 09-12-2014

Subject Name: Fiber Optic Communication

Time: 02:30 pm - 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)**	**Explain The Following** (1) External Reflection (2) DWDM (3) MDF (4) PMD (5)GVD (6)Fiber Birefringence (7) Basic SONET Frame Structure (8) SOLOTION	**08**
	(b)	**Answer The Following** (1) Optical bandwidth is higher compared to electrical bandwidth. Why? (2) ITU specify channel spacing in terms of frequency not wavelength. Why? (3) Write down conditions to propagate light into optical fiber.	**06**
Q.2	**(a)**	Enlist the Advantages of optical fiber communication.	**07**
	(b)	Enlist optical fiber losses. Explain one of them.	**07**
		OR	
	(b)	A Graded index fiber has a core with a parabolic refractive index profile which has a diameter of 50µm.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 1µm.	**07**
Q.3	**(a)**	**Compare following** (1) LED-LASER (2) APD-PIN photo detector	**06**
	(b)	An InGaAs pin photodiode has the following parameters at a wavelength of 1300nm: I_D=4nA, ɖ=0.90, R_L=1000Ý and the surface leakage current is negligible. The incident optical power is 300nW (-35dBm), and the receiver bandwidth is 20MHz.Find various noise currents of the receiver.	**08**
		OR	
Q.3	**(a)**	Enlist key system requirements in analyzing point to point link. Also Calculate Rise Time Budget.	**08**
	(b)	A Double-Hetero junction InGaAsP LED emitting at a peak wavelength of 1310nm has radiative and non radiative recombination times of 30 and 100ns,respectively.The drive current is 40mA.Find (1) Bulk Recombination lifetime (2) Internal Quantum efficiency (3) Internal power	**06**
Q.4	**(a)**	Explain key features of WDM system	**07**

	(b)	A 2×2 biconical tapered fiber coupler has an input optical power level of P_0=200µW.The output powers at the other three ports are P_1=90µW,P_2=85µW and P_3=6.3nW.Find (1) Coupling Ratio (2) Excess loss (3) Insertion losses (4) Crosstalk	**07**
		OR	
Q.4	**(a)**	Enlist components and its relevant system parameters of WDM system	**07**
	(b)	A 32×32 single mode coupler made from a cascade of 3-dB fused fiber 2×2 couplers, where 5 percent of the power is lost in each element. Find (1) Excess loss (2) Splitting loss (3) Total Loss	**07**
Q.5	**(a)**	Compare SOAs and DFAs	**07**
	(b)	Explain Eye pattern measurement technique	**07**
		OR	
Q.5	**(a)**	Enlist non-linear effects in fiber optic link	**07**
	(b)	Enlist performance measurement parameters in WDM link	**07**

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