GUJARAT TECHNOLOGICAL UNIVERSITY
PDDC - SEMESTER–V • EXAMINATION – WINTER • 2014

Subject Code: X 51102   **Date: 02-12-2014**
Subject Name: Optical 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)** Draw the block diagram of an optical communication system. Also explain the advantage of the optical communication.   **07**

(b) Explain the following terms with reference to optical communication: **07**
1) Refractive Index.
2) Snell's Law.
3) Skew Ray.
4) Acceptance Angle.
5) Numerical Aperture.
6) Optical Dispersion.
7) Cutoff Wavelength.

Q.2 **(a)** Solve the followings   **07**
1) A signal of 100 mW is injected into a fiber. The signal detected at the other end is 40 mW. What is the loss in dB?
2) A 2 km length of fiber has an input power of 20 mW and an output power of 150 µW. What is its loss in dB/km? Also express this loss in dBm.

(b) Describe briefly the losses in optical fibers.   **07**

OR

(b) A glass clad fibre is made with core glass of refractive index 1.5 and the cladding is doped to give a fractional index difference of 0.0005.   **07**
Find
1) The cladding index.
2) The critical internal reflection angle.
3) The numerical aperture.

Q.3 **(a)** Discuss briefly the fabry parrot resonator cavity LASER with neat sketch.   **07**

(b) A graded index fiber with a parabolic refractive index profile core has a refractive index at the core axis of 1.5 and a relative index difference of 1%. Estimate the maximum possible core diameter which allows single mode operation at a wavelength of 1.3 µm.   **07**

OR

Q.3 **(a)** Explain pulse broadening in graded-index fiber. Also explain how graded Index profile reduces the dispersion.   **07**

(b) List the different types of lensing schemes used in optical system and explain it.   **07**

Q.4 **(a)** Discuss Optical fiber splicing techniques in detail.   **07**

(b) Explain the working of Avalanche Photodiode detector with neat sketches and relevant mathematical expressions.   **07**

OR

Q.4 **(a)** Classify the optical amplifier and explain any one in brief.   **07**

	(b)	Describe key system requirements needed for analyzing point to point link. Discuss the component selection for the same based on the characteristics of the components.	**07**

Q.5 **(a)** Explain block diagram of optical receiver. **07**

(b) Write a short note on **07**
1) Optical couplers.
2) Optical circulators.

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OR

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Q.5 **(a)** Write detail note on synchronous optical network (SONET). **07**

(b) Describe the insertion loss method for optical attenuation measurement. **07**

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