Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– VI• EXAMINATION–SUMMER 2015

Subject code: 161005 **Date:12/05/2015**

Subject Name: Optical 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.**

Q.1 **(a)** Explain any seven advantages of optical fiber communication. **07**

(b) With figure explain double crucible arrangement for drawing fibers from molten glass. **07**

Q.2 **(a)** Define:(1) Phase velocity **07**
(2) Group Velocity.
(3) Skew rays
(4) Total internal reflection
(5) Normalized frequency of fiber.
(6) Mode volume for step index fiber
(7) Mode volume for graded index fiber

(b) Explain the three key transition processes involved in laser action. **07**

OR

(b) A multimode step index fiber with a core diameter of 80 µm and a relative index difference of 1.5% is operating at a wavelength of 0.85 µm. If the core refractive index is 1.48,calculate: **07**
(i) Normalized frequency of fiber
(ii) Total number of guided modes.

Q.3 **(a)** Describe linear scattering losses in detail. **07**

(b) Explain Non linear scattering losses in detail. **07**

OR

Q.3 **(a)** What are bending losses in fiber optic communication? Describe: **07**
(1) Micro bending losses. (2) Macro bending losses.

(b) With neat diagram explain modified chemical vapor deposition(MCVD) Technique of fiber fabrication. **07**

Q.4 **(a)** What is dispersion in fiber optic communication? Describe: **07**
(1) Material dispersion (2) Wave guide dispersion

(b) A silica optical fiber with a core diameter large enough to be considered by ray theory analysis has a core refractive index of 1.50 and a cladding refractive index of 1.47 Determine : **07**
(1)The critical angle at the core cladding interface.
(2)The N.A. for the fiber
(3)The acceptance angle in air for the fiber.

OR

Q.4 **(a)** With figure explain the plasma activated chemical vapor deposition (PCVD) technique for the production of optical fiber. **07**

Q.4 **(b)** Draw and explain the schematic of an edge-emitting double heterojunction **07**

LED.

Q.5	**(a)**	With figures explain the classification of fiber couplers briefly.	**07**
	(b)	The radiative and non radiative recombination life times of minority carriers in the active region of a double hetrojunction LED are 60ns and 100 ns respectively. Determine the total carrier recombination life time and optical power generated internally, if the peak emission wavelength is 0.87µm, and the drive current is 40 mA.	**07**

OR

Q.5	**(a)**	Make a comparison of LED and LASER diode as a light source in fiber optic communication.	**07**
	(b)	With necessary diagrams explain the operation of p-n photo diode in detail.	**07**

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