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Roll No.

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(ECE) (Sem.-7,8) OPTICAL FIBER COMMUNICATIONS Subject Code : EC-404 Paper ID : [A0329]

Time: 3 Hrs.

Max. Marks : 60

31.06

INSTRUCTION TO CANDIDATES :

- 1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
- 2. SECTION-B contains FIVE questions carrying FIVE marks each and students has to attempt any FOUR questions.
- 3. SECTION-C contains THREE questions carrying TEN marks each and students has to attempt any TWO questions.

SECTION-A

1. Write briefly :

- a) List properties of optical detectors.
- b) Draw the layer diagram of p-i-n photodiode.
- c) Taking suitable example explain Snell's law.
- d) A single mode fiber has refractive index of 1.47 and a radius of 4.3 μ m. The relative index difference is 0.20%.Find out the value of cutoff wavelength.
- e) How Group velocity dispersion affect performance of optical communication?
- f) List some factor which determine need of optical fiber communication.
- g) Discuss importance of total internal reflection in optical communication.
- h) Why graded index fiber has higher transmission bit rate than multimode step index fiber?
- i) Differentiate between connectors and splices.
- j) Explain laser characteristics.

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SECTION-B

- 2. What are basic requirements of WDM system?
- 3. Which of the dominant nonlinear phenomenon limits the system performance in a long haul system? Also analyze combined effects of GVD and SPM.
- 4. What do you understand by double hetero structure? Draw schematic diagram of an edge emitting DH LED.
- 5. Differentiate between spontaneous emission and stimulated emission.
- 6. A step index fiber in air has a numerical aperture of 0.16, core refractive index 1.45 and core diameter 60 μm. Determine normalize frequency for the fiber.

SECTION-C

- 7. Explain the following mechanism associated with in optical fiber communication :
 - a) Quantum shot noise
 - b) Avalanche excess noise
 - c) Fiber mode partition noise
 - d) Thermal noise
- 8. a) Describe with aid of suitable diagram the mechanism giving the emission of light from the LED.
 - b) Discuss the properties of LED in relation to its use as an optical source for communication.
- 9. a) Describe the mechanism of emission of light from light emitting diode.
 - b) A double hetero junction In GaAsP LED operating at 1310 nm has radiative and non-radiative recombination times of 30 and 100 ns. The injected current is 40 mA. Calculate bulk recombination life time, Internal quantum efficiency and Internal power level.