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Total No. of Pages : 02

Total No. of Questions : 08

**M.Tech.(ECE) (Sem.-2)**  
**OPTICAL COMMUNICATION SYSTEMS**  
**Subject Code : EC-507**  
**M.Code : 36208**

Time : 3 Hrs.

Max. Marks : 100

**INSTRUCTION TO CANDIDATES :**

1. Attempt any FIVE questions out of EIGHT questions.
2. Each question carries TWENTY marks.

1.
  - a. Explain the main components of fiber optics communication system with the help of suitable block diagram.
  - b. Explain the basic principle of light propagation in optical fiber. (12+8)
2.
  - a. Differentiate between multimode and single mode fiber.
  - b. Differentiate between elastic and inelastic scattering. Classify Raman scattering, Rayleigh scattering, and Brillouin scattering under elastic and inelastic scattering. Explain any two of them. (5+15)
3.
  - a. Discuss the requirement for population inversion in order that stimulated emission may dominate over spontaneous emission.
  - b. Derive the relationship between the electrical and optical bandwidth for a LED. (8+12)
4.
  - a. Discuss the two approaches used for coupling maximum source power into the optical fiber.
  - b. Draw a block diagram of a digital optical receiver showing its various components. Explain the function of each component. (8+12)
5.
  - a. A photodiode has a quantum efficiency of 75% when photons of energy  $2.5 \times 10^{-19}$  J are incident upon it. Calculate the wavelength at which photodiode is operating. Also calculate the incident optical power required to obtain a photocurrent of 7.5  $\mu$ A from the same photodiode.

- b. Explain the detection process in avalanche photodiode. Enlist some of its advantages and drawback compared to other photodiodes. (10+10)
- 6.
  - a. Discuss the three possible applications of optical amplifiers in lightwave systems.
  - b. Explain the gain mechanism in Erbium-Doped Fiber Amplifiers (EDFAs). (10+10)
- 7. What is the need for dispersion management? Discuss the prechirp technique used for dispersion compensation. Also draw its schematic. (20)
- 8. Write short notes on :
  - a. Star couplers
  - b. Optical cross-connects
  - c. Fiber solitons (7+7+6)

**NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.**