Roll No. | | | | | | | | | | | | 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 2.5×10^{-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 μA 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.