Roll No. ..... **Total Pages : 2**

BT-7/M-21 **47010**

OPTICAL COMMUNICATION

Paper–ECE-405 E

Time allowed : 3 Hours **Maximum Marks : 100**

Note : Attempt **five** questions in all, selecting at least **one** question from each unit. All questions carry equal marks.

UNIT-I

1. (i) What do you mean by Numerical Aperture? What is the difference between Numerical Aperture for Meridional Rays and Skew Rays? Find out the relationship between Numerical Aperture, Critical Angle and Acceptance Angle. 10

   (ii) What is V number? How it helps in describing the number of modes propagating in a fiber? Differentiate between single mode and multimode fibers. Also give expression to calculate number of modes propagating in a fiber. 10

2. (i) What are the different types of fibers based on Refractive Index? Explain the Ray propagation through fibers with the help of Ray diagram through the different types of fibers 10

   (ii) Explain in detail, with the help of diagram, the process of electrical arc fusion splicing. 10

UNIT-II

3. (i) What is Attenuation? Write the expression for Attenuation. What are the reasons responsible for internal absorption in optical fiber? 10

   (ii) Explain the reasons for linear scattering losses and bending losses in an optical fiber. 10

4. Explain in brief the process and effects of dispersion. Derive the expression for spreading in a pulse due to intermodal dispersion. 20

UNIT-III

5. (i) Illustrate with the help of energy band diagram, the process of light emission in lasers. Why is population inversion necessary to achieve raising action? Explain how population inversion is achieved in semiconductor injection laser? 10

(ii) Describe, with the help of diagram, how optical confinement can be achieved in double heterojunction laser structure? 10

6. Explain the construction and working principle of Avalanche Photodiodc. Also explain the impact ionization process in Avalanche Photodiode and gain provided by it to photodiode. Find out the expression for responsivity of APD. 20

UNIT-IV

7. (i) What is the function of a Coupler? List the various losses associated with couplers. Explain the working of 2×2 directional coupler in detail explaining the reason for the name 'directional coupler'. 12

(ii) Identify the types of optical amplifiers on the basis of their application. Also explain with the help of diagram their positioning. 8

8. Write a short note on WDM and linear divider combiner 20