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

BT-7/D-20 **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.

UNIT-I

1. (i) Explain how a ray propagates through an optical fiber ? How is TIR achieved ? What is significance of critical angle ? How is it related to numerical aperture of a fiber ? 10

   (ii) Discuss mode theory for dielectric medium. Derive EM wave equation and its solution for optical fibers. 10

2. What is difference between step index and graded index fibers ? Explain ray propagation through these fibers with the help of ray diagrams. Also describe the expression for finding out number of modes in both the fibers. 20

UNIT-II

3. Explain in detail various types of losses in optical fibers. 20

4. What is dispersion ? How does it effect pulse transmission? Explain the reasons for material dispersion and how much spreadening occurs due to material dispersion ? 20

UNIT-III

5. Write down the working and construction of Semiconductor Injection Laser. Also explain the reason for presence of various modes in laser spectrum. Sketch the spectral and power voltage characteristics of Lasers. 20

6. (i) Describe the method of optical detection in photodiodes. 10

   (ii) Explain the principle of coherent detection of light in optical fiber communication. 10

UNIT-IV

7. (i) Illustrate the process of amplification achieved by semiconductor optical amplifiers. How is it different from LASERS ? 10

   (ii) What is the function of optical coupler ? What are various losses associated with couplers ? Explain different types of couplers in brief. 10

8. Write short note on : 20

   (i) wavelength division multiplexer and demultiplexer

   (ii) single hop and multihop optical networks.