Faculty of Engineering & Technology

Eighth Semester B.E. (Information Tech.) Examination

FIBRE OPTICAL COMMUNICATION

Elective – I

Sections—A & B

Time—Three Hours] [Maximum Marks—80

INSTRUCTIONS TO CANDIDATES

(1) All questions carry marks as indicated.

(2) Answer any **THREE** questions from Section A and any **THREE** questions from Section B.

(3) Due credit will be given to neatness and adequate dimensions.

(4) Assume suitable data wherever necessary.

(5) Retain the construction lines.

(6) Illustrate your answers wherever necessary with the help of neat sketches.

SECTION–A

1. (a) Draw the block diagram of an optical communication system. Discuss about various types of optical fiber. 7

   (b) Using ray model, describe the mechanism of transmission of light within optical fiber. 6

2. (a) The GI fiber has a core with parabolic refractive index profile which has diameter of 48 μm. The fiber has NA of 0.15. Estimate total number of graded modes operating in fiber if $\lambda = 1$ μm. 7

(b) What is dispersion in optical fiber and how does it occur ? 6

3. (a) A graded index fiber has core with parabolic refractive index profile which has diameter of 50 μm. The fiber has numerical aperture of 0.2. Estimate the total number of guided modes propagating in the fiber when it is operating at a wavelength of 1 μm. 7

(b) What are macroscopic and microscopic bends in the fiber ? Why does it occur ? Explain the losses occurred due to them. 6

4. (a) Discuss Fusion Splices. Compare splices and connectors. 7

(b) Describe with the aid of suitable diagrams three common techniques used for mechanical splicing of optical fibers. 7

5. (a) Give the constructional details of surface emitter LED and state its advantages. 6

(b) Explain modal, partition and reflection noise in relation to injection laser. 7

SECTION–B

6. (a) Discuss the principle of operation of avalanche photodiode. Discuss advantage and drawbacks of APD. 7

(b) A photodiode has a quantum efficienty of 65% when photon of energy 1.5×10^{-19} J are incident upon it.

(i) At what wavelength is the photodiode operating ?

(ii) Calculate the incident optical power required to obtain a photo current of 2.5 μA when the photodiode is operating as above. 6

7. (a) Discuss NRZ, RZ and optical Manchester codes. 4

(b) Explain wavelength division multiplexing in fiber and write note on WDM devices. 6

(c) Discuss active T coupler. 4

8. (a) Explain in detail Backscatter method of fiber attenuation measurement. 7

(b) Describe the LAN configuration used in fiber optics. 6

9. (a) Discuss the "Eye-pattern" which provides the data handling ability in digital transmission system. 7

(b) Describe the cut back method for measuring total transmission loss of a fiber link. 6

10. Write short notes on :

(i) Sources of noise in optical receiver 5

(ii) OTDR Method 4

(iii) Tree and Star Network. 4