Faculty of Engineering & Technology
Seventh Semester B.E.(Electronics Engg.)
ET/EC(C.B.S.) Examination
OPTICAL COMMUNICATION

Time—Three Hours]   [Maximum Marks—80

INSTRUCTIONS TO CANDIDATES

(1)   All questions carry marks as indicated.

(2)   Solve Question No. **1 OR** Questions No. **2**.

(3)   Solve Question No. **3 OR** Questions No. **4**.

(4)   Solve Question No. **5 OR** Questions No. **6**.

(5)   Solve Question No. **7 OR** Questions No. **8**.

(6)   Solve Question No. **9 OR** Questions No. **10**.

(7)   Solve Question No. **11 OR** Questions No. **12**.

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

(9)   Assume suitable data wherever necessary.

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

(iii) Overall signal attenuation for a 10 km optical link using the same fiber with splices at 1 km intervals each giving an attenuation of 1 dB.   6

5. (a) Discuss different types of optical connectors used in optical communication.   7

(b) What is Splicing ? Explain the basic Splicing Techniques used.   7

OR

6. (a) Draw and explain Surface Emitter LED. State it's advantages and disadvantages.   7

(b) A single mode fiber has the following parameters :

(1) Normalised Frequency (v) = 2.40

(2) Core Refractive Index (n_1) = 1.46

(3) Core Diameter (2a) = 8 μm.

(4) Numerical Aperture (NA) = 0.1

Estimate the total insertion loss of fiber joint with a lateral misalignment of 1 μm and angular misalignment of 1°.   7

7. (a) Explain the working principle of Avalanche Photo diode and draw its equivalent circuit.   7

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

Calculate :

(i) At what wavelength is the photo diode operating.

(ii) Responsivity of Photodiode.

(iii) Calculate the incident optical power required to obtain a photocurrent of 2.5 μA. When the photodiode is operating as described above.   6

OR

8. (a) Define the terms Quantum Efficiency and Responsivity of a photodetector and obtain a relationship between them.   7

(b) Draw the block diagram of Typical Optical Receiver and explain its working in detail.   6

9. (a) Explain the block diagram of basic element of analog link.   7

(b) With a neat block diagram explain multichannel amplitude modulation.   6

OR

1. (a) Write the help of a ray diagram, show how optical fibers can guide light waves. 7

   (b) Write the advantages and disadvantages of optical fiber communication. 6

OR

2. (a) For a step index fiber prove that $NA = n_1 (2\Delta)^{1/2}$ 7

   (b) Classify optical fiber in detail. 6

3. (a) What are the requirements for selecting material for optical fiber. What are the different fiber materials used ? 7

   (b) Explain Double Crucible Method of fiber fabrication with neat diagram. 6

OR

4. (a) Discuss bending loss and dispersion in optical fiber in short. 7

   (b) When the mean optical power launched in an 8 km length of fiber is 120 μW, the mean optical power at the fiber output is 3 μW.

   Determine :

   (i) The overall signal attenuation or loss in decibels through the fiber assuming there are no connectors or splices.

   (ii) The signal attenuation per kilometer for the fiber.

10. (a) Explain point to point link. 7

    (b) What are the different system considerations for designing a digital transmission system. (digital link) ? 6

11. (a) With the help of neat block diagram, explain the working of WDM system. 7

    (b) Explain the Semiconductor Optical Amplifier. Also state the characteristics and types of Optical Amplifier. 7

OR

12. (a) Explain the Erbium-doped optical amplifiers. State the advantages and disadvantages. 7

    (b) Describe the cut-back method for Measuring Total Transmission Loss of fiber link. 7