

M.Sc. Fourth Semester (Applied Electronics) (New) (CBS)
15058 : Optical Fiber Communication : 4 AE 2

P. Pages : 2

Time : Three Hours



AV - 3316

Max. Marks : 80

- Notes :
1. Due credit will be given to neatness and adequate dimensions.
 2. Assume suitable data wherever necessary.
 3. Illustrate your answer necessary with the help of neat sketches.
 4. Use of pen Blue/Black ink/refill only for writing the answer book.

1. a) What is Numerical Aperture? Prove that $NA = n_1 (2\Delta)^{1/2}$. 8

b) Explain Circular Waveguide modes in an optical fiber. 6

OR

2. a) An optical fiber has numerical aperture of 0.20 and a cladding refractive index 1.59. Determine. 7

i) The Acceptance angle for the fiber in Water which has a refractive index of 1.33.

ii) The critical angle at core-cladding interface.

Comment on any assumption made about the fiber.

b) Differentiate between Multimode and single mode fiber. 7

3. a) A 15km optical fiber link with a loss of 1.5 dBkm^{-1} . The fiber is jointed every km with connectors which gives an attenuation of 0.8dB each Determine minimum optical power which must be launched into the fiber in order to maintain a mean optical power level of $0.3 \text{ } \mu\text{W}$ at detector. 6

b) Briefly explain reason for pulse broadening in fiber due to material dispersion. 8

OR

4. a) Discuss attenuation in fiber. Also explain absorption loss in glass fiber. 7

b) Explain in detail following losses in fiber. 7

i) Scattering loss

ii) Bending loss.

5. a) Explain operation of double heterojunction LED. 6

b) Explain various structure of LED's. 7

OR

6. a) Explain following concept in optical source. 7

i) Spontaneous emission

ii) Stimulated emission

iii) Internal & External efficiency.

b) Explain in detail the basic principle of LASER. Give its type. 6

7. a) Explain fusion and mechanical splicing for fiber optics. 7
b) Give detail explanation of fiber alignment and joint loss with suitable diagram. 6

OR

8. a) What are the requirement of good optical connector. 6
b) State different connection problem associate with fiber. 7
9. a) Give principle working of optical detector. 6
b) Explain semiconductor photodiode with internal gain. 7
i) P-n Photodiode ii) Pin Photodiode

OR

10. a) Explain Avalanche photo diode in detail give draw-back of it. 7
b) Explain the concept of direct and Indirect absorption in fiber optic communication. 6
11. a) Give detail for digital system planning consideration. 7
b) Explain technique for linearization of LED transmitter. 6

OR

12. a) With the help of block diagram Explain Direct Intensity Modulation (IM/DD) Receiver. 8
b) In digital optical fiber system show that the maximum bit rate for system is given as 5
$$B_{T(max)} = \frac{0.35}{T_{syst}}$$

where, T_{syst} = total system rise time.
