USN | | | | | | | | | | |

06EC72

Seventh Semester B.E. Degree Examination, June/July 2015
Optical Fiber Communication

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting at least TWO questions from each part.***

PART – A

1 a. Explain with a neat schematic block diagram, the elements of an optical fiber transmission link. **(07 Marks)**

b. Derive an equation for NA of Step Index Fiber using Snell's Law. **(07 Marks)**

c. Calculate the maximum value of Δ and μ_2 of a single mode fiber of core diameter 10μm and core refractive index 1.5.The fiber is coupled to a light source with a wavelength of 1.3 μm. V cutoff for single mode propagation is 2.405. Also calculate the acceptence angle. **(06 Marks)**

2 a. What is signal Attenuation? Explain in the context of optical fiber communication. **(06 Marks)**

b. Explain Intrinsic and Extrensic Absorption Losses. **(04 Marks)**

c. What is signal distortion? Explain its types. **(06 Marks)**

d. An optical fiber has 2mW as its input power, while the o/p is 2μW. If the fiber is designed for an attenuation value of 0.49 dB/Km find the length of the optical fiber. **(04 Marks)**

3 a. With a neat diagram, Explain the double hetero junction light emitting diode. **(08 Marks)**

b. Write a note on Fabry-Perot Laser Diode operation. **(06 Marks)**

c. A GaAs Laser operating at a wavelength of 850nm and has a length of 600μm. Calculate the frequency spacing and wavelength spacing provided the refractive index as 4.2 **(06 Marks)**

4 a. What is fiber splicing? Explain various methods adopted to perform fiber splicing. **(08 Marks)**

b. Explain with relevant sketches, different lensing schemes used for coupling improvement. **(08 Marks)**

c. Calculate the insertion loss of the connector where the input and output power of the connector is 203 μW and 145 μW respectively. **(04 Marks)**

PART – B

5 a. Draw the basic block diagram of digital transmission link with relevant optical and electrical waveforms at each stage and explain. **(07 Marks)**

b. Why preamplifiers are necessary in optical receivers? List different types of preamplifiers in use. **(04 Marks)**

c. List the characteristic features of direct detection and coherent detection techniques in optical fiber communication. **(04 Marks)**

d. Write a short note an Eye Diagrams. **(05 Marks)**

6 a. Explain with a neat diagram, the simplex point to point links in optical fiber communication Engineering. **(06 Marks)**

b. Discuss various types of line codes used in optical fiber communication systems. **(06 Marks)**

June/July 2015

c. An optical fiber link is found with below data, calculate the system rise time and band width for the link.

Components	Rise Time	Bandwidth
1. Transmitter	1.45 ns	250 MHz
2. LED	2.9 ns	115 MHz
3. Optical fiber cable	3.55 ns	98 MHz
4. Detector-PIN photodiode	1.3 ns	375 MHz
5. Optical Receiver	2.1 ns	200 MHz

(08 Marks)

7 a. What is MEMS Technology? Explain its relevance to optical fiber communication Engineering. **(05 Marks)**

b. Explain with neat sketches, the working of optical isolators. List out its importance in optical fiber communication. **(08 Marks)**

c. With a neat sketch, Explain 8×8 star couplers using 2×2 couplers. **(07 Marks**

8 a. Explain different types of optical amplifiers used in OFC. **(06 Marks)**

b. Write a note on : i) SONET/SDH Rings ii) SONET/SDH frame format **(08 Marks)**

c. Explain various configurations used in EDFA with suitable diagrams. **(06 Marks)**

* * * * *