USN | | | | | | | | | |

10EC/TE72

Seventh Semester B.E. Degree Examination, July/August 2021
Optical Fiber Communication

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions.***

1 a. What are the advantages and disadvantages of optical fiber communication? **(08 Marks)**
b. Using Snell's law, derive an expression for numerical aperature of a fiber optic cable. **(08 Marks)**
c. A step index fiber has a core and cladding refractive indices of 1.48 and 1.46 respectively and supports propagation of an optical signal of wavelength 820nm, calculate core radius, numerical aperature and acceptance angle. **(04 Marks)**

2 a. Explain the different types of absorption losses in optical fiber. **(06 Marks)**
b. Derive an expression for pulse spreading due to material dispersion which is a function of wavelength and time delay. **(08 Marks)**
c. Explain the different types of bending losses in optical fiber. **(06 Marks)**

3 a. Draw the cross-section of Ga Aℓ As double hetero structure LED energy band diagram and refractive index variation. Explain their importance. **(07 Marks)**
b. With a neat diagram, explain surface emitting LED and Edge emitting LED. **(06 Marks)**
c. Explain the structure of RAPD photodiode. **(07 Marks)**

4 a. Describe the principle of operation of star coupler. **(07 Marks)**
b. Explain briefly various fiber splicing techniques. **(06 Marks)**
c. What are the different types of mechanical misalignments? **(07 Marks)**

5 a. With neat diagram, explain the operation of transimpedance pre-amplifier equivalent circuit. **(06 Marks)**
b. Discuss coherent detection with relevant block diagram. **(06 Marks)**
c. Drive an expression for receiver sensitivity and also explain quantum limit. **(08 Marks)**

6 a. Explain with block diagram, the elements of analog link. **(06 Marks)**
b. Explain sub-carrier multiplexing techniques in optical fiber communication. **(04 Marks)**
c. Briefly explain the rise time budget analysis with its basic elements contribute to system rise time. **(10 Marks)**

7 a. Explain the principle of operation of WDM with relevant block diagram. **(07 Marks)**
b. Write a note on optical add/drop multiplexers. **(07 Marks)**
c. Discuss the design and operation of a polarization independent isolator made of three miniature optical components. **(06 Marks)**

8 a. With the help of energy level diagram, explain the working of Erbium – Doped Fiber Amplifiers (EDFA). **(10 Marks)**
b. With suitable diagram, describe SONET and SDH optical network function. **(10 Marks)**

* * * * *