Dec 13 (KWK)

Roll No. ..... Total Pages : 03

BT-7/D-13 **8710**

OPTICAL COMMUNICATION

ECE-405-E

Time : Three Hours] [Maximum Marks : 100

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

Unit I

1. (a) Discuss basic principle by which rays are guided within optical fiber core. Why is cladding essential for a practical fiber ?

   (b) Derive an expression for acceptance angle for a fibre wave guide and show its relation with numerical aperture.

2. (a) Give a typical index profiles for a single mode step index fiber and discuss modes of propagation in the fiber.

(b) What are the various alignment errors which connecting end of two fiber ends ? Give a typical schematic for single mode fiber connector.

Unit II

3. (a) Draw a typical losses *Vs.* wavelength curve in a typical silica fiber. Give physics behind various losses regions of this curve.

   (b) Discuss micro and macro bending losses in fibers the brief.

4. (a) Discuss effect of dispersion on the pulse transmission in optical fiber. Also discuss its effect on transmission rate of data.

   (b) Discuss typical material dispersion in a Silica fiber. How can wave guide dispersion be used to control total dispersion in optical fibers ?

Unit III

5. (a) Discuss Laser action in semiconductor lasers and give a typical architecture for a surface emitting laser diode.

(b) Discuss modes of a laser diode and compare typical spectral characteristics of a LEO and Laser diode.

6. (a) Discuss structure and responsivity of a PIN photodiode and compare its performance with APD the optical fiber communication.

   (b) What are the differences between coherent and non-coherent detection ? Discuss a typical coherent detection system briefly.

Unit IV

7. (a) What is use of optical switches in optical networks ? Give a schematic to realize a 4×4 crossbar switch using 2×2 switches.

   (b) Discuss wavelength division multiplexing/ Demultiplexing and action of fitters in this WDM scheme in optical network.

8. (a) Give working of a semiconductor optical amplifiers and discuss crosstalk in this kind of optical amplifiers in detail.

   (b) Compare working and performance of multi-hop and hybrid optical link network briefly and future of all photonic network.