

2125
M. E. (Information Technology)
First Semester
MEIT-1202: Advanced Optical Communications

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Unit.

x-x-x

I. Attempt the following:-

- (a) What is Polarization in optical fibre communication?
- (b) Discuss the significance of Soliton pulse?
- (c) Explain the term fibre birefringence in optical fibres?
- (d) What is the significance of EDFA as an optical amplifier?
- (e) Discuss the applications of Optical Light Sources? (5x2)

UNIT - I

- II. a) A certain optical fibre has an attenuation of 0.6db/km at 1300nm and 0.3db/km at 1550nm. Suppose the following two optical signals are launched simultaneously into the fiber: an optical power of 150 μ w at 1300nm and an optical power of 100 μ w at 1550nm. What are the power levels in μ w of these two signals at (i)8km and (ii)20km??
- b) Explain with diagram the impact of Polarization Mode Dispersion in optical fibers? Does Pulse broadening occurs in Graded index waveguides? What are the factors which impact the design optimization of single mode fibers? (4,6)

- III. a) Describe transmission characteristics of optical fibers in context of dispersion and types of bending losses?
- b) The beat length in a single mode optical fiber is 8 cm when the light from an injection laser with a spectral linewidth of 2nm and a peak wavelength of 0.8 μ m is launched into it. Determine the modal birefringence and estimate the coherence length in this situation. (2x5)

P.T.O.

(2)

- IV. a) Explain significance of star couplers and fiber splicing in optical communication?
b) Explain mathematically the Einstein relations in Lasers as optical source? What is the threshold condition for Laser Oscillation? Is semiconductor injection laser a special application, comment? (4,6)

UNIT - II

- V. a) Describe the working principle of Optical Detectors? How does Quantum efficiency and Responsivity have their effect on performance of Optical Detectors? Give one application of Quantum dot photodetectors?
b) With the help of Energy level diagrams and various transition processes of Er^{3+} ions in silica, explain the amplification mechanism in EDFAs? (6,4)
- VI. a) Explain the best linearization method for LED drive circuits. Compare the negative feedback compensation and selective harmonic compensation with suitable reasons?
b) Describe the system design considerations for optoelectronic regenerative repeater for digital optical fiber communication? Explain point to point system applications for optical amplifiers in various modes? (4,6)
- VII. Write short notes on the following:-
(a) Optical Switching Networks
(b) Mutiprotocol Label switching
(c) Optical Ethernet
(d) Reliability Considerations for Light Emitting diodes (4x2½)