2124

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

Time allowed: 3 Hours   Max. Marks: 50

NOTE: *Attempt* <u>*five*</u> *questions in all, including Question No. I which is compulsory and selecting two questions from each Part.*

x-x-x

I.

    (a)What are dispersion losses in optical fibers?   (2)
    (b)Discuss the importance of Soliton Propagation?   (2)
    (c)What is optical fiber splicing?   (2)
    (d)Give two examples of Lasers as Optical Sources?   (2)
    (e)Discuss the application of Raman & Brillouin fiber amplifiers   (2)

Part A

II.

    (a)A step index fiber has a solid acceptance angle in air of 0.115 radians and a relative refractive index difference of 0.9%.Estimate the speed of light in the fiber core.?   (4)
    (b)Discuss the significance of Group Delay & mode delay factor in optical fiber waveguides? What are the benefits of Electromagnetic mode theory for circular waveguides?   (6)

III.

    (a)Describe the transmission characteristics of optical fibers in detail?   (5)
    (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 1nm and a peak wavelength of $0.9\mu m$ is launched into it.Determine the modal birefringence and estimate the coherence length in this situation.In addition,calculate the difference between the propagation constants for the two orthogonal modes as well.   (5)

IV.

    (a)Explain with the help of Energy Level diagrams the Population Inversion and Lasing for two non semiconductor lasers?What is the threshold condition for Laser Oscillation?   (5)
    (b) Draw and explain the working of Optical Isolation & Circulators?How optical add/drop wavelength multiplexing using fiber Bragg grating is achieved with all optical circulators?   (5)

Part B

V.

    (a)Compare the working of Surface Emitter LED AlGaAs DH with Edge Emitting LED structure? (5)
    (b) With the help of Energy level diagrams and various transition processes of Er^{+3} ions in silica,explain the amplification mechanism in EDFA?.   (5)

VI.

    (a)Differentiate the linearization methods for LED drive circuits(a)Complementary distortion (b)negative feedback compensation?   (4)
    (b) Describe the system design considerations for optoelectronic regenerative repeaters in digital optical communication? Explain the potential point to point system applications for optical amplifiers in different mode configurations?   (6)

VII. Write short notes on the following: (2.5 x4=10)
    (a)Optical Packet Switched Networks
    (b)Differential Quadrature Phase Shift Keying
    (c) Multiprotocol label Switch
    (d) Ultra high capacity networks

x-x-x