B.Tech. 7th Semester (ECE) Examination,
December–2017
OPTICAL COMMUNICATION
Paper–ECE–415–F

Time allowed : 3 hours] *[Maximum marks : 100*

Note : ***Q. No. 1 is compulsory*** *and attempt* ***one*** *question from each of the four sections.*

1. (a) What do you mean by group and phase velocity in optical communication ? 5

   (b) What do you mean by fiber connectors ? 5

   (c) Explain basic principle of LED. 5

   (d) Give definition of responsivity and quantum efficiency. 5

Section–A

2. (a) Describe the mechanism of light within an optical fiber using ray theory. 10

   (b) Enlist advantages, disadvantages and applications of optical fiber communication. 10

3. (a) Draw and explain electro magnetic spectrum and highlight the spectrum for optical communication. 10

(b) Draw the block diagram of an optical communication system and explain function of each block. 10

Section–B

4. (a) Briefly describe linear scattering losses in optical fibers with regards to (i) Rayleigh scattering (ii) Mie scattering. 10

(b) How bending effects the optical fiber communication ? Derive the bending loss equation and calculate the critical radius of bending ? 10

5. (a) Explain the operation of both optical isolator and optical circulators. Discuss use of these devices in wavelength division multiplexing systems as three and four ports devices. 10

(b) An optical fiber has core refractive index of 1.5 and cladding refractive index of 1.47. Apply ray theory and find the critical angle, numerical aperture and acceptance angle. 10

Section–C

6. (a) Enlist the advantages, disadvantages and applications of LED's in detail. 10

(b) Explain the following terms in relation to injection LASERS : relaxation oscillator, frequency chrip, partition noise, mode hopping. 10

7. (a) Explain the characteristics of LED with emphasis on optical output power, output spectrum, modulation bandwidth and reliability. 10

(b) How LASER is coupled to optical fiber, explain in detail ? 10

Section–D

8. (a) Explain construction and working of avalanche photo diode (APD) in detail. 10

(b) Discuss on noise and frequency response in PIN photo diode. 10

9. (a) What are the differences between semiconductor photo diodes with and without internal gain, take one example from both types. 10

(b) Outline the advantages and drawbacks with the use of APD as a detector for optical fiber. 10