B.Tech 7th Semester (ECE) F-Scheme Examination,

May–2017

OPTICAL COMMUNICATION

Paper-ECE-415-F

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

Note : ***Question No.1 is compulsory.*** *Attempt* ***one*** *question from each section.*

1. (a) Differentiate between analog and digital communication systems in connection with optical mode of communication.

   (b) Explain the effects of critical bending radius of optical fibre.

   (c) Briefly outline the advantages and drawbacks of the LED in comparison with the injection laser for use in optical communication systems.

   (d) What is meant by the long wavelength cut off point for an intrinsic photo detector.

Section-A

2. (a) Enlist the advantages of optical fibre. Also discuss the applications of optical fibre communication. 10

(b) Draw the e.m. spectrum and highlight the spectrum for optical communication. 10

3. (a) Apply the ray theory and find the numerical aperture and solid acceptance angle in air for the fibre when the relative refractive index difference is 1% and core index is 1.46. Also find the critical angle at the core cladding interface. 10

(b) Define the relative refractive index difference for an optical fibre and show how it may be related to numerical aperture. 10

Section-B

4. (a) Describe the construction and usage of multimode step index fibre and single mode step index fibre. 10

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

5. (a) What are the important mechanisms responsible for aborption losses and scattering losses in optical communication system ? 10

(b) Discuss scattering losses in optical fibre. Differentiate linear and non-linear scattering. 10

Section-C

6. (a) describe the mechanism of giving the emission of light from LED. Discuss its effects on the properties of LED in relation to its use as an optical source for communication. 10

(b) Write notes on :

LED characteristics, Quantum efficiency 10

7. (a) Explain the concept of quantum, dot and quantum wire lasers. 10

(b) Compare the ideal light output against current characteristic for the injection laser with one from a typical gain guided device. 10

Section-D

8. Write notes on :

(a) APD design

(b) Optical detection

(c) Intrinsic absorption 7+7+6

9. (a) What are the benefits and drawbacks of avalanche photo diodes ? 10

(b) What factors should be considered while selecting the semi conductor material for construction of a photodetector ? Explain. 10