

B.Tech IV Year I Semester (R13) Regular Examinations November/December 2016

**OPTICAL FIBER COMMUNICATION**  
(Electronics and Communication Engineering)

Time: 3 hours

Max. Marks: 70

**PART – A**

(Compulsory Question)

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- 1 Answer the following: (10 X 02 = 20 Marks)
- What are Ray and Modes?
  - Why do we prefer Step index single mode fiber for long distance communication?
  - What are the two main causes of Intra Modal Dispersion?
  - What are the Mechanisms which causes Absorption?
  - Define Population Inversion.
  - Write a short note on Fiber Splicing.
  - What are the various noise sources and disturbances in optical pulse detection mechanism?
  - List out the factors that the Response time depends on.
  - What is Power Budget?
  - Define Receiver Sensitivity.

**PART – B**

(Answer all five units, 5 X 10 = 50 Marks)

**UNIT – I**

- 2 Explain the Elements of an optical fiber Transmission link.

**OR**

- 3 Discuss the Mode theory of Circular Waveguides.

**UNIT – II**

- 4 Describe any two types of Losses in Optical Fiber Communication System.

**OR**

- 5 Explain the Design Optimization of Single mode fibers.

**UNIT – III**

- 6 (a) Explain LED Structure with neat sketch.  
(b) A planar LED is fabricated from GaAs which has a refractive index of 3.6. (i) Calculate the optical power emitted into air as a percentage of the internal optical power for the device when the transmission factor at the crystal-air interface is 0.68. (ii) When the optical power generated internally is 50% of the electric power supplied, determine the external power efficiency.

**OR**

- 7 (a) Explain in detail the various Lensing schemes for coupling improvement.  
(b) Discuss about Fibre splicing.

**UNIT – IV**

- 8 (a) Explain in detail the operation of Avalanche Photo Diode with its structure.  
(b) A photo diode has a quantum efficiency of 65% when photons of energy of  $1.5 \times 10^{-19}$  J are incident upon it. (i) Find the operating wavelength of the photodiode. (ii) Calculate the incident optical power required to obtain a photo current of  $2.5 \mu A$  when the photodiode is operating as described above.

**OR**

- 9 (a) Discuss any one type of Preamplifier in detail.  
(b) Give the comparisons of photo detectors.

**UNIT – V**

- 10 Analyze the Power Budget of Optical Fibre Communication in terms of analog system design.

**OR**

- 11 Describe in detail about Rise time Budget of Optical Fibre Communication in-terms of digital system design.

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