8E4090

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B.Tech. (Sem.VIII) (Main/Back) Examination, April/May - 2012
Electronics & Communication
8EC3 Optical Communication

Time : 3 Hours [Total Marks : 80
[Min. Passing Marks : 24

Attempt any five questions selecting one question from each unit. All questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

UNIT - I

1. (a) In a typical fiber-optic communication system, the received power distribution as a function of time t is given by a symmetrical triangular pulse as shown in fig. Calculate :
(i) The total energy in the pulse 3
(ii) The mean pulse arrival time and **3**
(iii) The rms pulse width. **3**

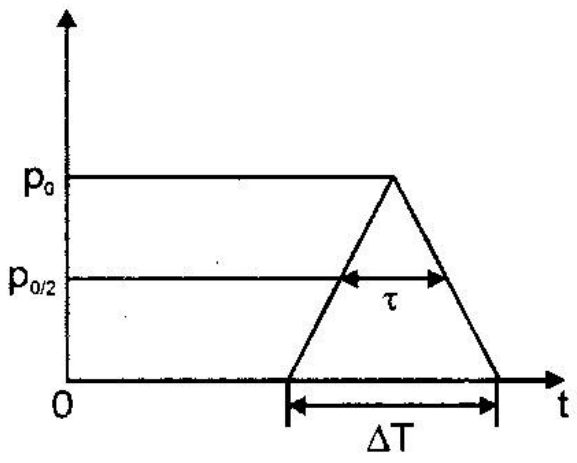

Fig. Triangular pulse

(b) Explain the following terms :
(i) Numerical Aperture **2**
(ii) Acceptance Angle **2**
(iii) Acceptance Cone. **3**

OR

1. (a) Classify fibers based on modes of propagation and index profiles. Draw index profile of various types of fibers. Enumerate their applications. **10**
(b) Using the simple ray theory explain the following
(i) Transmission of light within an optical fiber. **3**

(ii) An optical fiber in air has an NA of 0.3. Compare acceptance angle for meridional rays with that for skew rays which change direction by 100° at each. **3**

UNIT - II

2. Explain

(a) Heterojunction LED **8**

(b) Edge Emitting LED (ELED) **8**

OR

2. Explain

(a) Various characteristics of a semiconductor laser (LASER) **8**

(b) Operation of DFB Laser diode. **8**

UNIT - III

3. (a) Discuss the operations of RAPD, describing how it differs from the PIN photodiode. Outline the advantages and drawback with the use of RAPD as a detector for optical fiber communication. **10**

(b) What factor must you take into account to choose the correct width of an intrinsic layer in a p-i-n photodiode. **6**

OR

3. (a) Explain the "impact-ionization" in a avalanche photodiodes. Define photo-multiplication factor and multiplication factor in reference to APD. **6**

(b) Explain how a photoconductor is different from a photo multiplier tube ? Which material is commonly used in photo conductor for measuring the intensity of visible light ? **10**

UNIT - IV

4. (a) How would you couple a source to fiber and what are the various factors to be taken to account while coupling? **8**

(b) Explain the losses caused by longitudinal, lateral and angular displacement in splicing. **8**

OR

4. (a) List two major types of optical coupler. Describe construction and working of a simple coupler. **8**

(b) Discuss the connectors used to connect two fibers in brief. **8**

UNIT - V

5. Explain how can you measure :

(a) Attenuation **8**

(b) Numerical Aperture (NA) **8**

OR

5. How can you measure :

(a) Microbanding loss coefficient **8**

(b) Mode Field Diameter (MFD) **8**