P6621

[6181]-184

B.E. (E & TC)

FIBER OPTIC COMMUNICATION

(2019 Pattern) (Semester - VIII) (404190)

Time : 2½ Hours]   *[Max. Marks : 70*

Instructions to the candidates:

1)   *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.*
2)   *Neat diagrams must be drawn wherever necessary.*
3)   *Figures to the right indicate full marks.*
4)   *Assume suitable data if necessary.*

Q1) a)   When 3×10^{11} photons each with a wavelength of 0.85 μm are incident on a photo diode, on average. 1.2×10^{11} electrons are collected at the terminals of the device. Determine the quantum efficiency and the responsivity of the photodiode at 0.85μm.   **[6]**

b)   Explain the detection process in the p-n photodiode.   **[6]**

c)   Define and explain the important performance and compatibility requirements for detectors.   **[6]**

OR

Q2) a)   A p-n photodiode has a quantum efficiency of 50% at a wavelength of 0.9 μm.   **[6]**

Calculate:

i)   its responsivity at 0.9 μm;

ii)   the received optical power if the mean photocurrent is 10^{-6} A;

iii) the corresponding number of received photons at this wavelength

b)   Enlist various noises in photodetector. Explain one of them in detail. **[6]**

c)   With the help of diagram explain working of APD.   **[6]**

Q3) a) Let the data rate of 20Mb/s and BER of 10^{-9} For the receiver PIN photodiode operating at 850 nm, the required receiver input signal is -42dBm .The LED is used as a source can couple 50uW(-13dBm) average optical power into a fiber flylead with a 50 μm core diameter. Assume 1dB loss occurs when the fiber flylead is connected to the cable and another 1dB connector loss at the cable-photo detector interface. System margin of 6dB. Let attenuation per km is 3.5dB/km. Estimate link length. **[8]**

b) Draw and explain Fiber Bragg Grating. **[6]**

c) Explain EDFA in detail. **[4]**

OR

Q4) a) Explain Rise time budget. Give equation for the same. **[6]**

b) A 2×2 biconical tapered fiber coupler has an input optical power level of $P_0 = 200$ mW. The output powers at the other three ports are $P_1 = 90$ mW, $P_2 = 85$ mW, and $P_3 = 6.3$ nW. What are the coupling ratio, excess loss, insertion losses, and return loss for this coupler? **[8]**

c) With the help of diagram explain optical Isolator. **[4]**

Q5) a) Explain SONET structure in details. **[5]**

b) Enlist and explain advantages and applications of SONET. **[6]**

c) With the help of diagram explain AON. **[6]**

OR

Q6) a) Explain long haul networks. **[7]**

b) Explain w.r.t. FDDI the following: **[10]**

  i) FDDI model

  ii) Frame structure

  iii) Ring structure

Q7) a) Enlist widely used optical system test instruments and explain their functions. **[6]**

b) Draw Schematic experimental setup for determining fiber attenuation by the cutback technique. Explain the same. **[6]**

c) Explain Dispersion measurement technique in detail. **[5]**

OR

Q8) a) Explain OTDR in detail. **[6]**

b) Explain Eye diagram test. Define fundamental measurement parameters. **[6]**

c) With the help of diagram explain NA measurement technique. **[5]**

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