

Total No. of Questions : 8]

SEAT No. :

P6621

[Total No. of Pages : 3

[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 $0.85 \mu\text{m}$ 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 $0.85 \mu\text{m}$. [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 $0.9 \mu\text{m}$. [6]

Calculate:

- i) its responsivity at $0.9 \mu\text{m}$;
 - 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]

P.T.O.

- 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 μ m 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 \times 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]
- FDDI model
 - Frame structure
 - 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]

