Total No. of Questions : 6]

SEAT No. :

P401

[Total No. of Pages : 3

BE/Insem/APR-56

B.E. (E & TC)

BROADBAND COMMUNICATION SYSTEMS

(2012 Pattern) (Semester - II)

Time : 1 Hour] *[Max. Marks : 30*

Instructions to the candidates :

1) ***Answer Q. 1 or Q. 2, Q. 3 or Q. 4, Q.5 or Q. 6.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***All questions carry equal marks.***
5) ***Use of logarithmic tables slide rule, Mollier Charts and electronic pocket calculator and steam tables are allowed.***
6) ***Assume suitable data if necessary.***

Q1) a) Explain following terms related to optical fiber communication (any three) **[6]**

i) Total internal reflection

ii) Acceptance angle

iii) Critical angle

iv) Numerical aperture.

b) Explain various attenuation mechanisms in optical fiber. **[4]**

OR

Q2) a) Explain the working of PIN photo diode with neat diagram and characteristics. **[6]**

b) A manufacturer wishes to make silica core step index fiber with V=75 and NA=0.30,to be used at 820 nm. If the core refractive index is 1.458, what should be the core size and cladding index? **[4]**

P.T.O.

Q3) a) State & Explain the requirement of good optical source & Detector from link design Point of view. **[6]**

b) Analog optical fiber link has following rise time components: **[4]**

Source (LED) 10ns;

Fiber cable: intermodal 9ns/km;

Intra modal: 2ns/km;

Detector (APD): 3ns

The desired link length without repeaters is 5km and the required optical Bandwidth is 6MHz. Determine whether the above combination of components give an adequate response.

OR

Q4) a) Explain in detail the importance of budgets. What are the different system considerations For rise time budget? **[4]**

b) Components chosen for a digital optical fiber link of overall length 7 km and operating at 20Mbits/s using an RZ code is given Below:

i) LED capable of launching a average power of 0.1mW at 0.85μm [including connector loss into a 50μm core diameter graded index fiber]

ii) Fiber attenuation 2.6 dB/km

iii) Requires splicing every km with a loss of 0.5dB per splice.

iv) There is also a connector loss at the receiver of 1.5dB

v) The receiver requires mean incident optical power of-41dBm in order to give the necessary BER of 10^{-10}

vi) Predicted safety margin of 6dB

Write down the optical power budget for the system and determine it viability. **[6]**

Q5) a) Write short note on WDM coupler. **[4]**

b) Explain working of SOA and EDFA with neat diagrams. **[6]**

OR

Q6) a) Explain the following with their applications. **[4]**

i) Fiber bragg grating

ii) Diffraction grating

b) A 2×2 bi conical tapered fiber coupler with 40/60 splitting ratio has insertion losses of 2.7 dB for 60% channel and 4.7 dB for 40% channel. **[6]**

i) If input power is 200uW, find output levels P_1 & P_2

ii) Find excess loss of coupler

iii) Verify that splitting ratio is 40/60.

⌘⌘⌘