

Total No. of Questions : 10]

SEAT No. :

P2276

[Total No. of Pages : 2

[5254]-613

B.E. (E & TC)

BROADBAND COMMUNICATION SYSTEM

(2012 Pattern) (Semester - II)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Attempt five questions as Q.NO.1 or Q.NO.2, Q.NO.3 or Q.NO.4, Q.NO.5 or Q.NO.6, Q.NO.7 or Q.NO.8, Q.NO.9 or Q.NO.10*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Use of Calculator is allowed.*
- 5) *Assume Suitable data if necessary.*

- Q1)** a) Explain the terms: mode field diameter, spot size, cut off wavelength for single Mode fibers and Explain numerical aperture. **[6]**
- b) Write short notes on : **[4]**
- i) Rise Time Budgeting.
 - ii) Optical power budget

OR

- Q2)** a) Explain in detail the architecture of EDFA. **[4]**
- b) A graded index fiber has a core with a parabolic refractive index profile which has a Diameter of 45µm. The fiber has numerical aperture of 0.25 Estimate the total number of guided modes propagating in the fiber when it is operating at a wavelength of 1.5µm. **[6]**

- Q3)** a) A 1550 nm single mode digital fiber optic link needs to operate at 622 Mb/s over 80 km without amplifiers. A single mode laser launches an average optical power of 13dB m into the fiber. **[6]**
- The fiber has a loss of 0.35 dB/km. and there is a splice with a loss of 0.1 dB every kilometer. The coupling loss at the receiver is 0.5 dB and the receiver uses an InGaAs APD with a sensitivity of -39 dBm. Excess noise penalties are predicted to be 1.5 dB. Set up an optical power budget for this link and find the system margin. What is the system margin at 2.5 Gb/s with an APD sensitivity of -31 dBm?
- b) Write a short note on optical coupler. **[4]**

P.T.O.

OR

- Q4)** a) Radioactive and non-radioactive recombination lifetimes of the minority carriers in the Active region of a DH InGaAsP-LED are 50 ns and 110 ns respectively. Determine the total carrier recombination lifetime and the power internally generated within the device when the Peak emission wavelength is $0.87 \mu\text{m}$ at a drive current of 40 mA . [6]
- b) Write short notes on Optical amplifier. [4]

- Q5)** a) State and explain Kepler's three laws of planetary motion. Explain the forces associated with it. [8]
- b) Find apogee and perigee heights for satellite orbit having semi-major axis 7192.3km and eccentricity 0.0013. [8]

OR

- Q6)** a) Derive the equation for computing Elevation angle and Azimuth angle for an earth station - GEO satellite arrangement. [8]
- b) Explain with block diagram basic satellite communication system. [8]

- Q7)** a) With the help of block diagram. explain typical tracking, telemetry, command and monitoring system. [9]
- b) Explain the transponder arrangement and frequency plan (uplink and downlink) for any satellite. Also draw block diagram of single conversion transponder for 6/4 GHz band. [9]

OR

- Q8)** a) What are different types of antennas used in satellite systems, explain importance of each. [9]
- b) Write a short note on equipment reliability and space qualification. [9]

- Q9)** a) Derive the link equation for satellite communication. [8]
- b) Explain in detail design of specified C/N. [8]

OR

- Q10)** a) Explain system noise temperature and G/T ratio. [8]
- b) Obtain the expression of EIRP in terms of flux density. [8]

