

Total No. of Questions : 8]

SEAT No. :

**P3170**

[5461]-213

[Total No. of Pages : 3

**B.E. (E&Tc)**

**BROAD BAND COMMUNICATION SYSTEM  
(2012 Pattern) (Semester - II) (404190) (End Semester)**

*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) *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) With neat block diagram, explain features of key elements of optical transmission link. Explain advantages & disadvantages of optical fiber communication system. [6]
- b) Describe the system design considerations involved in establishing point to point optical fiber link. [6]
- c) Explain the following with their applications [8]
- i) Fiber bragg grating
  - ii) Diffraction grating

OR

- Q2)** a) Explain various attenuation mechanisms in optical fiber. [6]
- b) Analog optical fiber link has following rise time components: [6]
- Source (LED) 10ns;
- Fiber cable : intermodal 9ns/km;
- Intra modal : 2ns/km;
- Detector (APD): 3ns

*P.T.O.*

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.

- c) A  $2 \times 2$  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.
- If input power is 200uW, find output levels  $P_1$  &  $P_2$ .
  - Find excess loss of coupler
  - Verify that splitting ratio is 40/60. [8]

- Q3)** a) State and explain Kepler's three laws of planetary motion. Explain the forces associated with it. [8]
- b) What does LEO, MEO and GEO orbits mean by? State specific applications of each. [8]

OR

- Q4)** a) What is the mechanism of launching a satellite? Briefly explain each step of launch sequence. [8]
- b) Calculate look angle to geo stationary satellite if earth station latitude and longitude are  $42^\circ$  N and  $0^\circ$ . The sub satellite point is  $56^\circ$  W. [8]

- Q5)** a) With the help of block diagram, explain typical tracking, telemetry, command and monitoring system. [8]
- 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. [8]

OR

- Q6)** a) With the help of neat sketch, explain typical satellite antenna coverage zone. [8]
- b) Write the short note on power systems used in satellite. [8]

**Q7) a)** Explain basic transmission theory of satellite communication link design. What do you mean by EIRP? [9]

b) In relation to satellite communication, define noise temperature and derive the equation for carrier to noise ratio at the output of demodulator. [9]

OR

**Q8) a)** Discuss the importance of G/T ratio for earth station. How does it affect C/N ratio for satellite communication system? [9]

b) A satellite transponder is used for TV program distribution with objective of overall circuit C/N = 17 dB. If the downlink provides C/N of 20 dB. Determine the EIRP of TV up linking terminal assuming following data:

- i) Uplink Frequency = 6 GHz
- ii) Transmission BW = 30 MHz
- iii) Satellite receiver G/T = - 3.0 dB
- iv) slant range = 40.600 km

Assume negligible antenna misalignment losses and negligible inter modulation noise components. [9]

