Total No. of Questions : 8]

SEAT No. :

**P3170**

[Total No. of Pages : 3

**[5461]-213**

# 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 official 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 × 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.

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. **[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 42º N and 0º. The sub satellite point is 56º 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]**

♦ ♦ ♦