Total No. of Questions : 8] **SEAT No. :**

P111 **[Total No. of Pages : 3**

[5871]-614

B.E. (E & TC)

BROADBAND COMMUNICATION SYSTEMS

(2015 Pattern) (Semester - II)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Figures to the right indicate full marks.***
2) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
3) ***Assume suitable data if necessary.***

Q1) a) With a neat block diagram, explain the features of the key elements of an optical fiber transmission link & what are the advantages of fiber optics communication. **[8]**

b) With reference to mode theory for optical propagation explain the terms. Phase velocity, group velocity, group delay, Mode field diameter. **[6]**

c) Explain bending loss in Fiber optics communication system? **[6]**

OR

Q2) a) Explain Erbium Doped Fiber Amplifier (EDFA) Architecture & amplifier mechanism. **[6]**

b) What are the key system requirements that are needed in analyzing a point-to-point explain the point-to-point link design with reference to choice of components? **[8]**

c) A typical relative refractive index difference for an optical designed for long distance transmission in 1%. Estimate the numerical aperture for the fiber when the core index is 1.46. Find the critical angle at the core cladding interface within the fiber. **[6]**

P.T.O.

Q3) a) Explain how satellite stays stable in orbit? Mention condition at which centripetal force = centrifugal force. **[10]**

b) Write a short note on look angle determination? **[6]**

OR

Q4) a) Explain briefly the following terms w.r.t satellite communication.

i) Prograde orbit

ii) Argument of perigee

iii) Ascending node & line of nodes

iv) Apogee

v) Perigee

vi) Solar day

vii) Sidereal day

viii) Azimuth angle **[8]**

b) Explain the AOCS subsystem of a satellite.With a neat diagram. **[8]**

Q5) a) Explain in detail how TTC & M is useful to determine satellite Health? **[8]**

b) Explain the orbital effects in communication system performance (draw diagrams & Write equations to support your answer). **[9]**

OR

Q6) a) Draw & Explain satellite Antenna subsystem? **[8]**

b) Explain satellite power subsystem w.r.t.

a) Eclipse

b) Solar battery life **[9]**

Q7) a) With Reference to a satellite system. Derive the expression for satellite link budget? **[8]**

b) A C-band earth station has an antenna with a transmit gain of 54dB. The transmitter outputs a distance of 37,000km by an antenna with gain of 26 dB. the signal is then routed to a transponder with a noise temperature of 500 k, a Bandwidth of 36 MHz & gain of 110 dB.

i) Calculate path loss at 6.1 GHz. wavelength is 0.04918m.

ii) Calculate the power at the o/p port of the satellite antenna in dBW.

iii) Calculate the noise power at the transponder i/p, in dBW, in a BW of 36 MHz.

iv) Calculate the C/N ratio, in dB in the transponder.

v) Calculate the carrier power in dBW & in watts, at the transponder output. **[9]**

OR

Q8) a) Write a short note on ku band rain effect. **[8]**

b) Derive & Explain importance of G/T ratio & System noise Temperature? **[9]**