Roll No. .....

Total Pages : 3

42112

May, 2019

M.Tech. (ECE) - I SEMESTER (Reappear)

Satellite & Space Communication (E16C 603)

Time : 3 Hours]

[Max. Marks : 75

Instructions :

1. *It is compulsory to answer all the questions (1.5 marks each) of Part-A in short.*
2. *Answer any four questions from Part-B in detail.*
3. *Different sub-parts of a question are to be attempted adjacent to each other.*

PART–A

1. (a) Why the uplink frequency is different from the down link frequency? Also give the reason to keep higher uplink frequency. (1.5)

(b) Differentiate between active and passive satellite. (1.5)

(c) What is system noise temperature? (1.5)

(d) Differentiate between symbol error rate and bit error rate. (1.5)

(e) What is meant by look angles? (1.5)

(f) List various frequency bands being used in satellite communication. (1.5)

(g) What is meant by tracking in satellite communication? (1.5)

(h) Differentiate between coherent and noncoherent digital modulation techniques. (1.5)

(i) The orbital period of a satellite is 650 min. Determine the semi major axis of the elliptical orbit. (1.5)

(j) Define the terms : (i) Perigee (ii) Apogee. (1.5)

PART–B

2. (a) What are the basic elements of a satellite communication system? Explain with a suitable block diagram. (5)

(b) Explain the Kepler's law of planetary motion and how are they applicable to the geostationary satellite. (5)

(c) A satellite is moving in a circular orbit at a height of 150 km above the surface of earth. If the radius of earth is 6360 km, determine the orbital velocity and orbital period of the satellite.
($G = 6.67 \times 10^{-11}$ Nm^2/kg, $M = 5.98 \times 10^{24}$ kg). (5)

3. (a) Explain the concept of earth coverage and slant range for geostationary satellite. What are the maximum values of these parameters? (7)

(b) Derive general link equations. Find out expressions for C/N and G/T ratios. Explain the importance of these ratios on satellite link design. (8)

4. (a) Explain what do you understand by rain rate? How this is related to specific attenuation? (5)

(b) Explain the following : (10)

(i) Atmospheric Absorption.

(ii) Ionospheric scintillation.

5. (a) Explain coherent detection of QPSK system. (5)

(b) Derive the relation of error of probability for PSK and FSK system. (5)

(c) What is time division multiplexing? How does it differ from frequency division multiplexing? Explain why TDM is the only option for digital satellite link? (5)

6. (a) Explain the need for a reference burst in TDMA system. What is the function of (i) the burst code word (ii) the carrier and bit time recovery channel in a TDMA burst? (8)

(b) What is the difference between a geostationary satellite and a low altitude satellite? Can a low altitude satellite be also used for communication purpose? If not why? (7)

7. Write shorts notes on :

(i) Orbital spacing.

(ii) VSAT.

(iii) SPADE system. *(5x3=15)*