

Code No: RT42043A

R13

Set No. 1

IV B.Tech II Semester Regular/Supplementary Examinations, April - 2018

SATELLITE COMMUNICATION

(Electronics and Communications Engineering)

Time: 3 hours

Max. Marks: 70

Question paper consists of Part-A and Part-B

Answer ALL sub questions from Part-A

Answer any THREE questions from Part-B

PART-A (22 Marks)

1. a) Write the Kepler's laws of planetary motion. [4]
- b) Define the azimuth angle. [3]
- c) What are the types of rocket motors used on satellites? [3]
- d) Define the processing gain. [4]
- e) List out the disadvantages of LEO satellites. [4]
- f) Write the various applications of GPS. [4]

PART-B (3x16 = 48 Marks)

2. a) Explain the frequency allocations for satellite services. [8]
- b) Why the uplink frequency is always greater than the downlink frequency in satellite communication? Explain. [8]
3. a) Derive the expression for the time period of satellite's orbit. [8]
- b) A satellite is in an elliptical orbit with a perigee of 1000 km and an apogee of 4000 km. using a mean earth radius of 6378.14 km, find the period of the orbit. [8]
4. a) What are the various subsystems in the satellite? Explain the power system. [8]
- b) Explain the redundancy type of approach used for improving reliability in satellite. [8]
5. a) What is G/T ratio of a satellite link? Derive the expression for it. [8]
- b) Explain the principle of CDMA with an example. [8]
6. a) Draw the general configuration of an earth station and explain each block. [8]
- b) What are the different satellite constellation designs? Explain any one. [8]
7. a) Explain the operation of GPS receiver. [8]
- b) Write short note on GPS C/A code accuracy. [8]

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Set No. 2

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SATELLITE COMMUNICATION

(Electronics and Communications Engineering)

Time: 3 hours

Max. Marks: 70

Question paper consists of Part-A and Part-B

Answer ALL sub questions from Part-A

Answer any THREE questions from Part-B

PART-A (22 Marks)

1. a) Define perigee of a satellite. [3]
- b) What is an elevation angle? [4]
- c) List out the main types of antennas used on satellite. [4]
- d) Define Intermodulation. [3]
- e) What are the various types of power amplifiers used at satellite earth station? [4]
- f) What are the different functions of GPS? [4]

PART-B (3x16 = 48 Marks)

2. a) What are the different segments in satellite architecture? Explain. [8]
- b) Why the uplink and downlink frequencies are different? Explain. [8]
3. a) Define the azimuth angle and derive the expression for it. [8]
- b) Describe the history of satellite launch vehicles. [8]
4. a) Explain the TTC&M satellite subsystem with a neat diagram. [10]
- b) Describe the functions of satellite communication subsystem. [6]
5. a) Derive the expression for system noise temperature of a satellite link. [8]
- b) Explain the frame structure of TDMA with a neat sketch. [8]
6. a) Explain the operation of earth station receiver with the help of a neat block diagram. [8]
- b) Explain the delay considerations of LEO, MEO and GEO satellites. [8]
7. a) Explain the generation of GPS signals with a neat sketch. [8]
- b) Explain the principle of differential GPS. [8]

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Set No. 3

IV B.Tech II Semester Regular/Supplementary Examinations, April - 2018

SATELLITE COMMUNICATION
(Electronics and Communications Engineering)

Time: 3 hours

Max. Marks: 70

Question paper consists of Part-A and Part-B

Answer ALL sub questions from Part-A

Answer any THREE questions from Part-B

PART-A (22 Marks)

1. a) Define apogee of a satellite. [3]
- b) What are the various orbital elements? [4]
- c) What are the differences between the geosynchronous and geostationary orbits? [4]
- d) Compare FDMA, TDMA and CDMA. [4]
- e) Define throughput. [3]
- f) What are the limitations of GPS? [4]

PART-B (3x16 = 48 Marks)

2. a) Explain the history of Indian satellite communications. [8]
- b) Describe the various frequencies used for satellite communications. [8]
3. a) Define the elevation angle and derive the expression for it. [8]
- b) What are the various types of satellite launch vehicles? Explain. [8]
4. a) Explain the altitude and orbit control system (AOCS) with necessary diagrams. [8]
- b) What are the various approaches used to improve the reliability of the satellite? Explain any one. [8]
5. a) What is satellite link equation? Derive the expression for it. [8]
- b) Explain the principle FDMA with a neat diagram. [8]
6. a) What are the different types of antenna mounts used at earth station? Explain. [8]
- b) Compare the low earth orbit and geostationary satellite systems. [8]
7. a) Explain the functions of control segment in GPS. [8]
- b) Describe the various sources of errors in GPS. [8]

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Set No. 4

IV B.Tech II Semester Regular/Supplementary Examinations, April - 2018

SATELLITE COMMUNICATION

(Electronics and Communications Engineering)

Time: 3 hours

Max. Marks: 70

Question paper consists of Part-A and Part-B

Answer ALL sub questions from Part-A

Answer any THREE questions from Part-B

PART-A (22 Marks)

1. a) Define subsatellite point of a satellite. [4]
- b) What is Doppler frequency shift? Write the expression for it. [4]
- c) What is a transponder? What are its types? [3]
- d) Write the formula to find the overall C/N ratio in a satellite when the uplink and downlink C/N ratio are given. [3]
- e) What are the future trends of satellite communications? [4]
- f) What are the different sources of GPS errors? [4]

PART-B (3x16 = 48 Marks)

2. a) Explain the architecture of a satellite communication system. [8]
- b) Explain the various applications of satellite communications. [8]
3. a) What are the various satellite launch vehicle selection factors? Explain them. [8]
- b) Explain the various orbital effects in satellite communication systems performance. [8]
4. a) What are the various forces acting on the satellite? Explain. [8]
- b) Explain the transponder for use in 14/11 GHz band with the help of a neat diagram. [8]
5. a) Derive the expression for C/N ratio in a satellite link. [8]
- b) Low earth orbit satellites use mainly L band, with ranges varying from 1000 km to 2500 km. Calculate the maximum and minimum path loss from earth to a satellite, in dB, for the uplink frequency of 1.6 GHz and down link frequency of 1.5 GHz. [8]
6. a) Explain the operation of earth station transmitter with the help of a neat block diagram. [8]
- b) Explain the throughput considerations of LEO, MEO and GEO satellites. [8]
7. a) Draw the block diagram of GPS receiver and explain its operation. [8]
- b) Explain the GPS position location principles. [8]