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
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PART–A *(22 Marks)*

1. a) Write the Keppler'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]

Code No: **RT42043A**   **R13**   Set No. 2

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 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]

Code No: **RT42043A**   **R13**   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
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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]

Code No: **RT42043A**   **R13**   **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]