Code No:**R1642043** **R16** **Set No. 1**

IV B.Tech II Semester Regular/Supplementary Examinations, June - 2022

SATELLITE COMMUNICATIONS

(Electronics and Communication 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 FOUR questions from Part-B

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PART–A *(14 Marks)*

1. a) How to determine look angle in geostationary satellite? [3]
   b) What is the significance of spacecraft subsystem? [2]
   c) What is free space loss (FSL)? [2]
   d) Differentiate multiplexing and multiple access. [2]
   e) Describe the operation of Dual cone sensor. [3]
   f) List the major sources of errors in a GPS receiver. [2]

PART–B *(4x14 = 56 Marks)*

2. a) Explain the functions of each element of a Mobile Satellite Service(MSS) [7]
   b) Describe various orbital parameters required to determine a satellite's orbit? [7]

3. a) Explain how the spin stabilization shall take place? Discuss. [7]
   b) Discuss about 6/4 GHz communication subsystem. [7]

4. a) Narrate the process of the design of downlink in satellite communications. [7]
   b) What is the effect of noise and interference on the performance of satellite? [7]

5. a) Explain about the frequency division multiple access of satellite system with a suitable example. [7]
   b) An antenna has a noise temperature of 35 K and it is matched into a receiver whichhas a noise temperature of 100 K. Calculate the noise power density and the noisepowerfor a BW of 36 MHz. [7]

6. a) Explain each block of the block diagram of Earth station transmitter. [7]
   b) Discuss about the delay and throughput in satellite system. [7]

7. a) Discuss in detail about GPS position location principles. [7]
   b) What is the importance of the costal loop in GPS receiver? Discuss [7]

Code No:**R1642043** **R16** **Set No. 2**

IV B.Tech II Semester Regular/Supplementary Examinations, June - 2022

SATELLITE COMMUNICATIONS

(Electronics and Communication 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 FOUR questions from Part-B

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PART–A *(14 Marks)*

1. a) List the applications of satellites. [2]
   b) What is the significance of spin stabilization? [2]
   c) What is antenna pointing loss? Explain. [2]
   d) Write about Time division multiple access (TDMA). [3]
   e) Explain the structure of cassegrain antenna. [3]
   f) What is Costas loop? [2]

PART–B *(4x14 = 56 Marks)*

2. a) Discuss in detail about the design considerations of a satellite communication system. [7]
   b) How can be the look angle determination can be done?. [7]

3. a) Explain in detail about tracking subsystem with neat block diagram. [7]
   b) Discuss about spacecraft subsystems. [7]

4. a) Discuss about noise figure and temperature and derive them. [7]
   b) Draw the satellite uplink model and discuss each block. [7]

5. a) Find the expression for transmitted power of a satellite using FDMA. [7]
   b) Explain the Traffic burst in TDMA. [7]

6. a) Discuss about monitoring and control for an earth station equipment. [7]
   b) Illustrate the scan angle of an individual beam width within instantaneous coverage. [7]

7. a) How GPS receiver works? [7]
   b) Write short notes on differential GPS. [7]

Code No:**R1642043** **R16** **Set No. 3**

IV B.Tech II Semester Regular/Supplementary Examinations, June - 2022

SATELLITE COMMUNICATIONS

(Electronics and Communication 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 FOUR questions from Part-B

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PART–A *(14 Marks)*

1. a) Define Kepler's laws and list the orbital elements of a satellite. [2]
   b) What are the requirements of telemetry system? [2]
   c) Define noise figure. Find the relation between noise figure and noise temperature. [3]
   d) Write about Processing Gain. [2]
   e) Describe the terminal characteristics of NGOSS. [3]
   f) How to avoid clock error in GPS satellite? [2]

PART–B *(4x14 = 56 Marks)*

2. a) Show that three communication satellites are necessary for earth's coverage. [7]
   b) The longitude and lattitude of an earth station are 73^0E and 19^0N. Calculate azimuth and elevation angles from earth station to a satellite launched at 135^0E. [7]

3. a) Discuss about Telemetry, Tracking and command in satellite system. [7]
   b) Describe various functions and characteristics of a transponder. [7]

4. a) Explain about the double conversion earth station receiver. [7]
   b) Why uplink frequency is different from downlink frequency? Explain. [7]

5. a) Derive the overall carrier to noise ratio in FDMA. [7]
   b) A satellite is in an elliptical orbit with a perigee of 1000km and an apogee of 4000km. find the period of the orbit and eccentricity of the orbit. [7]

6. a) Distinguish about the Low-noise amplifier and High power amplifier in satellite earth station. [7]
   b) Explain the connectivity of LEO satellites to MCS via geostationary satellite. [7]

7. a) What are the signal processing techniques used in GPS receiver?. [7]
   b) Explain the technique of range error budget used to provide accuracy in GPS C/A code receiver. [7]

Code No:**R1642043** **R16** **Set No. 4**

IV B.Tech II Semester Regular/Supplementary Examinations, June - 2022

SATELLITE COMMUNICATIONS

(Electronics and Communication 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 FOUR questions from Part-B

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PART–A *(14 Marks)*

1. a) Define perigee of a satellite. [2]
   b) Write about Doppler effect. [2]
   c) What is the effect of interference on the performance of satellite? [2]
   d) Write about the importance of guard time in TDMA. [3]
   e) What is meant by sun-sync orbit? [2]
   f) Describe the codeless signal processing technique used in GPS receiver. [3]

PART–B *(4x14 = 56 Marks)*

2. a) Discuss the applications of satellite communications. [7]
   b) Satellite receives sun rays at $7^0 6'$ and the duration of eclipse is 56 min. calculate i) Radius of orbit ii) Height of the satellite. [7]

3. a) Explain various ways of electrical power generation in satellite. [7]
   b) Discuss about the practical satellite antennas. [7]

4. a) Explain about different losses exist in EM wave propagation from earth station to satellite. [7]
   b) Thermal noise in and earth station receives results in a $(C/N)_{dn}$ ratio of 20dB. A signal is received from a bent pipe transponder with a carrier to noise ratio $(C/N)_{up}$=20dB. What is the value of overall $(C/N)_o$ ratio at the earth station? If the transponder introduces intermodulation products with $(C/N)_I$ ratio =24dB. What is the overall $(C/N)_o$ ratio at the receiving earth station? [7]

5. a) Distinguish about processing gain and intermodulation. [7]
   b) Write about Code Division Multiple Access (CDMA). [7]

6. a) Draw the block diagram of earth station receiver and explain each block. [7]
   b) Explain the general aspects of coverage and frequency considerations of low earth orbit. [7]

7. a) Write subframe details of GPS navigation message. [7]
   b) What are the major sources of errors in GPS receiver? Explain. [7]