R22 Regulation *Subject code:4P7DF*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A+' Grade)

B.Tech VII Semester Regular Examinations, November 2025

SATELLITE COMMUNICATIONS

(ECE)

Maximum Marks: 60 Date: 01.12.2025 Duration: 3 hours

Note: **1.This question paper contains two parts A and B.**
2. Part A is compulsory which carries 10 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks (10X1M=10 Marks)		Marks	CO	BloomTx
1.a)	Why uplink frequency is kept higher than the downlink frequency in a satellite?	1M	1	L1
b)	How do the geostationary and geosynchronous orbits differ?	1M	1	L2
c)	State Kepler's second law.	1M	2	L1
d)	Define apogee and perigee.	1M	2	L3
e)	What is meant by Pitch angle and propellant.	1M	3	L2
f)	What is noise power spectral density?	1M	3	L1
g)	What is polarization interleaving?	1M	4	L2
h)	State the basic requirements of an earth station antenna.	1M	4	L1
i)	Write the principle behind DTH and GPS.	1M	5	L2
j)	Give the types of satellite services.	1M	5	L3

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	Bloom Tx
2	a) Explain the historical background of satellite communication. b) Demonstrate the orbital aspects, which are of importance in synchronous satellite communications. Explain these aspects in brief.	5M 5M	1	L1 L2
	OR			
3	a) Give the mathematical formulation of Kepler's third law for planetary motion. Express the importance of perigee and apogee in determining the orbit of a satellite in space. b) List out and elaborate the different types of orbits.	5M 5M	1	L2 L1
4	a) What are the various elements used in the space segments of a satellite system? Explain the need and function of each element in the satellite system. b) Why is thermal control necessary in a satellite? Explain	5M 5M	2	L3 L4
	OR			
5	a) What are the three main systems for tracking satellites? How can tracking systems be affected?	5M	2	L3

	b) What is the use of frequency reuse technique in communication subsystem and how it is employed?	5M		L3
6	a) Compare the features of the various multiple access schemes deployed for satellite access. Compare the salient features of FDMA, TDMA and CDMA. b) What are the main functions of TTC subsystem? Explain.	5M 5M	3	L4 L1
	OR			
7	a) From the calculation of system noise temperature prove that C/N ratio is directly proportional to G/T ratio. b) Consider the receive side of an earth station. The antenna gain is 65dB, and its noise contribution is 60 K. The waveguide loss is 0. 5dB. Determine the equivalent noise temperature of LNA assuming that the noise contribution by the down converter is negligible and earth station G/T is 40dB/K.(To =300K)	5M 5M	3	L2 L2
8	a) In detail, explain the block diagram representation of a typical earth station. b) Describe the VSAT system	5M 5M	4	L3 L2
	OR			
9	a) List the design considerations of lower orbit b) With the help of block diagram elucidate the tracking system in ground earth station.	5M 5M	4	L3 L2
10	a) Describe the Delay & Throughput Consideration in orbit. b) Briefly describe about satellite navigation system.	5M 5M	5	L2 L3
	OR			L4
11	a) Describe the NGSO orbits b) Discuss in detail about GPS satellite services.	5M 5M	5	L1 L1