Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI EXAMINATION – SUMMER 2025

Subject Code:3161010 Date:30-05-2025

Subject Name:Satellite Communication

Time:10:30 AM TO 01:00 PM Total Marks:70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	Define: (1) Sub satellite path (2) Retrograde Orbit (3) Inclination	**03**
	(b)	Describe various types of services provided by the satellite and also show the Frequency band designations.	**04**
	(c)	Describe the different types of orbits used for satellite communication with necessary figures.	**07**
Q.2	**(a)**	Define: (1) Mean Anomaly (2) true anomaly (3) Prograde Orbit	**03**
	(b)	Explain Apogee Height and perigee height with necessary equations.	**04**
	(c)	Explain Three laws of Kepler for planetary motion with figures.	**07**
		OR	
	(c)	What are the orbit perturbations? Explain the Effect of Non-spherical Earth with necessary equations.	**07**
Q.3	**(a)**	What are the conditions required for an orbit to be geostationary?	**03**
	(b)	What do you mean by The space segment and the satellite equipments? Explain in detail.	**04**
	(c)	Draw and explain the block diagram of satellite transponder in detail.	**07**
		OR	
Q.3	**(a)**	With necessary diagram explain: Spinning satellite Stabilization.	**03**
	(b)	Explain the term: Station keeping.	**04**
	(c)	What is the three axis stabilization? Explain with the help of suitable diagram. What are the advantages and disadvantages of three axis stabilization?	**07**
Q.4	**(a)**	Explain sun Transit outage.	**03**
	(b)	Calculate the apogee and Perigee heights for the orbital parameters e=0.0011501, a=7192.335 km and mean earth radius=6371 km.	**04**
	(c)	Write a short note on attitude control system..	**07**
		OR	
Q.4	**(a)**	Calculate the free space loss for a satellite at 42000 km from an earth station, if the signal frequency is 6 GHz.	**03**
	(b)	Explain the concept of Doppler shift with necessary equations.	**04**
	(c)	Explain the DSSS-CDMA for satellite communication with necessary diagrams.	**07**
Q.5	**(a)**	What are the advantages and disadvantages of Demand assigned FDMA?	**03**
	(b)	What is link power budget equation? Explain briefly.	**04**
	(c)	With diagram explain : SPADE System	**07**

OR

Q.5	**(a)**	Describe the merits of Demand assigned TDMA system.	**03**
	(b)	A satellite stationed at a distance 38000 km from the surface of earth radiates a power of 3 watts, in the direction of an earth station .Assuming the satellite antenna gain to be 20dB, calculate the flux density at the earth station and the power received by the antenna of an effective area 8m.	**04**
	(c)	Describe: Satellite switched TDMA with figures.	**07**

****