Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– VI (NEW) EXAMINATION – WINTER 2021

Subject Code:3161010 Date:04/12/2021

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)**	Draw and explain a simple block diagram of Satellite Communication System.	**03**
	(b)	Write a brief history of Satellite Systems.	**04**
	(c)	State the advantages, drawbacks, applications and frequency bands used for satellite communication.	**07**
Q.2	**(a)**	Determine the orbital period of a satellite for a circular orbit.	**03**
	(b)	Mention apogee, perigee and apogee height, perigee height.	**04**
	(c)	What are Kepler's three laws of planetary motion? Give the mathematical formulation of Kepler's third law of planetary motion.	**07**
		OR	
	(c)	Explain the difference between Sidereal Day and Solar Day.	**07**
Q.3	**(a)**	Explain Attitude control and Orbital Control of a satellite.	**03**
	(b)	Write a note on Station Keeping explaining different Station Keeping Maneuvers.	**04**
	(c)	What is the purpose of Telemetry, Tracking, Command, and Monitoring in Satellite communication? Explain in detail.	**07**
		OR	
Q.3	**(a)**	Explain why some satellites employ cylindrical solar arrays, whereas others employ solar-sail arrays for the production of primary power. State the typical power output to be expected from each type. Why is it necessary for satellites to carry batteries in addition to solar-cell arrays?	**03**
	(b)	Briefly describe the three-axis method of satellite stabilization.	**04**
	(c)	Explain the block diagram of Satellite Transponder. Also explain the frequency reuse technique for Transponder.	**07**
Q.4	**(a)**	What is sun transit outage? What is its effect and remedy for it?	**03**
	(b)	What is Earth eclipse of Satellite? Are there any ways of avoiding eclipse during lifetime of satellite.	**04**
	(c)	Explain the Spade system.	**07**
		OR	
Q.4	**(a)**	A satellite downlink at 12 GHz operates with a transmit power of 6 W and an antenna gain of 48.2 dB. Calculate the EIRP in dBW.	**03**
	(b)	The range between a ground station and a satellite is 42000 km. Calculate the free space loss a frequency of 6 GHz.	**04**
	(c)	Explain how to compute uplink and downlink C/N ratios for a typical satellite link.	**07**

Q.5	**(a)**	What is SCPC?	**03**
	(b)	What is an TDMA? What are the advantages?	**04**
	(c)	List the types of Multiple Access Scheme used in the satellite communication and give its comparisons.	**07**

OR

Q.5	**(a)**	What is the meaning of multiple access?	**03**
	(b)	What is meant by space division multiple access?	**04**
	(c)	With the help of equation and block diagram, properly explain the Code Division multiple Access in detail.	**07**

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