Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–VI (NEW) EXAMINATION – WINTER 2024

Subject Code:3161010 Date:05-12-2024

Subject Name:Satellite Communication

Time:02:30 PM TO 05:00 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: Prograde orbit, retrograde orbit, Mean anomaly	**03**
	(b)	Define: True anomaly, Argument of perigee, Apogee, Perigee	**04**
	(c)	Describe: (1) Kepler's first law with figure. (2) Kepler's Second law with figure.	**07**
Q.2	**(a)**	Describe Kepler's Third law.	**03**
	(b)	Define: (1) Ascending node. (2) Descending node (3) Line of Nodes (4) Inclination	**04**
	(c)	Describe: Feeder losses and antenna misalignment losses with figures.	**07**
		OR	
	(c)	Explain preassigned FDMA in detail.	**07**
Q.3	**(a)**	What are the conditions required for an orbit to be geostationary?	**03**
	(b)	Show the table containing different frequency bands (used with satellite communication) along with Band designation.	**04**
	(c)	Describe Noise temperature of absorptive networks and show that the noise factor of a lossy network is equal to its power loss.	**07**
		OR	
Q.3	**(a)**	Define: equivalent isotropic radiated power.	**03**
	(b)	Explain the term: Station keeping.	**04**
	(c)	With diagram Explain the overall system noise temperature and write its equation. Also derive the equation for carrier to Noise ratio.	**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)	Draw the complete satellite circuit which includes combined uplink and downlink. Derive the equation for combined Noise-to-carrier ratio N_0/C.	**07**
		OR	
Q.4	**(a)**	Calculate the radius of a circular orbit for which the period is one day.	**03**
	(b)	What are the advantages of satellite communication systems?	**04**
	(c)	The apogee and perigee distance of a satellite orbiting in an elliptical orbit are respectively 45000 km and 7000 km.Determine the following: (1) Semi-major axis of the elliptical orbit. (2) Orbital eccentricity	**07**

(3) Distance between the center of the earth and the center of elliptical orbit.

Q.5	**(a)**	Define Direct sequence Spread Spectrum.	**03**
	(b)	Explain Preassigned TDMA with diagram.	**04**
	(c)	Explain satellite switched TDMA with diagram.	**07**

OR

Q.5	**(a)**	Explain the space segment.	**03**
	(b)	With diagram explain the function of basic CDMA system.	**04**
	(c)	Illustrate the basic TDMA concept in which the stations transmit bursts in sequence. Draw necessary figures.	**07**

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