Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – I • EXAMINATION – SUMMER • 2014

Subject code: 710418N **Date: 26-06-2014**

Subject Name: Satellite Communication

Time: 02:30 pm - 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.**

Q.1	**(a)**	Explain Keplerôs first, second and third law of planetary motion Also explain why there is only one geostationary orbit?	**07**
	(b)	Define the following terms: (i) Prograde orbit (ii) True Anomaly (iii) Mean Anomaly (iv)Right ascension of the ascending node (v) Perigee (vi) Argument of perigee (vii) Inclination	**07**
Q.2	**(a)**	Describe the orbital perturbations.	**07**
	(b)	Thermal noise in an earth station receiver results in a $(C/N)_{dn}$ ratio of 20.0dB. A signal is received from a bent pipe transponder with a carrier to noise ratio $(C/N)_{up}$ = 20 dB. What is the value of overall $(C/N)_o$ at the earth station? If the transponder introduces intermodulation products with (C/I) ratio= 24dB, what is the overall $(C/N)_o$ ratio at the receiving earth station?	**07**
		OR	
	(b)	A quasi-GEO satellite is in a circular equatorial orbit close to geosynchronous altitude. The quasi-GEO satellite, however, does not have a period of a one sidereal day, its orbital period is exactly 24h, one solar day. Calculate (i)the radius of the orbit (ii) is the satellite moving toward the east or toward the west? Given Earth gravitational constant ε =3,986005 $x10^{14}$ m^3/s^2.	**07**
Q.3	**(a)**	Briefly describe the pre-assigned and demand assigned FDMA system?	**07**
	(b)	Briefly describe TDMA system. What are the functions of preamble and unique word in TDMA frame?	**07**
		OR	
Q.3	**(a)**	Discuss onboard signal processing for FDMA/TDMA operation. In what ways it is advantageous compared to transparent transponder?	**07**
	(b)	What is the purpose of Telemetry, Tracking, Command and Monitoring in satellite communication? Explain in detail.	**07**
Q.4	**(a)**	Briefly describe the three-axis method of satellite stabilization.	**07**
	(b)	Explain what is meant by the G/T ratio of a satellite receiving system. Suppose we have a 4-GHz receiver with the following gains and noise temperatures T_{in}=25K,T_{RF}= 50K, T_{IF}= 1000K, T_{in}= 500K,G_{RF}=23dB,G_{IF}=30dB. Calculate the system noise temperature assuming that the mixer has a gain G_m= 0dB.	**07**
		OR	
Q.4	**(a)**	Briefly describe functional block diagram of the communication transponder. Explain why de-multiplexer and multiplexers are used ?	**07**
	(b)	Describe and compare MATV and CATV systems.	**07**
Q.5	**(a)**	Define and explain the terms roll, pitch and yaw.	**07**
	(b	Explain in detail the operation of the Spade system of demand assignment. What is the function of common signaling channel?	**07**

OR

Q.5	**(a)**	Describe the antenna subsystem in the space segment.	**07**
	(b	Explain input and output back-off in power amplifier.	**07**

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