Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME SEMESTER II EXAMINATION – SUMMER 2017

Subject Code: 2720506 **Date: 30/05/2017**

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.**

Q.1	**(a)**	State Kepler's laws of planetary motion. Derive the expression for Time period of oscillation of a body in motion around earth.	**07**
	(b)	How does a satellite manage to remain suspended in the orbit?	**07**
Q.2	**(a)**	Define Apogee, Perigee. A satellite is in an elliptical orbit with a perigee of 1000 km and an apogee of 4000 km. Find its orbital period and eccentricity.	**07**
	(b)	Draw and explain (1) Inclined (2) Geostationary (3) Geosynchronous Orbit	**07**
		OR	
	(b)	State all the elements of the Keplerian set and locate them with the help of a diagram.	**07**
Q.3	**(a)**	With the help of a diagram, show the uplink and discuss related losses along this link.	**07**
	(b)	Classify the launch vehicles into different categories and describe them.	**07**
		OR	
Q.3	**(a)**	Define Sub satellite point, Zenith, Nadir, the central angle and the local horizontal. With the help of a diagram, show each of them.	**07**
	(b)	Write a short note on Orbital Perturbations.	**07**
Q.4	**(a)**	Write a short note on AOCS of the satellite. Show locations of stable points.	**07**
	(b)	How equipment reliability plays a significant role in space applications? Justify the use of Redundant system to uphold the reliability of the integral units.	**07**
		OR	
Q.4	**(a)**	Write a short note on different satellite antennas.	**07**
	(b)	CDMA techniques that were originally devised for military, uses a signal spreading technique that highlights the low probability of intercept. Give an example of this.	**07**
Q.5	**(a)**	Three identical large earth stations with 500W saturated output power transmitters access a 36 MHz bandwidth transponder using FDMA. The transponder saturated output power is 40W and it is operated with 3 dB output back off when FDMA is used. The gain of the transponder is 105 dB in its linear range. The BW of the earth station signals are Station A:15 MHz, Station B: 10 MHz, and Station C:5 MHz. Find the power level at the output of the transponder and at the input to the transponder in dBW for each earth station signal, assuming that the transponder is operating in its linear region with 3 dB output backoff. Each earth station must transmit 250 W to achieve an output power of 20W from the transponder. Find the transmit power for each earth station when the transponder is operated by the three earth stations.	**07**
	(b)	Explain the working of the GPS system using diagrams.	**07**
		OR	
Q.5	**(a)**	Show using diagram, the stratiform rain attenuation and the convective rain attenuation. Discuss non-hydro propagation effects.	**07**
	(b)	Explain Split Two Way Implementation in VSAT network. How to avoid interferences in VSAT network?	**07**

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