

GUJARAT TECHNOLOGICAL UNIVERSITY
PDDC - SEMESTER- VII • EXAMINATION – SUMMER 2014

Subject Code: X71104**Date: 05-06-2014****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) An earth station is located at latitude 30°S and longitude 130°E . Calculate the antenna-look angles for a satellite at 156°E . **07**

(b) Answer the following questions: **07**

- 1 Describe briefly the main advantages offered by satellite communications. Explain what is meant by a distance-insensitive communications system.
- 2 State Kepler's first & second laws for planetary motion.

Q.2 (a) List and explain orbital elements that define earth-orbiting artificial satellites. **07**

(b) Answer the following questions: **07**

- 1 Calculate the radius of a circular orbit for which the period is 1-day.
- 2 Describe orbit perturbations in brief.

OR

(b) Answer the following questions: **07**

- 1 Calculate the apogee and perigee heights for a satellite orbit having orbital parameters as given: radius of the orbit (semimajor axis) = 7192.3 km, eccentricity = 0.0011501, and mean earth radius = 6371 km.
- 2 Explain what is meant by geostationary orbit. How does the geostationary and geosynchronous orbit differ?

Q.3 (a) List various types of control required to maintain the satellite in space and explain orbit control system. **07**

(b) A satellite circuit has the following parameters: **07**

	Uplink, decibels	Downlink, decibels
[EIRP]	54	34
[G/T]	0	17
[FSL]	200	198
[RFL]	2	2
[AA]	0.5	0.5
[AML]	0.5	0.5

Calculate the overall $[C/N_0]$ value.

OR

Q.3 (a) Explain the working of a satellite transponder with the help of a block diagram. **07**

(b) Answer the following questions: **07**

- 1 An uplink operates at 14 GHz, and the flux density required to saturate the transponder is $-120 \text{ dB(W/m}^2\text{)}$. The free-space loss is 207 dB, and the other propagation losses amount to 2 dB. Calculate the earth-station [EIRP] required for saturation, assuming clear-sky conditions. Assume [RFL] is negligible.
- 2 What is meant by the G/T ratio of a satellite receiving system? Write the steps to be followed for downlink power budget preparation.

Q.4 (a) Describe the general operating principle of TDMA. Explain the need for a **07**

reference burst in TDMA system.

- (b) Describe demand access systems in relation to multiple access techniques for satellite link. **07**

OR

- Q.4 (a)** List the application of VSAT. Describe the access control protocols used in VSAT network. **07**

- (b) Discuss the effects of rain in satellite propagation. How XPD are predicted? **07**

- Q.5 (a)** Explain orbit considerations with respect to Non-Geostationary Satellite Orbit (NGSO) and describe Orbcomm system in brief. **07**

- (b) Write a short note on GPS receiver. **07**

OR

- Q.5 (a)** Write detail note on master control station required for Direct Broadcast Satellite Television (DBS-TV) system. **07**

- (b) Answer the following questions: **07**

- 1 Explain principle of GPS position location.
- 2 An amplifier having a noise temperature of 200 K has a 4-dB attenuator connected at its input. Calculate the effective noise temperature referred to the attenuator input.
