

GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER-VII(OLD) • EXAMINATION – WINTER 2016

Subject Code: 171007**Date: 18/11/2016****Subject Name: Satellite Communication (Department Elective - I)****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.

- Q.1 (a)** An earth station is located at latitude 12° S and longitude 52° W. Calculate the antenna look angles for a satellite at 70° W. **07**
- (b)** Answer the following questions: (3+2+2 Marks) **07**
- 1 Explain Kepler's first & second laws for planetary motion.
 - 2 Which features are offered by Satellites that are not readily available with other means of communications?
 - 3 What is meant by geostationary orbit?

- Q.2 (a)** A satellite is in elliptical orbit with a perigee of 1000 km and an apogee of 4000 km. Assuming a mean earth radius of 6378.14 km; determine the period of the orbit in hours, minutes, and seconds, and the eccentricity of the orbit. **07**
- (b)** Explain orbital elements that define earth-orbiting artificial satellites. Also discuss the effects of the earth's oblateness. **07**

OR

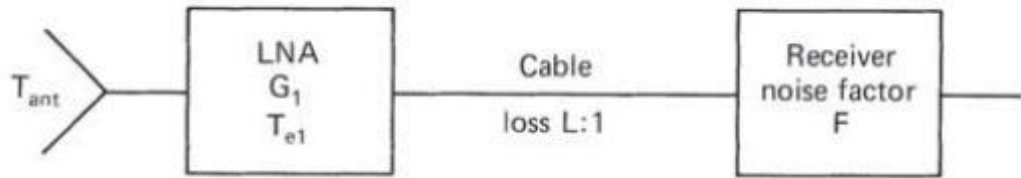
- (b)** Describe typical tracking, telemetry, command and monitoring system for satellite. **07**
- Q.3 (a)** Calculate the overall $[C/N_0]$ for a satellite circuit having the following parameters: **07**

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

- (b)** Answer the following questions: (4+3 Marks) **07**
- 1 Write brief note on satellite transponder.
 - 2 Briefly describe the three-axis method of satellite stabilization.

OR

- Q.3 (a)** Explain saturation flux density and input back-off for a satellite TWT amplifier. Find the carrier-to-noise density ratio at the satellite input for an uplink, which has the following parameters: operating frequency 6 GHz, saturation flux density -95 dBW/m²; input backoff 11 dB; satellite $[G/T]$ -7 dBK⁻¹, $[RFL]$ 0.5 dB. **07**
- (b)** Answer the following questions: (4+3 Marks) **07**
- 1 For the system shown in figure below, the receiver noise figure is 12 dB, the cable loss is 5 dB, the LNA gain is 50 dB, and the noise temperature 150 K. The antenna noise temperature is 35 K. Calculate the noise temperature referred to the input. Why LNA must be placed ahead of the cable?



2 Describe the main features and services offered by the orbcomm satellite system.

Q.4 (a) Illustrate basic TDMA concept and explain satellite switched TDMA with onboard processing. **07**

(b) Write detail note on Demand Access Multiple Access technique for satellite link. **07**

OR

Q.4 (a) Describe the operation of a typical VSAT system and discuss VSAT network architectures. **07**

(b) List different NGSO orbits and explain sun synchronous orbit in detail. **07**

Q.5 (a) Describe general arrangement of position locations with GPS and explain why a minimum of four satellites must be visible at any earth location utilizing the GPS system for position determination. **07**

(b) Explain DBS-TV receiver in detail using block diagram. **07**

OR

Q.5 (a) Explain GPS receiver operation in detail. **07**

(b) Answer the following questions: (4+3 Marks) **07**

1 Explain prediction of XPD in brief.

2 Discuss any one propagation effect that is not associated with hydrometeors.
