

**GUJARAT TECHNOLOGICAL UNIVERSITY**

M.E Sem-I Examination January 2010

**Subject code:710418****Subject Name: Satellite Communication****Date: 27 /01 / 2010****Time: 12.00 – 2.30 pm****Total Marks: 60****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) What is meant by Orbital Elements? Explain each of them with the aid of a neat sketch. **06**
- (b) With the aid of the block schematic briefly describe the outdoor and indoor unit in a home terminal DBS TV receiving system. **06**

- Q.2** (a) Explain Side Real Day and Mean Solar Day. How they are related to each other? **06**
- (b) A satellite in geostationary orbit has an apogee height of 35,795 km and perigee of 35,779 km. Assuming a value of 6378 km for the earth's equatorial radius; determine the semimajor axis and eccentricity of the satellite's orbit. **06**

**OR**

- (b) Explain combined uplink and downlink C/N ratio **06**
- Q.3** (a) What do you mean by Antenna Look Angles? What parameters of earth station and satellite are required to determine the look angles for a geostationary orbit? **06**
- (b) A satellite circuit has following parameters **06**

Quantity	Uplink ,decilogs	Downlink ,decilogs
[EIRP]	54	34
[GIT]	0	17
[FSL]	200	198
[RPL]	2	2
[AA]	0.5	0.5
[AML]	0.5	0.5

Calculate the overall [C/No] value.

**OR**

- Q.3** (a) A geostationary satellite is at  $90^{\circ}$  W. Calculate the azimuth angle for an earth station antenna at a latitude of  $35^{\circ}$  N and longitude  $100^{\circ}$  W **06**
- (b) Distinguish between pre-assigned and demand-assigned traffic in relation with satellite communications network. **06**
- Q.4** (a) Explain what is meant by satellite attitude, and briefly describe two forms of attitude control **06**

- (b) Explain Reference Burst in TDMA system. **06**

Also calculate the frame efficiency for an INTELSAT frame given the following information:

Total frame length=120,832 symbols

Traffic bursts per frame =14

Reference bursts per frame =2

Guard interval= 103 symbols

**OR**

- Q.4** (a) Determine the angle of tilt required for a polar mount with an earth station at altitude  $49^{\circ}$  N. assume a spherical earth of mean radius 6371 km and ignore earth station altitude. **06**
- (b) Explain why the LNA of a receiving system is placed at the antenna end of the feeder cable. **06**

Also calculate the overall noise temperature referred to the LNA input for LNA connected to a receiver which has a noise figure of 12 dB. The gain of the LNA is 40dB and its noise temperature is 120K.

- Q.5** (a) Briefly discuss the phenomenon of eclipse due to earth as applied to a geostationary satellite and solar interference at earth station. **06**
- (b) Describe on-board signal processing for FDMA/TDM operation. **06**

**OR**

- Q.5** (a) Explain the working of a transponder with the help of a block diagram, showing different sub-systems and approximate RF levels. **06**
- (b) Explain unique word detection w.r.t TDMA **06**

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