

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

**Subject Code:2171007****Date:21/11/2016****Subject Name:Satellite Communication(Departmental Elective - II)****Time:10.30 AM to 1.00 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)** Describe the following terms of Earth orbiting satellites **07**  
 (1) Ascending node (2) line of apsides (3) Inclination (4) Apogee (5) True anomaly (6) Mean anomaly (7) Retrograde orbit
- (b)** Explain Kepler's three law of planetary motion with require expression. **07**
- Q.2 (a)** A C-band earth station has an antenna with a transmit gain of 54 dB. The transmitter output power is set to 100 W at a frequency of 6.100 GHz. The signal is received by a satellite at a distance of 37,500 km by an antenna with a gain of 26 dB. The signal is then routed to a transponder with a noise temperature of 500 K, a bandwidth of 36 MHz, and a gain of 110 dB. Calculate (a) path loss at 6.1 GHz. (b) power at the output port of the satellite antenna, in dBW. (c) noise power at the transponder input (d) C/N ratio, in dB, in the transponder (e) carrier power, in dBW and in watts, at the transponder output. **07**
- (b)** Explain Atmospheric Losses and Ionosphere Effects for radio wave propagation. **07**
- OR**
- (b)** Explain how depolarization is caused by ionosphere, rain and ice. **07**
- Q.3 (a)** What is the purpose of Telemetry, Tracking, Command, and Monitoring in Satellite communication? Explain in detail. **07**
- (b)** Explain elevation angle and azimuth angle calculation with proper derivations. **07**
- OR**
- Q.3 (a)** Write a short note on Receive-Only Home TV Systems. **07**
- (b)** Write a short note on transponder. **07**
- Q.4 (a)** (i) What is Free space loss? The range between a ground station and a satellite is 42,000 km. Calculate the free-space loss at a frequency of 6 GHz. **03**  
 (ii) Derive Friis transmission equation for received power in any radio link. **04**
- (b)** Compare FDMA, TDMA and CDMA techniques. **07**
- OR**
- Q.4 (a)** Discuss the various design issues related with uplink design and give the Expression C/N ratio for the same. **07**
- (b)** What do you mean by multiple access technique? Explain Time Division Multiple Access in detail. **07**
- Q.5 (a)** How the error control done in Digital DBS-TV? Explain it. **07**
- (b)** Write a short note on VSAT. **07**
- OR**
- Q.5 (a)** Explain DBS satellite system. **07**
- (b)** Write a short note on Global Positioning Satellite System. **07**