

Seat No.: \_\_\_\_\_

Enrolment No. \_\_\_\_\_

**GUJARAT TECHNOLOGICAL UNIVERSITY**

**BE - SEMESTER-VIII (NEW) - EXAMINATION – SUMMER 2018**

**Subject Code: 2181007**

**Date: 07/05/2018**

**Subject Name: Satellite Communication(Departmental Elective - III)**

**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) Define: Line of nodes, Equinox and Satellite footprint. **03**
- (b) What are the advantages and disadvantages for Satellite Communication? **04**
- (c) Determine the radius of a circular orbit for which the period is one day. **07**
- Q.2**
- (a) Define Prograde Orbit, Retrograde Orbit and Satellite trajectory. **03**
- (b) State and Explain Kepler's 2<sup>nd</sup> and 3<sup>rd</sup> laws for planetary motion. **04**
- (c) For a satellite in a polar orbit, Perigee height is 600km and apogee height is 1200km. Determine mean motion, rate of regression of nodes and rate of rotation of line of apsides. Assume mean radius of earth is 6371km. **07**

**OR**

- (c) Earth station is located at longitude 130°E & latitude 30°S, Satellite longitude is 156°E. Determine the azimuth and look angle of transmitted antenna. **07**
- Q.3**
- (a) Explain Frequency Reuse by Spatial Isolation in brief. **03**
- (b) Explain Time Division Multiple Access system in brief. **04**
- (c) Design the downlink budget for a satellite system with following parameters: **07**
- a) Satellite transmitter output power at saturation=10dbW
  - b) Satellite back off loss=0.1dB
  - c) Satellite branching and feeder loss=0.5 dB
  - d) Satellite transmit antenna gain=30.8 dB
  - e) Additional downlink atmospheric losses=0.4 dB
  - f) Free space path loss=205.6 dB
  - g) Earth station receiver antenna gain=62 dB
  - h) Earth station branching and feeder losses= 0 dB
  - i) Earth station equivalent noise temperature=270°K
  - j) Earth station G/Ts=37.7 dB/°K
- Determine [C/N<sub>0</sub>] for Downlink.

**OR**

- Q.3**
- (a) Draw and explain Double conversion Satellite Transponder for Ku band. **03**
- (b) Explain the difference between FDMA, TDMA & CDMA. **04**
- (c) What is uplink and downlink? Design all the steps to follow for Uplink power budget preparation. **07**

- Q.4** (a) Explain the spade system in short. **03**
- (b) Explain How the prediction of rain attenuation is possible? **04**
- (c) Discuss the fooling satellite NGSO Systems (i) Iridium (ii) Global star **07**

**OR**

- Q.4** (a) Define Frame Efficiency & Channel Capacity. **03**
- (b) Explain what is XPD? How XPD are predicted? **04**
- (c) Explain Elliptical orbits and Molniya orbit with their uses. **07**

- Q.5** (a) Evaluate the Friss transmission equation used for calculating the power received by a radio link. **03**
- (b) Explain Master Control Station required for Direct Broadcast Satellite Television (DBS-TV) system in short. **04**
- (c) Explain How the error control done in Digital DBS-TV? Explain it. **07**

**OR**

- Q.5** (a) Evaluate the System Noise Temperature of earth station receiver. **03**
- (b) Explain following terms in detail regarding GPS. (1) Signal levels (2) Timing Accuracy **04**
- (c) Explain the principles of GPS location finding. Also explain Satellite signal acquisition in detail. **07**

\*\*\*\*\*