

**GUJARAT TECHNOLOGICAL UNIVERSITY****M.E Sem-I Regular Examination January / February 2011****Subject code: 710418N****Subject Name: Satellite Communication****Date: 05/02 /2011****Time: 02.30 pm – 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) State and explain Kepler's law in relation to artificial satellites orbiting the earth. **07**  
(b) Explain different types of Losses covered in link power budget calculations in detail. **07**

- Q.2** (a) Explain what is meant by the limits of visibility in relation to satellite communications. Show that for an earth station at equator the longitude limit is given by  $\pm 81.3$  degree **07**  
(b) What is fundamental unit of universal coordinated time? Express the following times in (a) days and (b) degrees: i) 0 h, 5 min, 24 s; ii) 6 h. 35 min, 20 s. **07**

**OR**

- (b) Explain what is meant by (a) antenna noise temperature, (b) amplifier noise temperature, and (c) system noise temperature referred to input. **07**  
A system operates with an antenna noise temperature of 40 K and an input amplifier noise temperature of 120 K. Calculate the available noise power density of the system referred to the amplifier input.

- Q.3** (a) What is meant by apogee height and perigee height? Calculate apogee and perigee heights for a satellite orbit having following parameters: a) radius of the orbit = 7192.335 km. b) eccentricity = 0.0011501 c) mean earth radius = 6371 km. **07**  
(b) Explain Input Back Off and Output Back Off for satellite TWT amplifier. **07**

**OR**

- Q.3** (a) Describe the TT&C facility of a satellite communication system. Is this a part of the space segment or part of ground segment of the system. **07**  
(b) Explain Reference Burst in TDMA system. **07**  
Also calculate the frame efficiency for an INTELSAT 2ms frame using the compositions of reference burst R and given the following information:  
Total frame length = 120,832 symbols  
Traffic bursts per frame = 14  
Reference bursts per frame = 2  
Guard interval = 103 symbols

- Q.4** (a) Briefly describe the equipment section making up a transponder channel **07**  
(b) Explain Bit Rates for Digital Television. **07**

**OR**

- Q.4 (a)** Explain the following terms: **(Any Two)** **07**
- (a) Frequency Reuse
  - (b) Sidereal Day
  - (c) Sun Transit Outage
  - (d) Hohmann Orbit
- (b)** Explain in detail the operation of the Spade system of demand assignment. What is the function of the common signaling channel? **07**
- Q.5 (a)** Explain what is meant by the term despun antenna and briefly describe one way in which the despunning is achieved **07**
- (b)** With the aid of a block schematic, briefly describe the functioning of the indoor receiving unit of a satellite TV/FM receiving system intended for home reception. **07**
- OR**
- Q.5 (a)** With help of a neat sketch explain what is meant by each of the angles: (a) inclination, (b) argument of perigee, (c) right ascension of ascending node **07**
- (b)** Explain Network Synchronization in TDMA system. **07**

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