

B.E. (CST, IT) Part-IV 8th Semester Examination, 2007

**Satellite Communication**

(Elective-III) (ETC-814/4)

Time : 3 hours

Full Marks : 100

Use separate answerscript for each half.Answer SIX questions, taking THREE from each half.Two marks are reserved for neatness in each half.**FIRST HALF**

1. a) How is communication possible with Low Earth Orbit (LEO) satellite?  
 b) Why is specifically 6 GHz used for uplink and 4 GHz for downlink?  
 c) Explain the basic difference between an active and a passive satellite. How can passive satellite be used for communication?  
 d) What is Van Allen belt? Mention its relation with satellite communication. [4+3+6+3]
  
2. a) What is meant by look angles? Explain them with reference to a geo-stationary satellite and the earth station.  
 b) What do you mean by the sun-transit outage?  
 c) Make a comparative study between LEO, MEO, GEO type of satellite. Name one satellite of each class. [(2+4)+4+6]
  
3. a) With the help of a block diagram explain telemetry, tracking and command (TT&C) subsystem of a satellite.  
 b) What is a transponder? With the help of a block diagram, explain the operation of a double conversion transponder. [10+6]
  
4. a) Derive the general link design equation.  
 b) For a satellite prove that
 
$$\left(\frac{C}{N_0}\right)_T = \left(\frac{C}{N_0}\right)_D$$
 where  $N_0$  is the noise power spectral density and C is the carrier power.  
 c) In a certain satellite communication link, the uplink carrier to noise ratio is 25 dB, whereas the downlink carrier to noise ratio is 20 dB. Find the carrier to noise ratio (C/N) of the whole link. [6+6+4]

5. a) Write down the requirements for the design of an earth station. How many types of earth stations are there?  
 b) Explain with a block diagram the working of receiver part of earth station. [4+2]+10]

### SECOND HALF

6. a) What are the various methods of digital modulation techniques and which one is mostly used in digital satellite communication?  
 b) With the help of a block diagram briefly explain the function of a quadrature amplitude modulation. Draw the phasor diagram of a 16 QAM modulator. [(3+1)+12]
7. a) What is the difference between multiplexing and multiple access techniques?  
 b) Define briefly the operation of a TDMA scheme. What is guard time? Mention its role in TDMA efficiency.  
 c) Why can not SDMA technique work alone? [2+(6+2+2)+4]
8. a) Mention the difference between the pre-assignment and demand assignment multiple access systems. Also make a comparative study of advantages and disadvantages between them.  
 b) What is Mixed Access System?  
 c) With a neat diagram explain 'Satellite Switched TDMA' concept used in INTELSAT VI. [(2+4)+4+6]
9. a) With a schematic diagram explain how a supergroup can form after multiplexing of five 12 channel basic group.  
 b) Explain how analog TV signal can be transmitted through satellite. [8+8]
10. Write short notes on any of the two special purpose satellites : [8×2]  
 a) Data Broadcast Satellite (VSAT)  
 b) INMARSAT  
 c) IRIDIUM Concept  
 d) INTELSAT.