Sem VIII ELR (Rev)
Subj- Satellite Comm. Engg

D488 : 1stHf07

Con. 2861-07. (REVISED COURSE) ND-848

(3 Hours) [Total Marks : 100

N.B. (1) Question No. **1** is **compulsory**.
(2) Solve **four** Question Nos. **2** to **7**.
(3) Draw **neat** sketches/diagrams, wherever **necessary**.
(4) Make **suitable** assumptions; wherever **necessary** and **justify**.
(5) **Figures** to the **right** incidate **full** marks.

1. (a) Discuss the frequencies used by C-band satellite. Why the uplink frequency is different from downlink frequency ? 20
   (b) Define : (i) Processing gain, (ii) Jamming margin.
   (c) Define : (i) Cross-polarisation discrimination, (ii) EIRP.
   (d) Define Prograde and Retrograde orbits.

2. (a) What do you understand by Attitude Control of satellite ? How it is achieved ? 10
   (b) What is telemetry, tracking and command subsystem ? Explain its functioning with block diagram. What kind of antennas are used for tracking and command signal transmission during transfer orbit and on orbit ? 10

3. (a) Explain the single-conversion and double-conversion transponder. Explain their advantages and disadvantages. 10
   (b) The transponder bandwidth for CTS satellite system is 36 MHz and free space loss in uplink is 207·3 dB and other uplink parameters are : 10

Atmospheric attenuation	= 0·18 dB
Ground station transmitter power output	= 17·86 watts
Feeder loss	= 0·15 dB
Ground station antenna gain	= 59·69 dB
Satellite antenna gain	= 38 dB
Satellite system temperature	= 1349 K

   Calculate :
   (i) Satellite received carrier level in dBW
   (ii) Satellite receiver noise power
   (iii) C/N ratio in dB at satellite input.

4. (a) Which are the different digital modulation techniques used in satellite communication ? Which are the preferred ones and why ? 10
   (b) A PN sequence is generated using a feedback register of length M = 4. The chip rate is 107 chips per second. Find the following parameters : 10
   (i) PN sequence length
   (ii) Chip duration of PN sequence
   (iii) PN sequence period.

5. (a) Explain with frame structure the Demand Assignment TDMA scheme. 10
   (b) Explain the effects of earth's oblateness on the orbital inclination of a geosynchronous satellite. 10

6. (a) Compare and contrast Low altitude, Medium altitude and High altitude satellites. 10
   (b) Compare : 10
   (i) FH-CDMA and DS-CDMA
   (ii) Uplink power requirement for FDMA and TDMA.

7. Write short notes on any **two** : 20
   (a) VSAT
   (b) SPADE system
   (c) Intermodulation noise
   (d) Link budget calculations
   (e) Combined Uplink and Downlink carrier to noise ratio.