B.E. Sem. VIII (Rev.) - EXTC - May 2007
Satellite Communication

D488 : tstHf07

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.