

(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** incideate **full** marks.
- (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.
 - (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**
 - (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 : ?

 - Satellite received carrier level in dBW
 - Satellite receiver noise power
 - C/N ratio in dB at satellite input.
 - (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**
 - PN sequence length
 - Chip duration of PN sequence
 - PN sequence period.
 - (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**
 - (a) Compare and contrast Low altitude, Medium altitude and High altitude satellites. **10**
 (b) Compare : **10**
 - FH-CDMA and DS-SS-SSMA
 - Uplink power requirement for FDMA and TDMA.
 - Write short notes on any **two** : **20**
 - VSAT
 - SPADE system
 - Intermodulation noise
 - Link budget calculations
 - Combined Uplink and Downlink carrier to noise ratio.