

Duration: 3hrs

[Max Marks:80]

N.B. : (1) Question No 1 is Compulsory.

(2) Attempt any three questions out of the remaining five.

(3) All questions carry equal marks.

(4) Assume suitable data, if required and state it clearly.

- 1 Attempt any **FOUR** [20]
- a Explain polarization [5]
- b Explain the various frequency bands used in satellite communication. List out advantages and disadvantages of 6/4 GHz band used in satellite communication [5]
- c Compare DS- CDMA & FH-CDMA [5]
- d Explain the parameters that control the design of earth station [5]
- e Write a short note on bath tub curve. [5]
- 2 a Draw and explain simplified block diagram of satellite transponders: [10]
- a. Single conversion C band. b. Double conversion Ku band
- b Define the following with respect to TWTA amplifier [10]
- a. 1 dB compression point
- b. Input and Output back-off
- c. 3rd order Inter-modulation Noise
- d. Am/PM conversion coefficient
- 3 a A multiple carrier satellite circuit operates in the 6/4-GHz band with the following characteristics. Uplink: Saturation flux density 67.5 dBW/m^2 ; input BO 11 dB; satellite G/T 11.6 dBK^{-1} . Downlink: Satellite saturation EIRP 26.6 dBW; output BO 6 dB; free-space loss 196.7 dB; earth station G/T 40.7 dBK^{-1} . For this example, the other losses may be ignored. Calculate the carrier-to-noise density ratios for both links and the combined value [10]
- b Explain [10]
- (1) Lobe switching
- (2) Mono pulse tracking

(3) step tracking

(4) intelligent tracking

- 4 a Explain TDMA frame structure and Unique word detection in detail. [10]
- b Draw a block diagram of TVRO or DBS system and explain each block in brief [10]
- 5 a Write a short note on [10]
- a. Sun-synchronous orbit.
- b. Polar orbit
- c. Molynia orbit
- d. Sun transit outage
- e. Solar and Sidereal day
- b Derive general link equation. Find expression for C/N and G/T ratio. Explain [10]
- importance of these ratios in satellite link design.
- 6 a Differentiate MCPC and SCPC FDMA systems and explain SPADE system in [10]
- detail,
- b What are the different types of lasers used for satellite communication? Explain [10]
- acquisition link model for optical communication
