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Question Paper Code : 71704

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2017.

Seventh Semester

Electronics and Communication Engineering

EC 6004 — SATELLITE COMMUNICATION

(Regulations 2013)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define orbital period.
2. State Kepler's first law.
3. How do you characterize uplink and downlink?
4. What are the effects to which the displacement in association with tracking feeds gives rise?
5. Draw the schematic for rain rate measuring device.
6. What are the factors contributing to noise in an earth station receiving channel?
7. Draw the curve for transfer characteristics of TDM.
8. Draw the spectrum of a baseband voice signal.
9. Draw a typical set up of international telephone service via satellite.
10. List the frequency bands assigned for DTH systems.

PART B — (5 × 16 = 80 marks)

11. (a) Derive the equation for a satellite orbit. (16)

Or

- (b) (i) Derive the equations which permit the elevation angle to be calculated. (8)
- (ii) Tabulate the various types of orbits with their merits and demerits. (8)
12. (a) (i) Consider a dual up converter with the following specifications:

Up link frequency spectrum = 14 to 14.5 GHz

First intermediate frequency = 140 MHz

Carrier bandwidth = 72 MHz

BPF-1 Center frequency = 1.19 GHz

Determine first local oscillator frequency, range of second local oscillator frequency, frequency spectrum of unwanted sideband bandwidths of BPF-1 and BPF-2. (8)

- (ii) With suitable mathematics explain the design aspects of uplink. (8)

Or

- (b) What are the three main systems for tracking satellites? How can tracking systems be affected? What are the main functions of TTC sub-system? Explain. (16)
13. (a) (i) From the calculation of system noise temperature prove that C/N ratio is directly proportional to G/T ratio. (10)
- (ii) Consider the receive side of an earth station. The antenna gain is 65 dB and its noise contribution is 60 K. The waveguide loss is 0.5 dB. Determine the equivalent noise temperature of LNA assuming that the noise contribution by the down converter is negligible and earth station G/T is 40 dB/K. ($T_o = 300$ K). (6)

Or

- (b) With test set-up explain the procedure of EIRP and antenna gain measurement. (16)

14. (a) Write the design aspects and explain the technical features of TDMA frame structure. (16)

Or

- (b) (i) Draw the schematic for on board signal processing system for FDMA/TDM operation and explain. (8)
- (ii) With mathematics briefly discuss on capacity of spread spectrum systems. (8)
15. (a) What is meant by INMARSAT? What are the objectives of the GRAMSAT program? What are the applications seen for DAB? (16)

Or

- (b) (i) With block diagram explain the working principle of DBS-TV receiving system. (8)
- (ii) Write an overview on VSAT systems. (8)
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