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Seventh Semester B.E. Degree Examination, Feb./Mar. 2022  
**Satellite Communication**

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

**Module-1**

- 1 a. Explain the Kepler's three laws of planetary motion with neat diagrams and necessary equation. (10 Marks)
- b. The elliptical orbit of a satellite has its semi-major and semi-minor axes as 25000km and 18330km respectively. Determine the apogee and perigee distances. (03 Marks)
- c. The apogee and perigee distances of a satellite orbiting in an elliptical orbit are 45000km and 7000km respectively. Determine the following :
  - i) Semi-major axis of the elliptical orbit
  - ii) Orbit eccentricity
  - iii) Distance between the center of earth and center of elliptical orbit. (03 Marks)

OR

- 2 a. Explain the following parameters with reference to satellite orbits
  - i) Apogee and perigee
  - ii) Ascending and descending nodes
  - iii) Right ascension of ascending node. (12 Marks)
- b. Derive the maximum line of sight distance between two satellites placed in the same circular orbit. (04 Marks)

**Module-2**

- 3 a. Mention the different subsystems used in satellite and briefly explain each subsystem and its primary function. (10 Marks)
- b. What is the payload of a satellite? What are the typical payloads that are used onboard communication, earth observation, and meteorological and scientific satellites? (06 Marks)

OR

- 4 a. Draw the basic schematic diagram of Tracking, Telemetry and Command (TTC) subsystem and explain it briefly. (06 Marks)
- b. Classify the earth stations on the basis of services provided by them? Briefly describe the features and facilities of each one of them. (10 Marks)

**Module-3**

- 5 a. Describe the operational principle of a FDMA system. Distinguish between single channel per channel and multichannel per carrier types of FDMA systems. (06 Marks)
- b. Explain with neat diagram, the typical TDMA frame structure. (10 Marks)

OR

- 6 a. Derive the received power at the destination in the satellite communication link. (08 Marks)
- b. Explain DS-SS-SSMA transmission and reception with neat block diagram. (08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and/or equations written eg. 42+8=50, will be treated as malpractice.

**Module-4**

- 7 a. What is a transponder? Explain the transparent transponder and regenerative transponder in brief. (08 Marks)
- b. Discuss the satellite point to point telephone networks having either single user or shared multi user earth station. (08 Marks)

**OR**

- 8 a. Explain the satellite – cable television with neat diagram. (10 Marks)
- b. Mention the advantages of satellites over terrestrial network. (06 Marks)

**Module-5**

- 9 a. Explain the optical remote sensing system and thermal infrared remote sensing system in brief. (08 Marks)
- b. Mention any four applications of remote satellites. (08 Marks)

**OR**

- 10 a. Explain the three segments of GPS system. (10 Marks)
- b. Discuss in brief the various types of sensors on board remote sensing satellite. (06 Marks)

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