

CBCS SCHEME

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18EC732

Learning Resource Centre
Acharya Institute of Technology

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

Satellite Communication

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. Outline the Kepler's laws of planetary motion. Also derive expressions for orbital period. (08 Marks)
- b. The apogee and perigee distances of a satellite orbiting in an elliptical orbit are respectively, 45,000 km and 7000 km. Determine the following :
 - (i) Semi-major axis of the elliptical orbits.
 - (ii) Orbit eccentricity.
 - (iii) Distance between the centre of earth and the centre of elliptical orbit. (06 Marks)
- c. Interrupt any six orbital parameters required to illustrate a satellite orbit. (06 Marks)

OR

- 2 a. Define and Infer the significance of Azimuth angle and elevation angle on earth station. (06 Marks)
- b. An earth station is located at 30°W longitude and 60°N latitude. Determine the earth station azimuth and elevation angles with respect to a geostationary satellite located at 50° longitude. The orbital radius is 42164 km (Assume radius of earth to be 6378 km). (06 Marks)
- c. Explain briefly the following:
 - (i) Orbital perturbations.
 - (ii) Spin Stabilization.
 - (iii) Three axis stabilization. (08 Marks)

Module-2

- 3 a. Explain the solar energy driven power supply system of a satellite. (10 Marks)
- b. Describe about the following satellite subsystem briefly:
 - (i) Altitude and orbital control.
 - (ii) Payload. (10 Marks)

OR

- 4 a. Summarize about the different types of earth station leased on services provided and also depending on their usages. (10 Marks)
- b. With a neat diagram, briefly describe each of the following earth station hardware components:
 - (i) Antenna.
 - (ii) Up/Down converters (10 Marks)

Module-3

- 5 a. Explain the typical TDMA frame structure. (08 Marks)
- b. Explain the commonly used forms of MCPC and SCPC systems. (12 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.

OR

- 6 a. Explain Faraday effect and Scintillation with respect to propagation considerations in satellite link design. (07 Marks)
- b. With usual notations, derive satellite transmission equations. (07 Marks)
- c. A geostationary satellite at a distance of 36000 km from the surface of the earth radiates a power of 10 W in the desired direction through an antenna having a gain of 20 dB. What would be the power density at a receiving site on the surface of earth and also the power received by an antenna having an effective aperture of 10 m^2 . (06 Marks)

Module-4

- 7 a. Explain communication related application of satellite and also list the frequency bands used in satellite communication. (10 Marks)
- b. With a neat diagram, explain VSAT's network and VSAT topologies. (10 Marks)

OR

- 8 a. Discuss the advantages and disadvantages of satellite over terrestrial network. (10 Marks)
- b. With a neat diagram, explain about the satellite cable television and direct broadcasting services. (10 Marks)

Module-5

- 9 a. Explain the weather forecasting applications. (10 Marks)
- b. Classify satellite remote sensing systems on the basis of radiation and spectral region used for data acquisition. Explain any two methods briefly. (10 Marks)

OR

- 10 a. Describe the working principle of GPS s/m. (10 Marks)
- b. Write a short note on : (i) Visible images (ii) IR images. (10 Marks)

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