

# CBCS SCHEME



18EC732

## Seventh Semester B.E. Degree Examination, Dec.2024/Jan.2025 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. With neat sketches, define:  
(i) Apogee and Perigee (ii) Prograde and retrograde orbit  
(iii) Eccentricity (iv) Inclination (08 Marks)  
b. Derive an expression for velocity of a satellite moving in a circular orbit around earth from fundamentals. (08 Marks)  
c. 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) Semimajor axis of the elliptical orbit  
(ii) Orbit eccentricity  
(iii) Distance between the centre of the Earth and the centre of the elliptical orbit (04 Marks)

OR

- 2 a. Explain with neat diagrams how the trajectory of a satellite changes with different cosmic velocities. (08 Marks)  
b. Explain LEO, MEO and GEO satellite orbits. (06 Marks)  
c. With relevant expressions, explain the look angles of a satellite with respect to azimuth angle and elevation angle. (06 Marks)

### Module-2

- 3 a. Describe the telemetry, tele-command and tracking control monitoring system of a communication satellite. (08 Marks)  
b. Explain the basic block diagram arrangement of a regulated power supply system. (07 Marks)  
c. With a diagram, explain the principle of operation of a solar cell. (05 Marks)

OR

- 4 a. List and explain the types of Earth Stations on the basis of service provided by them and their usage. (08 Marks)  
b. With neat diagram, explain earth station architecture. (07 Marks)  
c. With diagram, explain prime focus fed parabolic reflector antenna. (05 Marks)

### Module-3

- 5 a. Explain the basic concept of TDMA and FDMA. (06 Marks)  
b. With neat diagrams, explain the basic block diagram of the DS-CDMA transmitter and receiver. (08 Marks)  
c. Explain TDMA typical frame structure. (06 Marks)



OR

- 6 a. Describe the important parameters that influence the design of a satellite communication link. (09 Marks)
- b. With the schematic diagram, explain fading due to multipath signals. (06 Marks)
- c. Compute the free space path loss in decibels for the following conditions:
- For a path length of 10 km at 4 GHz operating frequency
  - Earth station transmitting antenna EIRP = 50 dBW, satellite receiving antenna gain = 20 dB and received power at satellite = -120 dBW. (05 Marks)

**Module-4**

- 7 a. Explain with neat block diagram, basic elements of a satellite communication system. (08 Marks)
- b. With neat block diagram, explain transparent type transponder. (06 Marks)
- c. Discuss briefly about satellite radio. (06 Marks)

OR

- 8 a. What are the various methods of reception of satellite TV programs? Explain satellite cable TV and satellite local broadcast TV network. (10 Marks)
- b. Explain with diagram DBS receiver setup. (05 Marks)
- c. What is regenerative transponder? Explain its types and performance parameters. (05 Marks)

**Module-5**

- 9 a. With the neat sketch, explain the principle of working of optical remote sensing. (09 Marks)
- b. Discuss various types of sensors used in remote sensing satellites. (06 Marks)
- c. What are the applications of remote sensing satellite? (05 Marks)

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- 10 a. Discuss the working principle of Doppler effect based satellite navigation system. (08 Marks)
- b. Explain the weather forecasting satellite payload. (06 Marks)
- c. Explain the working principle of Global Positioning Satellite (GPS) system. (06 Marks)

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