

# CBCS SCHEME

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17EC755



Seventh Semester B.E. Degree Examination, July/August 2021

## Satellite Communication

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions.

- 1 a. Define :
  - i) Trajectory
  - ii) Apogee distance
  - iii) Inclination
  - iv) Equinox
  - v) Prograde orbit. (05 Marks)
- b. State and explain three Kepler's law of planetary motion with relevant diagram and equations. (10 Marks)
- c. A satellite is moving in an elliptical orbit with the major axis equal to 42000km. If the perigee distance is 500km. Find :
  - i) semi major axis value
  - ii) Apogee distance
  - iii) Eccentricity. (05 Marks)
- 2 a. What is meant by stabilization of a satellite? Explain spin stabilization and 3-axis stabilization. (08 Marks)
- b. Explain orbital effects on satellite performance. (08 Marks)
- c. Two different geostationary satellites in INSAT series are located at  $70^{\circ}W$  and  $90^{\circ}W$ . Determine the line of distance between the two satellites orbiting the earth at a height of about 36,000km above the surface of earth. Assume radius earth is equal to 6370km. (04 Marks)
- 3 a. With neat sketch explain the working of a solar cell. (06 Marks)
- b. Why are seasons needed in satellite communication system? Explain its various types. (06 Marks)
- c. Explain with relevant diagram, telemetry tracking and command system. (08 Marks)
- 4 a. Explain earth station architecture with neat block diagram. (06 Marks)
- b. List and explain the types of earth stations on the basis of service provided by them and their usage. (06 Marks)
- c. What is satellite tracking? Explain with relevant diagram, monopulse tracking and lobe switching techniques. (08 Marks)
- 5 a. Explain with neat block diagram, the TDMA frame structure. (08 Marks)
- b. Compare SCPC and MCPC systems, with neat block diagram. (06 Marks)
- c. Explain frequency hopping CDMA transmitter and receiver with suitable block diagram. (06 Marks)

- 6 a. A geostationary satellite at a distance of 36000km from the surface of the earth radiates a power of 10W in the desired direction through an antenna having a gain of 20dB. What would be the power density at a receiving site on the surface of the earth also the power received by antenna having an effective aperture of  $10\text{m}^2$ ? (05 Marks)
- b. Describe the important parameters that influence the design of a satellite communication link. (08 Marks)
- c. Explain Farady effect and scintillation respect to propagation considerations in satellite link design. (07 Marks)
- 7 a. What is Transponders? Explain various types of transponders. (10 Marks)
- b. Explain with neat diagram satellite point to point telephone network. (10 Marks)
- 8 a. Explain the advantage and disadvantages of satellite over terrestrial network. (10 Marks)
- b. Explain with neat diagram satellite cable TV. (10 Marks)
- 9 a. Explain optical, thermal and microwave remote sensing system. (09 Marks)
- b. Explain remote sensing payloads. (06 Marks)
- c. Mention few applications of remote sensing satellite and weather forecasting satellite. (05 Marks)
- 10 a. Explain weather forecasting satellite payload. (06 Marks)
- b. Explain working principle of Global positioning systems. (08 Marks)
- c. Explain the signal structure of GPS system. (06 Marks)

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