



Name :
Roll No. :
Invigilator's Signature :

CS/M.TECH(ECE-COMM)/SEM-2/MCE-205A/2012

2012

SATELLITE COMMUNICATION

Time Allotted : 3 Hours

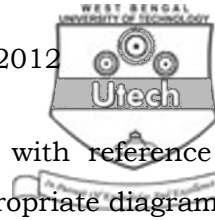
Full Marks : 70

The figures in the margin indicate full marks.

*Candidates are required to give their answers in their own words
as far as practicable.*

Answer Question No. 1 and any *four* questions from the rest.

1. a) Give an one line definition of a Communication Satellite. 2
- b) The apogee and perigee distances of a satellite orbiting in an elliptical orbit are 45,000 km and 7000 km respectively. Determine the following :
 - i) Semi-major axis of the elliptical orbit
 - ii) Orbit eccentricity
 - iii) Distance between the centre of earth and the centre of elliptical orbit. 3
- c) Define "Eccentricity" with reference to Satellite orbits. 2
- d) What are the various advantages of a VSAT ? 4
- e) Briefly describe the two types of launch sequence used to inject satellites. 3



2. a) Explain the concept of Look Angle with reference to Azimuth & Elevation Angles with appropriate diagrams.

4

- b) Describe the details of 5 Satellite types

i) Communication satellite

ii) Weather Forecasting

iii) Earth observation

iv) Navigational

v) Military Satellite.

5

- c) The difference between the farthest and the closest points in a satellite's elliptical orbit from the surface of the Earth is 30000 km and the sum of the distances is 50000 km. If the mean radius of the Earth is considered to be 6400 km, determine the orbit eccentricity.

2

- d) What are the advantages of TDMA over FDMA ?

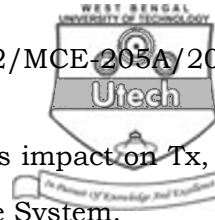
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3. a) Define the purpose of the Monitoring & Control equipment at Earth Stations.

5

- b) What are the different Satellite Subsystems ? Explain each with details.

9



4. a) Explain the concept of C/N ratio & its impact on Tx, Rx & inter modulation noise in a Satellite System. 4
- b) What are the essential criteria of a Satellite Link Design ? Derive the mathematical formula associated with this design. 3 + 5
- c) What is an Iridium constellation of satellites ? 2
5. a) Explain the concepts of Tropospheric Multipath & Scintillation effects. Explain briefly Faraday's rotation ϕ as experienced by a signal as ionospheric effect. 2 + 2 + 2
- b) What is a Satellite Earth Station ? Draw the Block Schematic and explain the principle of Up & Down Conversion. 2 + 4
- c) What are the typical features of LNA that are used for Satellite Systems ? 2
6. a) Explain the concept of Demand assigned Multiple Access technique. 3
- b) Draw & explain the function of a Satellite Transponder. 4
- c) Explain the concept of Satellite transponder channelization with appropriate diagrams. 4
- d) What are the features of Earth Station Antennas ? 3



7. a) What is a GPS System ? How many active satellites are involved in this constellation ? Describe its working principle. 1 + 1 + 3
- b) Explain the MSAT network concept and show how these are linked to ISDN & PSTN. 6
- c) Explain the concept of Direct to Home TV. 3
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