

## SATELLITE COMMUNICATION

**Paper Code: ETEC-404**  
**Paper: Satellite Communication**

<b>L</b>	<b>T/P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>3</b>

### **INSTRUCTIONS TO PAPER SETTERS:**

**MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

*Objectives: To study the most relevant aspects of satellite communication with emphasis on the most recent application & developments. It covers orbital mechanics, launching techniques, satellite link design, earth & space segment, error control coding and different multiple access techniques.*

### **UNIT- I**

**Principles of Satellite Communication:** Evolution & growth of communication satellite, Satellite frequency allocation & Band spectrum, Advantages of satellite communication, Active & Passive satellite, Applications of satellite communication. Synchronous satellite, Satellite Launch.

**Satellite Orbits:** Introduction, Kepler's Laws, Newton's law, orbital parameters, orbital perturbations, station keeping, geo stationary and non Geo-stationary orbits, LEO, MEO, Look Angle Determination- Limits of visibility –eclipse-Sub satellite point –Sun transit outage.

[T1, T2, R1][No. of Hrs. 11]

### **UNIT- II**

#### **Satellite Link Design**

Basic transmission, System noise temperature, G/T ratio, design of down links, uplink design, design of specified C/N, Atmospheric Absorption, Rain induced attenuation.

**Space Segment:** Power Supply, Altitude Control, Station Keeping, Thermal Control, TT&C sub system, Transponders, Antenna Sub system.

**Earth Segment:** Subsystem of earth station, Transmit-Receive Earth Station, different types of earth stations, frequency coordination.

[T1, T2, R1][No. of Hrs. 11]

### **UNIT- III**

**Multiple Access Techniques:** FDMA, FDMA down link analysis. TDMA, Satellite-switched TDMA, code division multiple access, DAMA, On board signal processing for FDMA/TDM Operation.

**Error Control for Digital Satellite Links:** Error detection and correction for digital satellite links, error control coding, Convolutional codes, satellite links concatenated coding and interleaving, Automatic Repeat Request (ARQ).

[T1, T2, R2][No. of Hrs. 10]

### **UNIT- IV**

**Interconnection of Satellite Networks:** Interconnection with ISDN, Interconnection of television networks.

**Satellite Applications:** Satellite mobile services, VSAT, GPS, Radarsat, INMARSAT, Satellite navigational system. Direct broadcast satellites (DBS)- Direct to home Broadcast (DTH), Worldspace services, Business TV(BTV)

[T1, R2, R3][No. of Hrs. 10]

#### **Text Books:**

- [T1] Dennis Roddy, "Satellite Communication", McGraw Hill International.  
[T2] T. Pratt, "Satellite Communication", John Willy and Sons (Asia) Pvt. Ltd.

#### **Reference Books:**

- [R1] T. Ha, "Digital Satellite Communication", McGraw Hill.  
[R2] Bruce R. Elbert, "The Satellite Communication Applications Handbook", Artech House Boston.  
[R3] Mark R. Chartrend, "Satellite Communication" Cengage Learning  
[R4] Handbook of Satellite Communication, Wiley.