3EC46: SATELLITE COMMUNICATION
CREDITS - 3 (LTP: 3,0,0)

Course Objective:
To understand basic aspects of Satellite Communication and role of satellite in various applications.

Teaching and Assessment Scheme:

Teaching Scheme (Hours per Week)			Credits	Assessment Scheme				
				Theory Marks		Practical Marks		Total Marks
L	T	P	C	ESE	CE	ESE	CE	
3	0	0	3	60	40	00	00	100

Course Content:

Unit No.	Topics	Teaching Hours
1.	**Introduction :** The origin of satellite communications, A brief history of satellite communications, The current state of satellite communications, An overview of satellite communications.	02
3.	**Radio Wave Propagation & Polarization :** Introduction, Atmospheric losses, Ionospheric Effects, Rain attenuation, other propagation impairments. Introduction to polarization, Antenna Polarization, Polarization of Satellite signals, Cross polarization discrimination, Rain and Ice depolarization.	05
4.	**Space Segment :** Introduction, Spacecraft Subsystem, Attitude and orbit control system, Telemetry, tracking and command system, Power Systems, Communications subsystem, Spacecraft Antennas, Equipment reliability and space qualification.	06
5.	**Satellite Link Design :** Basic transmission theory, System noise temperature and G/T ratio, Design of downlink, Domestic satellite systems using small earth stations, Uplink design, Design of satellite links for specified C/N.	05
6.	**Earth Segment :** Introduction, Receive-Only Home TV Systems, Master Antenna TV Systems, Community Antenna TV Systems, Transmit-Receive Earth Stations.	05
7.	**Multiple Access Techniques for Satellite Links :** Multiple Access Techniques, Frequency Division Multiple Access, Time Division Multiple Access, On Board Processing, Demand Access multiple Access, Random Access, Code Division Multiple Access.	05

Unit No.	Topics	Teaching Hours
8.	**Direct Broadcast Satellite TV and Radio :** C-Band and Ku Band Home Satellite TV, Digital DBS-TV,DBS-TV System Design, DBS-TV link Budget, Error Control in Digital DBS TV,DBS-TV Link Budget , Master Control Station and Uplink	04
9.	**Satellite Navigation and Global Positioning System :** Radio and Satellite Navigation, GPS Position Location Principles, GPS Receivers and Codes, Satellite Signal Acquisition, GPS Navigation Message, GPS Signal Level, Timing Accuracy and GPS Receiver Operation	05
10.	**Satellite communication Case Studies :** Chandrayan 2,Chandrayan 1,Mars Orbiter Mission,LVM3-X (CARE),AstroSat, PSLV-C40/Cartosat-2 Series Satellite PSLV-C39/IRNSS-1H Mission,GSAT-17,PSLV-C38 / Cartosat-2 Series Satellite, Gslv-Mk Iii-D1 / Gsat-19, Niusat, Pisat,Pratham Sathyabamasat, Swayam	03
	Total	**45**

List of References:

1. Timothy Pratt, Charles Bostian, Jeremy Allnut, "*Satellite Communication*", 2nd Edition , Jhon Wiley & Sons,2012
2. Dennis Roddy, "*Satellite Communications*",4th Edition , McGraw Hill,2012.
3. Anil K. Maini, Varsha Agarwal, "*Satellite Technology, Principles and Applications*",2nd Edition, Wiley,2014.

Course Outcomes (COs):

By learning this course student will be able to …

1. Recollect basic knowledge from principles of satellite communication, orbital parameters.
2. Understand factors affecting radio wave propagation and various polarizations.
3. Study the space and ground segment of satellite communication.
4. Analyze simple Satellite Communication Link.
5. Analyze various methods for satellite access.
6. Learn various applications of satellite communication.