



SILVER OAK UNIVERSITY

College of Technology

Master of Technology

Electronics and Communication

Course Name: Satellite Communication System

Course Code: 1010097139

Semester: 1st

Prerequisite: Electronics Communication, Digital Communication

Course Objective:

1. To understand the basics of satellite communications.
2. To understand different satellite communication orbits.
3. To understand the satellite segment and earth segment and provide an in-depth treatment of satellite communication systems operation and planning.
4. To analyze the various methods of satellite access. Link budgets & planning

Teaching Scheme:

Teaching Scheme				
L	T	P	Contact Hours	Credit
3	0	2	5	4

Content:

Unit No.	Course Contents	Teaching Hours	Weightage %
1	Introduction to Satellite Communication: Historical background, Basic concepts of Satellite Communications, Communication Networks and Services, Comparison of Network Transmission technologies, Orbital and Spacecraft problems, Growth of Satellite communications.	8	20
2	The Geostationary Orbit: Antenna Look Angels, The Polar Mount Antenna, Limits of Visibility, Near Geostationary Orbits, Earth Eclipse of Satellite, Sun Transit Outage, Launching Orbits, Attitude Control, Spinning Satellite Stabilization, Momentum Wheel Stabilization, Station Keeping, Thermal Control, TT&C Subsystem	10	20
3	Multiple Access Techniques: Introduction, FDMA (No derivation), SCPC Systems, MCPC Systems, TDMA, CDMA, SDMA. Satellite Link Design Fundamentals: Transmission Equation, Satellite Link Parameters, Propagation considerations.	8	20
4	radiated power, transmission losses, the link power budget equation, system noise, carrier-to-noise ratio (C/N), the uplink, the downlink, effects of rain, combined uplink and downlink C/N ratio, inter modulation noise, intersatellite links. interference between satellite circuits.	10	20
5	Introduction of RADAR: The simple form of Radar Equation, Radar Block diagram and Operation, Types of transmitters, duplexer and displays. Radar Frequencies, millimeter and submillimeter waves, Applications of Radar, Radar Equation: Prediction of Range Performance, Minimum Detectable Signal, Receiver Noise, Signal to Noise Ratio	6	20

Course Outcome:

Sr. No.	CO statement	Unit No
CO-1	Understand principle, working and operation of various sub systems of satellite as well as the earth station.	1
CO-2	Learn advanced techniques and regulatory aspects of satellite communication	2
CO-3	Apply various communication techniques for satellite applications	3
CO-4	Analyze and design satellite communication link	4
CO-5	Understand role of satellite in various applications	5

Teaching & Learning Methodology:-

1. Direct Instruction
2. Flipped Classrooms
3. Kinesthetic Learning
4. Context-Based Learning
5. Adaptive Teaching

List of Experiments/Tutorials:

Total Hours: 28

Sr. No.	Practical Name
1	Understanding the basic concepts of satellite communication
2	To setup a communication link between uplink transmitter and downlink receiver using Satellite.
3	To setup an Active satellite communication link and demonstrate link fail operation
4	To communicate voice & Video signal through satellite link
5	Observe the effect of Different combinations of uplink and downlink frequencies on satellite link.
6	To transmit and receive three separate signals (Audio, Video , Tone) simultaneously through satellite link
7	To transmit and receive function generator signals through satellite link.
8	To measure the signal parameters in ananalog FM/FDM TV satellite link

Major Equipment:

Transponder, different types antennas, speker, transmitter, receiver-trainner kit.

Books Recommended:-

1. Timothy Pratt – Charles Bostian & Jeremy Allmuti, Satellite Comm. , John Willy & Sons (Asia) Pvt. Ltd. 2004.

2. Dennis Roddy, Satellite Communications, McGraw-Hill Publication
3. Third edition 2001.
4. Wilbur L. Pritchards Henri G.Suyder Hond Robert A.Nelson,
5. Satellite Comm. Systems Engg., Pearson Edu.Ltd., 2nd edition 2003.
6. Richharia : Satellite Communication Systems (Design Principles Macmillan Press Ltd. Second Edition 2003.

List of Open Source Software/learning website:

1. <http://nptel.iitm.ac.in/course.php>
2. <http://ocw.mit.edu>
3. www.radio-electronics.com
4. <http://en.wikipedia.org>
5. [www.youtube.coms](http://www.youtube.com)

CO-PO Matrix:

CO No.	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO-1	3	2	2	1	2				1				3	3
CO-2	3		3		3		1		2					3
CO-3		2	2	2			2	1		1	1			-
CO-4		2	3	2		2	2		2				-	3
CO-5	3		3		3		2	1	3					