Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME – I Year (Spl Digital Communication) Semester- A			
Subject Code & Name	Instructions Hours per Week			Credits			
DCP2E1 Satellite Communication	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 6 Hours/week							

Course Objectives: The course provides fundamentals, link design, overview of practical consideration and applications of satellite communication.

Prerequisite(s): Fundamentals of communication systems.

COURSE CONTENTS

Unit I

SATELLITE ORBITS: Kepler's Laws, orbital mechanics and parameters, – Look Angle Determination, orbital perturbations-longitudinal and inclination changes, geo stationary and non-geo-stationary orbits, Orbital Effects in Communications system performance- Doppler shift, range variations, solar eclipse, sun transit outage, Launching Procedures - launch vehicles.

Unit II

SATELLITE SUB-SYSTEMS AND LINK DESIGN: Satellite sub systems, Attitude and Orbit control system, Telemetry, Tracking and command. Communication sub-systems- Description of the communication system and various types of transponders, satellite antennas.

Satellite link design-Basic transmission theory, system noise temperature and G/T ratio, design of downlinks, satellite system using small earth stations, uplink design, system design examples, Ku band uplink and downlink design and rain effects on Ku band.

Unit III

MODULATION AND MULTIPLEXING TECHNIQUES FOR SATELLITE LINKS: Frequency modulation, Analog FM transmission by satellite, digital transmission, digital modulation and demodulation digital transmission of analog signals, time division multiplexing- TDM terminology, TDM systems and channel synchronization in TDM.

Unit IV

MULTIPLE ACCESS TECHNIQUES USED IN SATELLITE COMMUNICATION: FDMA-intermodulation, calculation of C/N with intermodulation, TDMA-Bits, symbol and channels, frame structure, TDMA in a fixed station network- synchronization and transmitter power in TDMA networks, CDMA, spread spectrum transmission and reception, CDMA in a fixed earth station and LEO satellite network.

Unit V

SATELLITE APPLICATIONS: VSAT Systems-overview, network architecture, access control protocols, modulation and multiple access selection, VSAT earth station and calculation of link margin, Low earth orbit and Non Geo –stationary satellite systems-Orbit consideration, coverage and frequency consideration, delay and throughput considerations, system considerations, DBS system, Satellite navigation and the Global Positioning System .

BOOKS RECOMMENDED:

[1]. T. Pratt, C. Bostain, J. Allnutt, 'Satellite Communications', Second Edition, John Wiley & Sons, 2003.

[2]. M.Richharia, 'Satellite Communication Systems-Design Principles", Macmillan 2003

[3]. Bruce R. Elbert, 'The Satellite Communication Applications' Hand Book, Artech HouseBostan London, 1997.

[4]. Tri T. Ha, 'Digital Satellite Communication', II edition, 1990.

[5]. Emanuel Fthenakis, 'Manual of Satellite Communications', McGraw Hill Book Co.,1984.

[6]. Brian Ackroyd, 'World Satellite Communication and earth station Design', BSP professional Books, 1990.

[7]. G..B.Bleazard, 'Introducing Satellite communications NCC Publication, 1985.