EC-409A	SATELLITE COMMUNICATION (ELECTIVE - V)	L	T	P	C
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COURSE OBJECTIVES:

1. To know the orbital aspects of satellite communication.
2. To know about the satellite subsystems and multiple access techniques used in satellite communication.
3. To design satellite links and earth stations.
4. To know the Low earth orbit and non-geo stationary satellite systems.
5. To know about the Global positioning system.

COURSE OUTCOMES:

After successful completion of the course, the students are able to

1. understand the orbital aspects and sub systems used in satellite communication.
2. relate about the various coding techniques used in satellite communication.
3. design basic satellite uplink and downlink transmission models and earth station systems.
4. analyse coding and spread spectrum techniques used in satellite communication systems
5. understand the basic concepts of global positioning systems.

UNIT I *Text Book - 1* **(12)**

INTRODUCTION AND ORBITAL ASPECTS OF SATELLITE COMMUNICATIONS : A brief history of satellite communications, Orbital mechanics, Keplers laws of planetary motion, Locating the satellite in the orbit, Locating the Satellite with respect to the earth, Orbital elements, Look angle determination, Orbital perturbations, launches and launch vehicles, Orbital effects in communication System performance.

UNIT II *Text Book - 1,2* **(12)**

SATELLITE SUB SYSTEMS : Introduction, attitude and orbit control system, Telemetry, tracking, command and monitoring, Power Systems, Communication Subsystems, Satellite antennas.

MULTIPLE ACCESS TECHNIQUES : Introduction, FDMA Systems, TDMA Systems, Beam switching and satellite switched TDMA, Spread spectrum techniques (CDMA), Comparison of multiple access techniques.

UNIT III *Text Book - 1,2* **(12)**

SATELLITE LINK DESIGN : Introduction, Basic transmission theory, System noise temperature and G / T ratio. Design of uplink and down link models, Design of satellite links for specified C / N ratio.

EARTH STATIONS : Introduction, Transmitters, Receivers, Antennas, Tracking systems, Terrestrial interface, Primary power, test methods.

UNIT IV *Text Book - 1* **(10)**

LOW EARTH ORBIT AND NON-GEO STATIONARY SATELLITE SYSTEMS : Introduction, Orbit consideration, coverage and frequency considerations, Delay and Throughput considerations, System considerations, Operational NGSO constellation Designs

UNIT V *Text Book - 1* **(10)**

SATELLITE NAVIGATION & THE GLOBAL POSITIONING SYSTEM : Introduction, Radio and Satellite Navigation, GPS Position Location principles, GPS Receivers and codes, Satellite signal acquisition, GPS Navigation Message, GPS signal levels, GPS receiver operation, GPS C/A code accuracy, Differential GPS.

LEARNING RESOURCES:

TEXT BOOK(s):

1. T Pratt and W Bostiain - Satellite Communications, 2nd Edition, John Wiley, 2003.
2. Wilbur L. Pritchard, Henri G.Suyderhoud and Robert A Nelson - Satellite Communication Systems Engineering, 2nd Edition, Pearson Publications, 2003.

REFERENCE BOOK(s):

1. Dennis Roddy, Satellite communications, McGraw Hill, 4 th Edition,2009.
2. DC Agarwal, Satellite Communications, Khanna Publishers, 2003 Robert M Gagliard, Satellite Communications.

WEB RESOURCES:

http://nptel.iitm.ac.in/courses/