III B.Tech - II Semester

(20EC6744) SATELLITE COMMUNICATIONS: PRINCIPALS & APPLICATIONS

(Minors)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	4

Pre-Requisites: Analog & Digital Communications

Course Objectives:

- To learn about the history of geostationary and non-geostationary satellites and orbital mechanisms.
- To know about various satellite subsystems.
- To design of satellite link budget.
- To study and analyze of Earth station antenna and equipments.
- To study satellite navigation & the global positioning systems.

UNIT–I:

INTRODUCTION : Origin of Satellite Communications, Historical Back-ground, Basic Concepts of Satellite Communications, Frequency allocations for Satellite Services, Applications, Future Trends of Satellite Communications.

ORBITAL MECHANICS AND LAUNCHERS: Orbital Mechanics, Look Angle determination, Orbital perturbations, Orbit determination, launches and launch vehicles, Orbital effects in communication systems performance.

UNIT–II:

SATELLITE SUBSYSTEMS: Attitude and orbit control system, telemetry, tracking, Command and monitoring, power systems, communication subsystems, Satellite antenna Equipment reliability and Space qualification.

UNIT–III:

SATELLITE LINK DESIGN: Basic transmission theory, system noise temperature and G/T ratio, Design of down links, up link design, Design of satellite links for specified C/N, System design example.

UNIT–IV:

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

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

UNIT–V:

SATELLITE NAVIGATION & THE GLOBAL POSITIONING SYSTEM: 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.

Course Outcomes:
After successful completion of the course, the students can be able to:

S. No	Course Outcome	BTL
1	Describe various geostationary and non-geostationary satellites.	L2
2	Explain about various subsystems of satellite.	L2
3	Construct uplink and downlink design and various multiple access techniques.	L3
4	Understand and analyze the earth station antenna and equipments.	L4
5	Understand satellite navigation & the global positioning systems.	L2

Correlation of COs with POs & PSOs:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	2	1	1	-	-	-	-	-	-	-	-	-	2	-
CO 2	2	1	1	-	-	-	-	-	-	-	-	-	2	-
CO 3	3	3	2	2	-	-	-	-	-	-	-	-	2	-
CO 4	2	1	1	-	-	-	-	-	-	-	-	-	1	-
CO 5	2	1	1	-	-	-	-	-	-	-	-	-	1	-

Text Books:

1. Satellite Communications – Timothy Pratt, Charles Bostian and Jeremy Allnutt, WSE, Wiley Publications, 2nd Edition, 2003.
2. Satellite Communications Engineering – Wilbur L. Pritchard, Robert A Nelson and Henri. G.Suyderhoud, 2nd Edition, Pearson Publications, 2003.

Reference Books:

1. Satellite Communications: Design Principles – M. Richharia, BS Publications, 2nd Edition, 2003.
2. Satellite Communication - D.C Agarwal, Khanna Publications, 5th Ed.
3. Fundamentals of Satellite Communications – K.N. Raja Rao, PHI, 2004.
4. Satellite Communications – Dennis Roddy, McGraw Hill, 2nd Edition, 1996.