

GUJARAT TECHNOLOGICAL UNIVERSITY

Electronics Engg. / Electronics & Communication Engg.

/Electronics & Telecommunication

B. E. SEMESTER: VII

Subject Name: **Satellite communication (Department Elective - I)**

Subject Code: **171007**

Teaching Scheme				Evaluation Scheme			
Theory	Tutorial	Practical	Total	University Exam (E)		Mid Sem Exam (Theory) (M)	Practical (Internal)
				Theory	Practical		
3	0	2	5	70	30	30	20

Sr. No	Course Content	Total Hrs.
1.	Introduction: Overview of Satellite Communication	2
2.	Orbital Mechanics and launchers: Orbital Mechanics, Look Angle Determination, Orbital perturbations, orbit Control system, Telemetry, tracking, Command and monitoring, power systems, Communication subsystems, Transponders, Satellite Antennas, Equipment reliability and space qualification.	10
3.	Satellite Link Design: Basic transmission Theory, system noise temperature and G/T ratio, Design of downlinks, Satellite systems using small earth stations Uplink design, Design for C/N:Combining C/N and C/I values in satellite links, System design examples	9
4.	Multiple access techniques for satellite links: Multiple access, Frequency division Multiple Access, Time, division Multiple Access, On board processing, Demand access Multiple Access, Random access. Code division Multiple Access.	4
5.	Propagation effects and their impact on satellite-earth links: Quantifying attenuation and depolarization, propagation effects that are not associated with hydrometers, rain and ice effects, prediction of rain attenuation, prediction of XPD, propagation impairment Countermeasures.	3

6.	VSAT systems: Nnetwork architectures, Access control protocol, Basic techniques, SAT earth station engineering, Calculation of link margins for VSAT star network, system design procedures.	4
7.	Low Earth Orbit and Non-Geostationary Satellite systems: Orbit considerations, Coverage and frequency considerations, Delay and throughput considerations, Operational NGSO constellation design, introduction to Satellite mobile network	4
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, establishment of DBS – TV antennas Satellite radio broadcasting	4
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 levels, timing accuracy, GPS receiver operation.	5

Reference Books:

1. Satellite Communication, by Timothy Pratt, Charles Bostian, Jeremy Allnutt, Willey Student edition, second edition
2. Satellite Communication, by Dennis Roddy, TataMcGraw Hill
3. Communication Satellite systems,by James Martyn, Prentice Hall
4. Satellite communication by Wilbur L. Pritchard & Josheph a.Sciulli-PHI