



# Kadi Sarva Vishwavidyalaya

## Faculty of Engineering & Technology

Electronics and communication Engineering  
(Academic Year 2019-20)

<b>Subject Code: EC606B-N</b>	<b>Subject Title: SATELLITE COMMUNICATION</b>
<b>Pre-requisite</b>	

### Course Objective:

The educational objectives of this course are

- To present a problem oriented introductory knowledge of Satellite Communication.
- To address the underlying concepts and methods behind Satellite Communication.

### Teaching Scheme (Credits and Hours)

Teaching scheme				Total Credit	Evaluation Scheme					Total Marks
L	T	P	Total		Theory		IE Marks	CIA Marks	Pract. Marks	
Hrs	Hrs	Hrs	Hrs		Hrs	Marks				
03	00	02	05	04	03	70	30	20	30	150

### Outline of the Course:

Sr. No	Title of the Unit	Minimum Hours
1.	Introduction	06
2.	Orbital Mechanics and launchers	10
3.	Satellite Link Design	10
4.	Multiple access techniques for satellite links	06
5.	Propagation effects and their impact on satellite-earth links	07
6.	VSAT systems	09
		<b>48</b>

**Total hours (Theory): 48**

**Total hours (Lab): 16\*2=32**

**Total hours: 80**



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**Detailed Syllabus**

Unit No.	Topics	Lecture Hours	Weight age(%)
1.	<b>Introduction:</b> Overview of satellite communication, Introduction to GPS system	06	12
2.	<b>Orbital Mechanics and launchers:</b> Orbital Mechanics, Look Angle Determination, orbit Control system, Telemetry, tracking, Command and monitoring, power systems, Communication subsystems, Transponders, Satellite Antennas	10	15
3.	<b>Satellite Link Design:</b> 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.	10	15
4.	<b>Multiple access techniques for satellite links:</b> Multiple access, Frequency division Multiple Access, Time, division Multiple Access, Demand access Multiple Access, Random access, Code division Multiple Access.	06	14
5.	<b>Propagation effects and their impact on satellite-earth links:</b> Quantifying attenuation and depolarization, propagation effects that are not associated with hydrometers, rain and ice effects, prediction of rain attenuation, prediction of XPD	07	10
6.	<b>VSAT systems:</b> Network architectures, Access control protocol, Basic techniques, Calculation of link margins for VSAT star network, system design procedures.	09	14
<b>Total</b>		<b>48</b>	<b>100</b>

**Instructional Method and Pedagogy:**

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lecture and laboratory which carries 10 marks in overall evaluation.
- One internal exam will be conducted as a part of internal theory evaluation.
- Assignments based on the course content will be given to the students for each unit and will be evaluated at regular interval evaluation.
- Surprise tests/Quizzes/Seminar/tutorial will be conducted having a share of five marks in the overall internal evaluation.



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- The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures.
- Experiments shall be performed in the laboratory related to course contents.

**Learning Outcomes:**

On successful completion of the course

- To present a problem oriented introductory knowledge of SATELLITE COMMUNICATION.
- To address the underlying concepts and methods behind SATELLITE COMMUNICATION on successful completion of the course. The student can identify different areas of SATELLITE COMMUNICATION circuits.
- The student can identify different areas of satellite communication. Can find the applications of all the areas in day to day life. Can identify the operations, working, construction, material etc. aspects of link budget, losses, fading.

**TEXT & REFERENCE BOOKS:**

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

**List of Experiments** (Not limited to following. Subject teacher may modify the same):

Sr. No.	Experiment Title
1.	To perform active/passive satellites, uplink/downlink and transponders.
2.	To perform baseband analog signal transmission.
3.	To perform analog FM/FDM satellite link.
4.	To perform carrier to noise ratio.
5.	To perform signal to noise ratio.
6.	To perform digital baseband signal.
7.	To perform telemetry and telecommand.
8.	To perform polarization of antenna.
9.	To perform fading effect.
10.	To perform path loss effect.
11.	To perform propagation delay.