SEMESTER 7

SATELLITE SYSTEMS AND APPLICATION

Course Code	**OEAOT727**	**CIE Marks**	40
Teaching Hours/Week (L: T:P: R)	3:0:0:0	**ESE Marks**	60
Credits	3	**Exam Hours**	2 Hrs. 30 Min.
Prerequisites (if any)	None	**Course Type**	Theory

Course Objectives:

1. The purpose of the course is to understand the basics of satellite orbits, segments, satellite access and applications.

Syllabus

Module No.	Syllabus Description	Contact Hours
1	**SATELLITE ORBITS:** Kepler's Laws, Newton's law, orbital parameters, orbital perturbations, station keeping, geostationary and non Geo-stationary orbits – Look Angle Determination- Limits of visibility –eclipse-Sub satellite point –Sun transit outage-Launching Procedures - launch vehicles and propulsion.	9
2	**SPACE SEGMENT AND SATELLITE LINK DESIGN:** Spacecraft TechnologyStructure, Primary power, Attitude and Orbit control, Thermal control and Propulsion, Communication Payload and supporting subsystems, Telemetry, Tracking and command. Satellite Uplink and Downlink Analysis and Design, Link Power Budget, C/N calculation, G/T ratio-Performance Impairments-System noise, Intermodulation Noise, Noise Temperature, Propagation Factors, Rain and Ice effects, Polarization	9
3	**SATELLITE ACCESS:** Modulation and Multiplexing: Voice, Data, Video, Analog – digital transmission system, Digital video Broadcast, multiple access: FDMA, TDMA, CDMA, Assignment Methods, Spread Spectrum communication, compression – encryption	9
4	**SATELLITE APPLICATIONS:** INTELSAT Series, INSAT, VSAT, Mobile satellite services: GSM, GPS, INMARSAT, LEO, MEO, Satellite Navigational System. Direct Broadcast satellites (DBS)- Direct to home	9

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	Broadcast (DTH), Digital audio broadcast (DAB)- World space services, Business TV (BTV), GRAMSAT, Specialized services – E –mail, Video conferencing, Internet.	

Course Assessment Method
(CIE: 40 marks, ESE: 60 marks)

Continuous Internal Evaluation Marks (CIE):

Attendance	Assignment/ Microproject	Internal Examination-1 (Written)	Internal Examination- 2 (Written)	Total
5	15	10	10	40

End Semester Examination Marks (ESE)

In Part A, all questions need to be answered and in Part B, each student can choose any one full question out of two questions

Part A	Part B	Total
• 2 Questions from each module. • Total of 8 Questions, each carrying 3 marks (8x3 =24marks)	• Each question carries 9 marks. • Two questions will be given from each module, out of which 1 question should be answered. • Each question can have a maximum of 3 sub divisions. (4x9 = 36 marks)	60

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Course Outcomes (COs)

At the end of the course students should be able to:

Course Outcome		Bloom's Knowledge Level (KL)
CO1	Analyze the satellite orbits	K4
CO2	Analyze the space segment	K4
CO3	Explain the satellite access	K2
CO4	Understand the various satellite applications	K2

Note*: K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create*

CO-PO Mapping Table (Mapping of Course Outcomes to Program Outcomes)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	-	-	-	1	-	-	-	-	-	2
CO2	3	1	-	-	-	1	-	-	-	-	-	2
CO3	3	1	-	-	-	1	-	-	-	-	-	2
CO4	3	1	-	-	-	1	-	-	-	-	-	2

Note: *1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), -: No Correlation*

Text Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Satellite Communication	Dennis Roddy	Fourth Edition, McGraw Hill International	2006
2	Satellite Communication Systems Engineering	Wilbur L.Pritchard, Hendri G. Suyderhoud, Robert A. Nelson	Prentice Hall/Pearson	2007
3	Satellite Communication Applications	Bruce R. Elbert	Artech House Bostan London	1997

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Reference Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Manual of Satellite Communications	Emanuel Fthenakis	McGraw Hill Book Co.	1984
2	Satellite Communication Systems-Design Principles	M. Richharia	Macmillan	2003