MOHAMMED SATHAK A J COLLEGE OF ENGINEERING

Siruseri IT park, OMR, Chennai - 603103

LESSON PLAN

Department of Electronics and Communication Engineering

Name of the Subject	SATELLITE COMMUNICATION	Regulation	2017
Subject Code	EC8094	Year / Sem	IV/VIII
Acad Year	2021-2022	Batch	2017-2021

Course Objective

To understand the basics of satellite orbits

To understand the satellite segment and earth segment

To analyse satellite link design

To analyse the various methods of satellite access

To understand the application of satellite

Course Outcome

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

CO1: Know and analyse the satellite orbits

CO2:Analyse earth segment space segment

CO3:Solve signal to noise ratio of earth segment

CO4:Learn the comparison of multiple access

CO5:learn and design the applications of various satellite

Lesson Plan

Sl. No.	Topic(s)	T / R* Book	Periods Required	Mode of Teaching (BB / PPT / NPTEL / MOOC / etc)	Blooms Level (L1-L6)	CO	PO
	UNIT I SATELLITE ORBITS						
1	Kepler‟s Laws, Newton‟s law, orbital parameters	T1	**1**	BB,PPT	L1	CO1	PO1-PO3
2	orbital perturbations	T1	**1**	BB,NPTEL	L2	CO1	PO1-PO3
3	station keeping	T1	**1**	BB,PPT	L2	CO1	PO1-PO3
4	geo stationary and non Geo-stationary orbits,Look Angle Determination	T1,R2	**1**	BB,PPT	L2	CO1	PO1-PO3,P12
5	Limits of visibility	T1	**1**	BB,NPTEL	L4	CO1	PO1-PO3
6	Eclipse. Sub satellite point	T1	**1**	BB,NPTEL	L2	CO1	PO1-PO3,P12
7	Sun transit outage	T1	**1**	BB,PPT	L2	CO1	PO1-PO3,P12
8	Launching Procedures	T1	**1**	BB,PPT	L2	CO1	PO1-PO3,P12
9	launch vehicles Propulsion	T1	**1**	BB	L2	CO1	PO1-PO3
10	Revision						

Suggested Activity: Assignment / Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others Planned if any
Assignment

Evaluation method : SEMINOR on small Review about Recent launching

	UNIT II SPACE SEGMENT						
11	Spacecraft Technology	T1	**1**	BB	L2	CO2	PO1-PO3
12	structure -Primary power	T1	**1**	BB	L2	CO2	PO1-PO3
13	attitude and orbit control	T1	**1**	BB	L4	CO2	PO1-PO3

14	Thermal control and propulsion	T1,R2	**1**	BB	L2	CO2	PO1-PO3
15	Communication payload	T1	**1**	BB	L2	CO2	PO1-PO3
16	supporting subsystems	T1	**1**	BB,PPT	L2	CO2	PO1-PO3,P12
17	Telemetry, Tracking and command	T1,R1	**1**	BB,PPT	L2	CO2	PO1-PO3,P12
18	Transponders	T1	**1**	BB	L2	CO2	PO1-PO3,P12
19	Antenna subsystem	T1	**1**	BB	L2	CO2	PO1-PO3
20	Revision						
Suggested Activity: Assignment / Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others Planned if any							
Evaluation method : Assignment on Spacecraft Technolgy							
UNIT III SATELLITE LINK DESIGN							
21	Basic link Analysis	T1	1	BB,NPTEL	L4	CO3	PO1-PO3
22	Link analysis design	T1	1	PPT	L2	CO3	PO1-PO3
23	Interference Analysis	T1	1	PPT	L4	CO3	PO1-PO3
24	Interference Analysis continuation	T1	1	PPT	L4	CO3	PO1-PO3
25	Rain Induced attenuation	T1,R1	1	PPT	L4	CO3	PO1-PO3
26	Interference	T1	1	PPT	L2	CO3	PO1-PO3
27	Ionospheric Characteristics	T1,R2	1	BB	L2	CO3	PO1-PO3,P12
28	Link design With Frequency Reuse	T1	1	BB	L2	CO3	PO1-PO3,P12
29	Link design Without Frequency Reuse	T1	1	BB	L2	CO3	PO1-PO3,P12
30	Revision						
Suggested Activity: Assignment / Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others Planned if any							
Evaluation method : CASE study about various Interference occured in Satellites							
UNIT IV SATELLITE ACCESS AND CODING METHODS							
31	Modulation and Multiplexing: Voice, Data, Video	T1	1	BB	L1	CO4	PO1-PO3
32	Analogdigital transmission system	T1,R1	1	BB	L2	CO4	PO1-PO3
33	Digital video Brocast	T1	1	PPT	L2	CO4	PO1-PO3
34	multiple access,FDMA	T1	1	PPT	L2	CO4	PO1-PO3
35	TDMA,CDMA	T1,R1	1	BB,NPTEL	L1	CO4	PO1-PO3
36	DAMA	T1	1	PPT	L1	CO4	PO1-PO3
37	Assignment Methods,Compression	T1,R2	1	PPT	L1	CO4	PO1-PO3
38	Encryption	T1	1	PPT	L1	CO4	PO1-PO3,P12
39	Coding Schemes	T1	1	PPT	L1	CO4	PO1-PO3
40	Revision						
Suggested Activity: Assignment / Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others Planned if any Quiz							
Evaluation method : Online MCQ Quiz							
UNIT V SATELLITE APPLICATIONS							
41	INTELSAT Series	T1	1	PPT,NPTEL	L2	CO5	PO1-PO3
42	INSAT,VSAT	T1	1	PPT	L2	CO5	PO1-PO3
43	Mobile Satellite Services	T1,R1	1	PPT	L2	CO5	PO1-PO3,P12
44	GSM,GPS	T1	1	PPT	L2	CO5	PO1-PO3,P12
45	INMARSAT,LEO	T1	1	PPT	L2	CO5	PO1-PO3,P12
46	MEO,SATELLITE NAVIGATION SYSTEM	T1	1	BB	L2	CO5	PO1-PO3

47	GPS Position Location Principles,Differential GPS	T1	1	BB	L2	CO5	PO1-PO3
48	Direct Broadcast Satellites (DBS)	T1,R2	1	BB	L2	CO5	PO1-PO3
49	Direct to Home Satellites (DTH)	T1	1	BB	L2	CO5	PO1-PO3
50	Revision						

Suggested Activity: Assignment / Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others Planned if any

Evaluation method: Present satellite Apllication in Varios Fields

Content Beyond the Syllabus Planned

1	Master antenna TV
2	Community antenna TV

Text Books

1	1. Dennis Roddy, ―Satellite Communication‖, 4th Edition, Mc Graw Hill International, 2006.
2	2. Timothy, Pratt, Charles, W. Bostain, JeremyE.Allnutt,"SatelliteCommunication‖,2nd Edition, Wiley Publications,2002

Reference Books

1	1. Wilbur L. Pritchard, Hendri G. Suyderhoud, Robert A. Nelson, ―Satellite Communication Systems Engineering‖, Prentice Hall/Pearson, 2007.
2	2. N. Agarwal, ―Design of Geosynchronous Space Craft‖, Prentice Hall, 1986.
3	3. Bruce R. Elbert, ―The Satellite Communication Applications‖, Hand Book, Artech House Bostan London, 1997.
4	4. Tri T. Ha, ―Digital Satellite Communication‖, II nd edition, 1990.
5	5. Emanuel Fthenakis, ―Manual of Satellite Communications‖, Mc Graw Hill Book Co., 1984
6	6. Robert G. Winch, ―Telecommunication Trans Mission Systems‖, Mc Graw-Hill Book Co.1983.
7	professional Books, 1990

Website / URL References

1	https://nptel.ac.in/content/storage/117/105/117105131/MP4/mod01lec01.mp4
2	https://nptel.ac.in/content/storage/117/105/117105131/MP4/mod02lec06.mp4
3	https://nptel.ac.in/content/storage/117/105/117105131/MP4/mod03lec11.mp4
4	https://nptel.ac.in/content/storage/117/105/117105131/MP4/mod06lec26.mp4
5	https://nptel.ac.in/content/storage/117/105/117105131/MP4/mod08lec39.mp4

Blooms Level

Level 1 (L1) : Remembering	Lower Order Thinking	Fixed Hour Exams	Level 4 (L4) : Analysing		Higher Order Thinking	Projects / Mini Projects
Level 2 (L2) : Understanding			Level 5 (L5) : Evaluating			
Level 3 (L3) : Applying			Level 6 (L6) : Creating			

Mapping syllabus with Bloom's Taxonomy LOT and HOT

Unit No	Unit Name	L1	L2	L3	L4	L5	L6	LOT	HOT	Total
Unit 1	SATELLITE ORBITS	1	7	0	1	0	0	8	1	9
Unit 2	SPACE SEGMENT	0	8	0	1	0	0	8	1	9
Unit 3	SATELLITE LINK DESIGN	0	5	0	4	0	0	5	4	9
Unit 4	SATELLITE ACCESS AND CODING METHODS	6	3	0	0	0	0	9	0	9
Unit 5	SATELLITE APPLICATIONS	0	9	0	0	0	0	9	0	9
Total		7	32	0	6	0	0	39	6	45
Total Percentage		15.56	71.11	0.00	13.33	0.00	0.00	86.67	13.33	100.00

CO PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	1	0	0	0	0	0	0	0	0	1	0	0
CO2	3	3	1	0	0	0	0	0	0	0	0	1	0	0
CO3	3	3	1	0	0	0	0	0	0	0	0	1	0	0
CO4	3	2	1	0	0	0	0	0	0	0	0	1	1	0
CO5	3	3	1	0	0	0	0	0	0	0	0	1	1	0
Avg	3	2.8	1	0	0	0	0	0	0	0	0	1	0.4	0

Justification for CO-PO mapping	
CO1	stong correlation for PO1,PO2,PO3 is given as CO1 can be used to apply knowledge of engineering to analyse the satellite orbits,parameters and moderately investigate of problems in lauching vehicles PO4 and to implement in design and developent solutions in PO12 An very less usage in embedded PSO2..
CO2	high correlation for PO1,PO2,PO3 is given as CO1 can be used to apply knowledge of engineering to analyse the satellite subsystems and segment and moderately investigate of testing of space equioments PO4 and to implement in design and developent solutions in PO12 An very less usage in embedded PSO2..
CO3	strong correlation for PO1,PO2,PO3 is given as CO1 can be used to apply knowledge of engineering to analyse the link power budjet calculation in satellite and moderately investigate of different interference levels PO4 and to implement in design and developent solutions in PO12 An very less usage in embedded PSO2..
CO4	High correlation for PO1,PO2,PO3 is given as CO1 can be used to apply knowledge of engineering to analyse the different access in satellite and coding schemes and moderately investigate of different interference levels PO4 and to implement in design and developent solutions in PO12 An very less usage in embedded PSO2..
CO5	strong correlation for PO1,PO2,PO3 is given as CO1 can be used to apply knowledge of engineering to understand the various applications of satellite and moderatelyconduct investigate of complex problems in broadcasting satellite PO4 and to implement in design and developent solutions in PO12 An very less usage in embedded PSO2.. .

3		High level			2		Moderate level			1		Low level			
Name & Sign of Faculty Incharge : MRS.I.S.SUGANTHI															
Name & Sign of Subject Expert :															
Head of the Department :DR.SIVA KUMAR															
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