



SWARNANDHRA COLLEGE OF ENGINEERING AND TECHNOLOGY
 (Autonomous)
 Narsapur, West Godavari District, A.P. 534280
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Course Code	Course Title	Sem	Branch	Contact Hrs/Week	Academic Year	Date of Commencement of semester
20EC5T03	Antennas and Wave Propagation	V	ECE	5	2024-25	03-06-2024

TEACHING PLAN

COURSE OUTCOMES:

After completion of the Course (Antennas and Wave Propagation) students are able to

CO1: Differentiate various types of antenna parameters. (K4)

CO2: Calculate the fields radiated by various types of antennas. (K3)

CO3: Categorize different types of antenna arrays. (K4)

CO4: Illustrate and identify the characteristics of radio wave propagation. (K3)

Unit No	Out Comes & Blooms Level	Topics/Activity	Text / Ref Book	Contact Hours	Delivery Method	
1	CO 1: Differentiate various types of antenna parameters. (K4)	I.ANTENNA FUNDAMENTALS				Chalk & Talk PPT and Tutorial.
		1.1	Introduction,	T1,T2,R1	1	
		1.2	Radiation Mechanism-single wire, two wire dipoles	T1,R1	1	
		1.3	Current Distribution on a thin wire antenna,	T1, T2,R2	1	
		1.4	Antenna Parameters- Radiation Patterns,	T1 ,R1	1	
		1.5	Patterns in Principle planes Main Lobe and Side Lobes	T1,R1	1	
		1.6	Beam Widths, Beam Area, Radiation Intensity	T1, T2	1	
		1.7	Beam Efficiency, Directivity,	T1 R1	1	
		1.8	Gain and Resolution	T1 R2	1	
		1.9	Antenna Apertures, Aperture Efficiency	T1, T2,R1	1	
		1.10	Effective Height	T1,T2,R1	1	
		1.11	Related Problems	T1,T2,R1	1	
		1.12	Class Test-1		1	
		Total		12		



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			II. THIN LINEAR WIRE ANTENNAS		
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2	CO2 Calculate the fields radiated by various types of antennas. (K3)	2.1	Retarded Potentials	T1,R1	1	Chalk & Talk , PPT and Tutorial.	
		2.2	Radiation from Small Electric Dipole	T2,R1	1		
		2.3	Half Wave Dipole	T1,R2	1		
		2.4	Evaluation of field components: Power Radiated,	T1,R1	1		
		2.5	Evaluation of field components: Power Radiated,	T1,R1	1		
		2.6	Radiation Resistance	T1,R1	1		
		2.7	Beam Widths, Directivity,	T1,R1	1		
		2.8	Effective Area, Effective Height	T1,R1	1		
		2.9	Reciprocity and Maximum power transfer theorem:	T1,R1	1		
		2.10	Loop Antennas: small loops Directivity	T1,R1	1		
		2.11	radiation resistance for small loops	T1,R1	1		
		2.12	Problems	T1,T2,R2	1		
		2.13	Class Test-2		1		
Total					13		
3	CO3 Categorize different types of antenna arrays. (K4)	III. ANTENNA ARRAYS					Chalk & Talk , PPT and Tutorial, LMS.
		3.1	2 element arrays –different cases,	T1,R1	1		
		3.2	Principle of Pattern Multiplication	T1,R1	1		
		3.3	N-element Uniform Linear Arrays-	T2,R1	1		
		3.4	Broadside Array	T1,R2	1		
		3.5	End fire Array	T1,R1	1		
		3.6	EFA With Increased Directivity	T2,R1	1		
		3.7	Derivation of their characteristics and comparison	T1,R1	1		
		3.8	Concept of Scanning Arrays, Binomial Arrays, Arrays with parasitic Elements,	T1,R1	1		
		3.9	Yagi-Uda Arrays	T2,R1	1		
		3.10	Folded dipole and their characteristics	T1,R1	1		
3.11	Related problems	T1,T2,R2	1				
3.12	Class Test-3		1				
Total					12		

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4	CO 3 Categorize different types of antenna arrays. (K4)	IV. NON-RESONANT AND MICROWAVE RADIATORS			Chalk & Talk , PPT and Tutorial, V- Lab, Experimental learning.
	4.1	Introduction, Traveling Wave radiators	T2,R1	1	
	4.2	Traveling Wave radiators basic concepts	T2,R1	1	
	4.3	Long Wire Antennas- field strength calculations and patterns	T2,R1	1	
	4.4	Micro strip antennas – introduction Geometry features, advantages and limitations	T2,R2	1	
	4.5	Rectangular patch antenna: different feeds	T2,R1	1	
	4.6	Helical Antenna Geometry, basic properties, Operational modes (axial mode and normal modes)	T2,R2	1	
	4.7	Reflector Antennas :Flat Sheet	T2,R1	1	
	4.8	Corner reflector	T2,R1	1	
	4.9	Paraboloidal Reflectors	T2,R2	1	
	4.10	Related problems	T2,R1	1	
	Content beyond Syllabus	4.11	Lens antenna with Zoning applications	T1,R1,R2	
		4.12	Class Test-4		1
Total				12	

5	CO 4 Illustrate and identify the characteristic s of radio wave propagation. (K3)	V. WAVE PROPAGATION			Chalk & Talk , PPT and Tutorial, LMS
	5.1	Concepts of Propagation- frequency ranges and types of Propagations.	T1,R1	1	
	5.2	Ground Wave propagation- Characteristics	T2,R1	1	
	5.3	Ground Wave propagation- Characteristics, Wave Tilt	T2,R1	1	
	5.4	Sky Wave propagation- Formation of Ionosphere layers	T1,R1	1	
	5.5	Sky Wave propagation- Formation of Ionosphere layers and their Characteristics	T1,R1	1	
	5.6	Mechanism of Reflection and Refraction, Critical Frequency	T2,R1	1	
	5.7	MUF & SKIP Distance-calculations for flat earth	T2,R1	1	
	5.8	MUF & SKIP Distance- Calculations for spherical earth	T2,R1	1	
	5.9	Space Wave Propagation- Mechanism, LOS and Radio Horizon	T1,R1	1	



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	5.10	Fundamental Equation for Free Space Propagation	T2,R1	1	
	5.11	Field strength, Duct Propagation	T2,R1	1	
	5.12	Related problems	T2,R1	1	
	5.13	Class Test-5		1	
				Total	13
CYCLE-II					
				TOTAL NO. OF CLASSES PROPOSED PER PERIODS :	62

Text Books:

S.No.	AUTHORS/BOOK TITLE/EDITION (latest)/PUBLISHER/YEAR OF PUBLICATION
T1	Constantine A. Balanis "Antenna Theory and Applications", Wiley 4 th edition, 2021.
T2	G.S.N.Raju, "Antennas and wave propagation ", 5 th edition, Pearson Education, South Asia 2012.

Reference Books:

S.No.	AUTHORS/BOOK TITLE/EDITION (latest)/PUBLISHER/YEAR OF PUBLICATION
R1	John D.Kraus and Ronald J.Marhefka Ahmad S Khan, "Antennas and wave propagation", 5 th edition, McGraw Hill Education private limited, 2018.
R2	K.D.Prasad, Satya Prakashan, " Antennas and wave propagation", 2019-20 edition .Satya Prakashan Publications, New Delhi,2020

Web Details

1	Antennas https://onlinecourses.nptel.ac.in/noc20ee20/preview
2	Antenna Arrays www.nrao.edu (https://public.nrao.edu/telescopes/vla/)
3	Analysis and design Principles of Microwave Antennas NPTEL IIT Kharagpur https://nptel.ac.in/courses/108/105/108105114/

	Name	Signature
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ii. Faculty II	Mrs. M. Radha Rani	
iii. Course Coordinator	Mr. Sekhar Didde	
iv. Module Coordinator	Dr. B. Sada Siva Rao	
v. Programme Coordinator	Dr. B. Subrahmanyeswara Rao	

Principal