



**SWARNANDHIRA 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
23EC5T03	Antennas and Wave Propagation	V	ECE	5	2025-26	09-07-2025

**TEACHING PLAN**

**COURSE OUTCOMES:**

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

CO1: Distinguish between various antenna parameters. (K4)

CO2: Compute the radiated fields of different types of antennas. (K3)

CO3: Classify different types of antenna arrays and analyze the characteristics of broadband and microwave antennas. (K4)

CO4: Demonstrate the characteristics of radio wave propagation through antenna measurements. (K3)

Unit. No	Out Comes & Blooms Level	Topics/Activity	Text / Ref Book	Contact Hours	Delivery Method
1	<b>CO 1:</b> Distinguish between various antenna parameters. (K4)	<b>1. ANTENNA FUNDAMENTALS</b>			
		1.1 Introduction,	T1,T2	1	Chalk & Talk , PPT and Tutorial, LMS.
		1.2 Radiation Mechanism-single wire, two wire dipoles	T1,R1	1	
		1.3 Current Distribution on a thin wire antenna,	T1,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	T2, R1	1	
		1.10 Effective Height	T1, T2	1	
		1.11 Antenna Efficiency, Band width, Input impedance	T2, R1	1	
		1.12 Related Problems	T1, T2	1	
		<b>Total</b>		12	
2	<b>CO2:</b> Compute the radiated fields of different types of antennas. (K3)	<b>II. THIN LINEAR WIRE ANTENNAS</b>			
		2.1 Retarded Potentials	T1,R1	1	
		2.2 Radiation from Small Electric Dipole	T2,R1	1	
		2.3 Half Wave Dipole	T1,R2	1	
		2.4 Quarter wave Monopole		1	
		2.5 Evaluation of field components: Power Radiated,	T1,R1	1	



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3	CO2: Compute the radiated fields of different types of antennas. (K3)	2.6	Evaluation of field components: Power Radiated,	T1,R1	1	Chalk & Talk , PPT and Tutorial, LMS.
		2.7	Radiation Resistance	T1,R1	1	
		2.8	Beam Widths, Directivity,	T1,R1	1	
		2.9	Radiation Efficiency		1	
		2.10	Effective Area, Effective Height	T1,R1	1	
		2.11	Natural current distributions, fields and patterns of thin linear center fed antennas of different lengths	T2, R1	1	
		2.12	Reciprocity theorem	T1,R1	1	
		2.13	Loop Antennas: small loops field components	T1,R1	1	
		2.14	Comparison of far fields of small loop and short dipole	T1,R1	1	
		2.15	Concept of short magnetic dipole, D and R, relations for small loops	T2, R1	1	
		2.16	Related Problems	T1,T2	1	
			<b>Total</b>		16	
<b>III. ANTENNA ARRAYS</b>						
3	CO3: Classify different types of antenna arrays and analyze the characteristics of broadband and microwave antennas. (K4)	3.1	2 element arrays –different cases,	T1,R1	1	Chalk & Talk , PPT and Tutorial, LMS.
		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, Directivity relations (no derivations)	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	
			<b>Total</b>		11	





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SECRET

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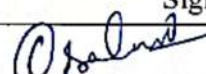
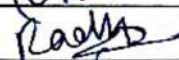
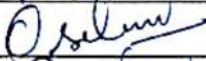
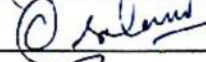

4	CO4: Demonstrate the characteristics of radio wave propagation through antenna measurements. (K3)	IV. BROADBAND ANTENNAS, UHF AND MICROWAVE ANTENNAS			
		4.1	Log periodic antenna	T2,R1	1
		4.2	Helical Antennas – Geometry, in Axial Mode and Normal Modes	T2,R1	1
		4.3	Horn Antennas – Types, Optimum Horns,	T2,R1	1
		4.4	Design Characteristics of Pyramidal Horns	T2,R2	1
		4.5	Paraboloidal Reflectors: – Geometry, characteristics	T2,R1	1
		4.6	types of feeds: Off-set Feeds, Case grain Feeds	T2,R2	1
		4.7	F/D Ratio, Spill Over, Back Lobes, Aperture Blocking	T2,R1	1
		4.8	Microstrip Antennas- Introduction, Features, Advantages and Limitations,	T2,R1	1
		4.9	Impact of different parameters on characteristics	T2,R2	1
	Content beyond Syllabus	4.10	Related problems	T2,R1	1
		4.11	Lens antenna with Zoning applications	T1,R1, R2	1
			<b>Total</b>	11	
5	CO4: Demonstrate the characteristics of radio wave propagation through antenna measurements (K3)	V: ANTENNA MEASUREMENTS, WAVE PROPAGATION			
		5.1	FRIIS Transmission Equation	T1,R1	1
		5.2	Patterns Required, Set Up,	T2,R1	1
		5.3	Distance Criterion, Directivity	T2,R1	1
		5.4	Gain Measurements (Comparison, Absolute and 3-Antenna Methods).	T1,R1	1
		5.5	Types of propagations. 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	T2,R1	1
		5.8	Space Wave Propagation-Mechanism, LOS and Radio Horizon	T1,R1	1
		5.9	Field strength equation	T2,R1	1
	5.10	Related problems	T2,R1	1	
			<b>Total</b>	10	
<b>TOTAL NO. OF CLASSES PROPOSED PER PERIODs</b>				<b>62</b>	

Chalk & Talk , PPT and Tutorial, LMS

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Text Books:			
S.No.	AUTHORS/BOOK TITLE/EDITION (latest)/PUBLISHER/YEAR OF PUBLICATION		
T1	Constantine A. Balanis "Antenna Theory and Applications", Wiley 3 <sup>rd</sup> edition, A. John Wiley & Sons, Inc., Publication 2021.		
T2	John D. Kraus and Ronald J. Marhefka Ahmad S Khan, "Antennas for All Applications", 3 <sup>rd</sup> edition, McGraw Hill Education private limited, 2018.		
Reference Books:			
S.No.	AUTHORS/BOOK TITLE/EDITION (latest)/PUBLISHER/YEAR OF PUBLICATION		
R1	G.S.N. Raju, "Antennas and wave propagation ", 5 <sup>th</sup> edition, Pearson Education, South Asia 2012.		
R2	K.D. Prasad, Satya Prakashan, " Antennas and wave propagation", 2019-20 edition ,Satya Prakashan Publications, New Delhi, 2019		
Web Details			
1	Antennas <a href="https://onlinecourses.nptel.ac.in/noc20ee20/preview">https://onlinecourses.nptel.ac.in/noc20ee20/preview</a>		
2	Antenna Arrays  <a href="http://www.nrao.edu">www.nrao.edu</a> ( <a href="https://public.nrao.edu/telescopes/vla/">https://public.nrao.edu/telescopes/vla/</a> )		
3	Analysis and design Principles of Microwave Antennas NPTEL IIT Kharagpur <a href="https://nptel.ac.in/courses/108/105/108105114/">https://nptel.ac.in/courses/108/105/108105114/</a>		
		Name	Signature
i.	Faculty I	Dr. Sekhar Didde	
ii.	Faculty II	Mrs. M. Radha Rani	
iii.	Course Coordinator	Dr. Sekhar Didde	
iv.	Module Coordinator	Dr. Sekhar Didde	
v.	Programme Coordinator	Dr. B. Subrahmanyeswara Rao	



Principal  
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Swarnandhra College of  
Engineering & Technology  
SEETHARAMAPURAM  
NARSAPUR - 534 280, W.G.D.