SWARNANDHRA COLLEGE of ENGINEERING & TECHNOLOGY

(Autonomous)

Seetharampuram, **NARSAPUR, W.G. Dt., 534 280.**

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Course Code	Course Title	Sem	Branch	Contact Hrs/Week	Academic Year	Date of Commencement of semester
23EC4T01	Electro Magnetic Waves and Transmission Lines	IV	ECE	5	2024-25	16-12-2024

COURSE OUTCOMES:

At the end of the Electro Magnetic Waves and Transmission Lines Course students should be able to

CO1: Determine the basics of Electrostatics by using Coulomb's law and Gauss law. (K3)

CO2: Illustrate Magneto statics and Max well Equations of Electromagnetic fields, depending up on the media. (K3)

CO3: Analyze the Electromagnetic Wave Propagation in dielectric and conducting media. (K4)

CO4: Focus on propagation problems of Electromagnetic Waves through Transmission Lines and its design. (K4)

Unit / No.	Out Comes & Blooms Level	Topics/Activity		Text/Ref Book	Total periods	Delivery Method
1	CO1: Determine the basics of Electrostatics by using Coulomb's law and Gauss law. (K3)	**I. Electrostatics:**				Chalk & Talk, PPT & Tutorial.
		1.1	Review of Co-ordinate Systems: Rectangular Co-ordinate Systems	T1, T2	01	
		1.2	Cylindrical Co-ordinate Systems	T1, R2	01	
		1.3	Spherical Co-ordinate Systems	T1, R2	01	
		1.4	Conversion from one coordinate system to another system	T1, R1	01	
		1.5	Coulombs law, Electric Field Intensity, Gauss law	T1, R2	01	
		1.6	Applications of Gauss law	T1, R2	01	
		1.7	Electric potential, Relations between E and V	T1, R3	01	
		1.8	Maxwell's Two Equations for Electrostatic Fields	T1, R2	01	
		1.8	Convection and Conduction Currents, Energy density	T1, R2	01	
		1.9	Dielectric constant, Types of dielectrics, Poisson's and Laplace`s Equations	T1, R2	01	
		1.10	Related problems	T1, R1	01	
		1.11	Class test-1	T1, R1	01	
			Total		**11**	

2	**CO2**: Illustrate Magneto statics and Max well Equations of Electromagnetic fields, depending up on the media. (K3)	**II. Magneto statics, Maxwell's Equations (Time Varying Fields)**				Chalk & Talk, PPT & Tutorial Video Lecturer , Problem Solving.
		2.1	Biot-Savart Law, Amperes Circuital Law	T1, T2	01	
		2.2	Applications of Amperes Circuital Law, Magnetic Flux Density	T1, T2	01	
		2.3	Maxwell's Two Equations for Magneto static Fields	T1, T2	01	
		2.4	Magnetic Scalar and Vector Potentials, Forces due to Magnetic Fields	T1, T2	01	
		2.5	Faraday's Law and Transformer EMF	T1, T2		
		2.6	Continuity equation for time varying fields, Inconsistency of Ampere's Law	T1, R1	01	
		2.7	Conduction and displacement current densities, Maxwell's equations in different final Forms	T1, R1	01	
		2.8	Maxwell's equations in Word statements	T2, R2	01	
		2.9	Conditions at a Boundary Surface: Dielectric-Dielectric	T1, R2	01	
		2.10	Conditions at a Boundary Surface: Dielectric –Conductor Interfaces	T1, R2	01	
		2.11	Dispersive medium, phase velocity	T1, R1	01	
		2.12	Group velocity, Beat phenomenon	T1, R1	01	
		2.13	Related problems	T1, R1	01	
		2.14	Class test-2	T1, R1	01	
			Total		**14**	
3	**CO3**: Analyze the Electromagnetic Wave Propagation in dielectric and conducting media. (K4)	**III. EM Wave Characteristics**				Chalk & Talk, PPT & Tutorial.
		3.1	Wave Equations for Conducting and Perfect Dielectric Media	T2, R1	01	
		3.2	Uniform Plane Waves-Definition,	T1, R2	01	
		3.3	Relations Between E&H		01	
		3.4	Wave propagation in lossless and Conducting (lossy) media	T2, R1	01	
		3.5	Conductors & Dielectrics-characterization,	T2, R2	01	
		3.6	Wave propagation in good conductors, good dielectrics and free space	T2, R2	01	
		3.7	skin depth, Polarization & Types	T1, R1	01	
		3.8	Normal Incidence for Perfect Conductor	T1, R3	01	
		3.9	Normal Incidences for Perfect Dielectric	T1, R3	01	
		3.10	Oblique Incidences for Perfect Conductor	T1, R3	01	
		3.11	Oblique Incidences for Perfect Dielectric	T1, R3	01	
		3.12	Brewster Angle, Critical Angle and Total Internal Reflection	T1, R2	01	

		3.13	Poynting Vector and Poynting Theorem	R1, R2	01	
		3.14	Related Problems	T1, R2	01	
		3.15	Class Test-3	T1, R1		
			Total		**15**	
4	CO4: Focus on propagation problems of Electromagnetic Waves through Transmission Lines and its design. (K4)	**IV. Transmission Lines-I**				Chalk & Talk, PPT & Tutorial, LMS.
		4.1	Types and parameters	T2, R2	01	
		4.2	Transmission line Equations,	T2, R2	01	
		4.3	Primary and secondary constants.	T2, R1	01	
		4.4	T & π Equivalent Circuits	T1, R1	01	
		4.5	Infinite Line concepts,	T1, R1	01	
		4.6	Propagation Constant, Phase and Group Velocities	T2, R2	01	
		4.7	lossless lines, Distortion less	T1, R1	01	
		4.8	Problems	T1, R1	01	
		4.9	Class Test-4		01	
			Total		**09**	
5	CO4: Focus on propagation problems of Electromagnetic Waves through Transmission Lines and its design. (K4)	**V. Transmission Lines-II**				Chalk & Talk, PPT & Tutorial, Video Lecturer, Problem Solving.
		5.1	Input Impedance Relations, Shorted Lines, Open Circuited Lines, and Matched Lines	T1, R1	01	
		5.2	Reflection Coefficient, VSWR, Average Power,	T1, R1	01	
		5.3	Low loss radio frequency and UHF Transmission lines	T1, R1	01	
		5.4	UHF Lines as Circuit Elements	T1, R1	01	
		5.5	Smith Chart- Construction	T1, R1	01	
		5.6	Smith Chart- Applications	T1, R2	01	
		5.7	Quarter wave transformer	T1, R2	01	
		5.8	Single Stub Matching	T1, R2	01	
		5.9	Problems	T1, R2	01	
	Content beyond Syllabus	5.10	Duct propagation	T1, R2	01	
		5.11	Class Test-5		01	
			Total		**11**	
			Total Proposed Number of Classes		**60**	

TEXT BOOKS:	
S. No.	AUTHORS/BOOK TITLE/EDITION (latest)/PUBLISHER/YEAR OF PUBLICATION
T1	Matthew N.O. Sadiku - Principles of Electromagnetics, Oxford Univ. Press, 6th ed., 2017.
T2	E.C. Jordan and K.G. Balmain- Electromagnetic Waves and Radiating Systems PHI, 2nd Edition, 2012.
REFERENCE BOOKS:	
S. No.	AUTHORS/BOOK TITLE/EDITION (latest)/PUBLISHER/YEAR OF PUBLICATION
R1	William H. Hayt, John A. Buck, Jaleel M. Akhtar Engineering Electromagnetics, TMH, 9th edition, 2020.
R2	John D. Ryder - Networks, Lines and Fields, Second Edition, Pearson Education, 2015

Web Details			
1	www.nrao.edu		
2	www.physics.bu.edu		
3	www.gnits.ac.in/sites/default/files/ONLINERESOURCES/EMWTL.pdf		
4	www.nptel.emwtl.in		
5	https://www.youtube.com/watch?v=pGSUXGf8P48		
6	www.slideshare.net		
		Name	Signature
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