Maharaja Agrasen Institute of Technology

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Department of Electrical & Electronics Engineering

ELECTROMAGNETIC FIELD THEORY (EEC-213)

ACADEMIC PLAN FOR SEMESTER-III 2022-2023
LESSON PLAN

Paper Code : EEC-213 **L;3; T:0; C:3**

	UNIT-I	L	CO
1	Review of scalar & vector field, 2D Dot & Cross Products	1	
2	Cartesian Coordinate System, Incremental Length, Surface, Volume, Gradient, Divergence & Curl	1	
3	Cylindrical Coordinate System – Incremental Length, Surface, Volume, Gradient, Divergence & Curl	1	
4	Spherical Coordinate System - Incremental Length, Surface, Volume, Gradient, Divergence & Curl	1	
5	Dot Products & Transformation of Vector from one form to other	1	
6	Electrostatics : Electric field due to point-charges, line charges and surface charges Gauss' Law & Applications	1	CO1
7	Electrostatic potential, Dirac Delta Representation of Charge, Electrostatic Energy	1	
8	Boundary Conditions at Dielectric – Dielectric Boundary	1	
9	Method of Images, Field Mapping	1	
10	Capacitance: Calculation for various geometries	1	
11	Laplace & Poisson's Equation: Solution (only 1- dimensional)	1	
	UNIT-II		
12	**Magnetostatics:** Introduction to Magnetic field, Magnetic Flux Density, Magnetic Field Strength H, Permeability	1	
13	Ampere's Law of Force, Biot Savart's law	1	
14	Ampere's Circuital Law in Differential & Integral Form	2	
15	Magnetic Vector Potential & Applications	1	

16	Equation of Continuity for Time-varying Fields & Boundary conditions.	1	CO2
17	Inconsistency in Ampere's Circuital Law & Maxwell's contribution of displacement current density	1	
18	Faraday's law of Electromagnetic Induction	1	
19	Maxwell's Equations : Differential & Integral form	2	
	UNIT III		
20	Electromagnetic Waves : Introduction & generation	1	
21	Plane wave equation & its solution	2	
22	Wave Equation for Harmonically Varying Fields	1	
23	Solution of wave equation for good dielectric, lossy dielectric & conductor	2	CO3
24	Depth of Penetration & Impedance of conducting medium	1	
25	Polarization, Reflection & Refraction of Plane Waves at Boundaries	1	
26	Poynting Vector, Poynting Theorem & Applications	2	
	UNIT-IV		
27	Transmission Lines : Introduction & Types	1	
28	Transmission Lines Equations	1	
29	Solution of Equations: lossless lines, distortionless lines	2	
30	Computation of Primary & Secondary constants	1	
31	Open Circuit lines, short circuited lines, standing wave & reflection loss	1	CO4
32	Loading of lines, I/P Impedance	1	
33	Impedance Matching, Single lines of lengths $\lambda/8$, $\lambda/4$, $\lambda/2$. Single Stub & Double Stub matching	1	
34	Relation between Reflection Coefficient (Transmission Coefficient) & VSWR	1	
35	Losses in Transmission lines, Smith's Chart & Applications	1	
	Total:	**41**	

Course Objectives

C.210.1	Relative knowledge of coordinate and Vector Sytem.
C.210.2	Explain laws and theorems of electrostatics and electromagnetics.
C.210.3	Applying Maxwell Equation for deriving and solving EM wave equations
C.210.4	Select Transmission Lines for various applications