VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY

BURLA, SAMBALPUR, ODISHA-768018

DEPARTMENT OF ELECTRICAL ENGINEERING

LESSON PLAN

Course	**:**	B.Tech (ElectricalEngg.)
Year &Semester	**:**	III year & VI semester (Sec. A & B)
Name of the Subject	**:**	Electromagnetic theory (3-1-0)
Name of the Faculty	**:**	Mamun Mishra

Class No	**Topics**	**Total No. Of Classes**
MODULE: -1		
1	Introduction to electromagnetics, A brief overview of the subject, Applications of static electric & magnetic fields, Need & Representation of vectors in different coordinate systems, Representation of vectors in Cartesian, Cylindrical, Spherical coordinate system.	10
2	Representation of vectors in Cartesian, Cylindrical, Spherical coordinate system. Coordinate transformations. Vector Algebra, Vector calculus.	
3	Vector Algebra, Vector calculus. (Assignment-1). Concept of field, scalar & vector field. Examples. Coulomb's law & concept of Electric field intensity. Numerical Problems.	

4	Coulomb's law & concept of Electric field intensity, Electric Field Intensity Potential due to various charge configurations (line, surface, volume charge distribution). Numerical Problems.	
5	Electric flux density – Gauss law and its application to symmetrical charge distributions, Numerical Problems.	
6	Gauss law applied to differential volume element, Concept of divergence – electric potential Numerical Problems.	
7	Potential field due to different types of charge configurations. Numerical Problems.	
8	The dipole – field due to dipole. Numerical Problems.	
9	Energy density in electrostatic field. Numerical Problems. (Assignment-2)	
10	Numerical Problems.	
MODULE:- 2		
11	Current and Conductors, Different material media, Different current densities in different material media(Convection & Conduction current density)	
12	Different current densities in different material media(Convection& Conduction current density), Boundary Conditions, The nature of dielectric materials – boundary conditions for perfect dielectric materials.	10
13	Boundary Conditions, (Assignment-3) Capacitance – different types of capacitors.	

14	Capacitance & resistance of different configurations.	
15	Capacitance of a two wire line – method of images	
16	Poisson's & Laplace equation, Uniqueness Theorem, Analytical Solution in one dimension.	
17	Analytical Solution in one dimension. Numerical problems.	
18	Concept of steady Magnetic fields, Biot Savart Law, Ampere's Circuital Law, Application of the laws to different current configurations.	
19	Numerical problems on Biot Savart Law & Ampere's Circuital Law. Stoke's Theorem. Maxwell's equations for static fields.	
20	Scalar and Vector Magnetic Potential. Numerical problems.	
MODULE:-3		
21	Force on a moving Charge, Lorentz force equation, Force on a differential Current Element,	
22	Force & Torque on different current carrying conductor configurations.	
23	Magnetization of materials, Concept of Magnetization & Permeability, Magnetic Boundary Conditions,	06
24	Magnetic Boundary Conditions, Inductance & Mutual Inductance.	
25	Introduction to Time varying fields, Faraday's Law, Displacement Current	
26	Displacement Current, Maxwell's equations for time varying fields.	
MODULE: -4		
27	Introduction to waves, Concept of plane wave & wave propagation, Derivation of wave equation.	

28	Wave propagation in Free Space, Dielectric, Numerical problems.	10
29	Wave propagation in Good Conductor, Concept of skin effect, Poynting's Theorem and wave power.	
30	Poynting's Theorem and wave power, Wave polarization, Reflection of Uniform Plane Waves at Normal incidence,	
31	Reflection of Uniform Plane Waves at Normal incidence & Oblique incidence, Transmission of Uniform Plane Waves at Normal incidence.	
32	Transmission of Uniform Plane Waves at Oblique incidence, Numerical problems.	
33	Standing wave ratio, Numerical problems.	
34	Wave Guide Operation.	
35	Antenna Principles.	
36	Numerical problems.	