Course Plan (Jan 2018-June 2018)

Electromagnetic Field Theory EC-212C

L T P CR			
3 1 0 4	Theory	:	75
	Class Work	:	25
	Total	:	100
	Duration of Exam	:	3 Hrs.

Name of the Teacher: Dr.Sheilza Jain
Class/Branch: B.Tech (ECE)
Semester: 4th
Department: Electronics Engineering

Unit No.	Topic to be covered	No. of lectures required	Remarks
UNIT 1: STATIC ELECTRIC FIELDS	Coulomb_s Law, Gauss_s Law,	1	
	Introduction to Del operation, Study of Del operation on scalar and vector and its physical interpretation, Laplacian operator,	2	
	Stoke_s Theorem and Divergence Theorem,	1	
	potential function, field due to a continuous distribution of charge, equi-potential surfaces,	1	
	Poison's equation, Laplace_s equation,	1	
	method of electrical images, capacitance, electro-static energy, boundary conditions	1	
	the electro-static uniqueness theorem for field of a charge distribution,	1	
	Dirac-Delta representation for a point charge and an infinitesimal dipole.	1	
	Total	**9**	
UNIT 2: STEADY MAGNETIC FIELDS	Faraday Induction law, Ampere_s Work law in the differential vector form, , ,	2	
	Ampere's law for a current element, magnetic field due to volume distribution of current and the Diracdelta function	2	
	Ampere_s Force Law, boundary conditions for magnetostatic	1	
	magnetic vector potential, scalar vector potential (Alternative derivation).	1	
	Total	**6**	
UNIT 3 : UNIT3. TIME VARYING FIELDS:	Introduction to conduction current, convection current and displacement current; Equation of continuity for static and time varying fields,	2	
	Inconsistency of Ampere's law	1	
	Maxwell's field equations and their interpretation,	1	

	solution for free space conditions, electromagnetic waves in a homogeneous medium	2	
	Discussion on : Group velocity, Phase velocity, Attenuation constant, Phase constant, Refractive index	1	
	propagation of uniform plane-wave, relation between E & H in a uniform plane-wave,	2	
	wave equations for conducting medium, Maxwell_s equations using phasor notation, wave propagation in a conducting medium,	2	
	Loss Tangent, conductors, dielectrics, wave propagation in good conductor and good dielectric, depth of penetration	2	
	polarization, linear, circular and elliptical,	2	
	Total	**15**	
UNIT 4 REFLECTION AND REFRACTION OF E M WAVES	Reflection and refraction of plane waves at the surface of a perfect conductor & perfect dielectric (both normal incidence as well as oblique incidence),	3	
	Brewester's angle and total internal reflection, reflection at the surfaces of a conductive medium	1	
	surface impedance, transmission-line analogy,	1	
	poynting theorem, interpretation of E x H, power loss in a plane conductor.	2	
	Total	**7**	
UNIT5. TRASMISSION LINE THEORY:	Transmission line as a distributed circuit, Primary Constant	1	
	Transmission line equation	1	
	Secondary constant, Distortion less and Loss less transmission line,	1	
	Open circuit and short circuit transmission line,	1	
	and Reflection coefficient, Standing waves, VSWR,	2	
	Smith's chart and its applications.	1	
	Total	**7**	

TEXT BOOK: 1. Electro-magnetic Waves and Radiating System: Jordan &Balmain, PHI.

REFERENCE BOOKS: 1. Engineering Electromagnetics :Hayt; TMH

2. Electro-Magnetics : Krauss J.DF; McGraw Hill.