General Sir John Kotelawala Defence University
Department of Electrical, Electronics and Telecommunication Engineering
Module Descriptor – Random Signals and Processes

Module Code	EE2212	**Module Title**	**Electromagnetics**											
Credits	2	**Hours/ Semester**	**Lectures**	25	**Prerequisites**	-								
GPA/ NGPA	GPA		**Continuous Assessments/ Tutorials**	10										
Module Objectives	To provide the students with knowledge of electromagnetic fields and waves related to electrical and communications engineering													
Learning Outcomes	After the completion of this module, the student will be able to **LO1: Estimate** induction and capacitance of a twin line and a coaxial **LO2: Analys** **LO3: Use** Maxwell's equations and identify electromagnetic wave propagation **LO4: Solve** problems related to plane wave propagation through lossless or lossy media. **LO5: Evaluate** the forces acting on a charge in electric and magnetic fields and determine its trajectory.													
Contents	**Static Electric & Magnetic Fields** Gauss's Law, Ampere's Law, Capacitance and Inductance of a twin line and a coaxial line; Transmission lines; VSWR, Smith Chart and its uses; Laplace and Poisson equations and their applications; Energy stored in a capacitor; magnetic flux density and magnetic field intensity; energy stored in an inductor; magnetic circuits, air-gap flux, permanent magnets													**LO1 LO2**
	Dynamic Fields and Electromagnetic Wave Propagation Faraday's Law of electromagnetic induction; Maxwell's equations; Electromagnetic wave propagation; Wave equation; Wave impedance; Power flow and Poynting's Theorem; Reflection, Refraction and Polarization of electromagnetic waves; Reflection and Transmission coefficients of electromagnetic waves at normal incidence and oblique incidence at an interface; Brewster angle, critical angle and their relevance in communications; Penetration of a wave incident on a boundary, skin effect and skin depth. Plane waves as TEM, TE and TM waves													**LO3 LO4**
	Electrodynamics: Motion of charged particles in electric and magnetic fields and their applications, electron ballistics													**LO5**
Laboratory/ Practical Sessions	• VSWR along a transmission line terminated by different loads – Matlab simulation • Reflection coefficient for parallel and perpendicular polarization of electromagnetic waves at a dielectric–dielectric interface for different angles of incidence – Matlab simulation • Impedance matching using Smith Chart													**LO1 LO2**
Method of Assessment	Continuous Assessments : 20% End semester examination : 80%													
References	1. John D Kraus, Electromagnetics-International edition: Mc Graw Hill, ISBN 0-07-035621-1 2. Schaum's outlines Third edition: Mc Graw Hill 2011, ISBN: 978-0-07-163235-5 3. Kraus , Fleisch, Electromagnetics with applications - International edition: Mc Graw Hill 1999, ISBN: 0-07-116429-4													

Linkage between Learning Outcomes (LO) and Program Outcomes (PO)

Learning Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO 12
LO1 (0.25)	H	M	L						M			
LO2 (0.20)	H	M	M						L		-	
LO3 (0.20)	H	M	L	L	L				L			M
LO4 (0.20)	H	L	L	L	L				M			L
LO5 (0.15)		L		L	L							M
Module	**H**	**H**	**M**	**L**	**L**				**M**			**M**

Program Outcomes