BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE – PILANI, HYDERABAD CAMPUS
INSTRUCTION DIVISION, First SEMESTER 2016 - 2017
<u>**COURSE HANDOUT (PART-II)**</u>

Date: 01-08-2016

In addition to part I (General handout for all courses appended to the timetable) this portion gives further specific details regarding the course.

Course Number   : PHY F212, ECE F212, EEE F212
Course Title   : Electromagnetic Theory I
Instructor-in-Charge   : **Souri Banerjee**
   Instructors   : Kannan Ramaswamy; Adonis   Lupulescu
             Rahul Nigam

<u>Scope & Objective of the course:</u>
   We live in an electromagnetic world. From atoms and molecules to computers and biological systems the electromagnetic forces, which is the most well-understood forces, are at the heart of most phenomena. We perceive physical objects because of electromagnetic forces and the objects around us are held together because of electromagnetic forces.
   The theory which gives account of electromagnetic phenomena is one of the greatest accomplishments of the human mind and as such it has to be part of the intellectual achievements of our students too. The chief principles of the electromagnetic theory are *deceptively* simple. It is one of the aims of this course to *lead the students to a thorough understanding of electromagnetic phenomena and their origin.*

<u>Text Book</u>:   *Introduction to Electrodynamics,* David J. Griffiths, Third Edition, Pearson Education Inc., 1999.

<u>Reference Books:</u>
1. *Electricity and Magnetism,* Edward M. Purcell, Second Edition, McGraw Hill Education, 2011.
2. *The Feynman Lectures on Physics: Volume II*, Richard P. Feynman, Robert B. Leighton, Matthew Sands, The New Millennium Edition, Pearson Education Inc. 2013.

Lecture Number	Learning Objectives	Topics to be covered	Reference Chapter/ Section
1	Feel of Electromagnetism	Introduction: The scope of EMT 1	CLASS LECTURE
2-6	Vector Algebra	Gradient, divergence and curl, Line, surface and volume integrals, Curvilinear co-ordinates, Dirac Delta Function	1.2-1.6
7-8	Review of	Gauss's Law in differential and integral	2.1, 2.2

	Electrostatics	form and its applications	
9-11	Some special mathematical techniques	Laplace's equation, First uniqueness theorem, Method of images, Multipole expansion, Applications	3.1- 3.4, (Exclude 3.3)
12-15	Electric Fields in Matter	Polarization, bound charges, electric displacement, Linear dielectrics.	4.1-4.4
16-20	Magnetism	Lorentz force law, Biot-Savart law, Ampere's law, Magnetic vector potential.	5.1-5.4
20-23	Magnetic fields in Matter	Magnetization, the field of a magnetized object, Ampere's law in magnetized materials, Magnetic susceptibility and permeability, Ferromagnetism.	6.1-6.4
24-28	Electrodynamics	Electromotive force, Ohm's law, Text book problem on Superconductors, Electromagnetic induction, Faraday's law.	7.1-7.2
29-31	Maxwell's Equations	Maxwell's equations, Boundary conditions, Poynting's theorem	7.3, 8.1
32-40	Electromagnetic Waves	Polarization, EM waves in vacuum, EM waves in matter	9.1,9.2,9.3

Evaluation Scheme:

EC No.	Evaluation Component	Duration	Weightage (%)	Date, Time	Remarks
1	Test I	60 Min.	20		Closed Book
2	Test II	60 Min.	20		Open Book
3	Assignment in the form of 3 announced quiz*	20 mins	20		Closed Book
4	Comprehensive	3 Hours	40		Closed Book

* Best two out of three will be taken. The quiz will roughly be equi-spaced and exact dates & venue will be announced later.

Chamber Consultation Hour: To be announced in class

Notices: Notices and solutions of tests & Final Comprehensive Examination will be displayed only on the **Physics** notice board.

Make-up Policy: NO Make-up for any quiz. However for T1 & T2, it is applicable to the following two cases and it is permissible on production of evidential documents.

(i) Debilitating illness.

(ii) Out of station with prior permission from the Institute.

Instructor-in-Charge