

**BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE – PILANI, HYDERABAD CAMPUS**  
**FIRST SEMESTER 2019-2020**  
**COURSE HANDOUT**

Date:01-08-2019

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, INSTR F212  
Course Title : Electromagnetic Theory I  
Instructor-in-Charge : **Souri Banerjee**  
Instructors : Aranya Bhuti Bhattacharjee, Subhash Karbelkar,  
Sarmistha Banik, Kannan Ramaswamy

**Scope & Objective of the course:**

Electromagnetic theory forms an important ingredient, along with the quantum theory, of the physics behind the technology we use and design today. Building on the electromagnetic theory, studied in the XII standard, this course augments students understanding of electromagnetic fields to a level where from she can take up advanced learning in this field. Students are strongly advised to revise what they have learnt in XII using the textbook as it may lead to deeper/newer insights.

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

**Reference Books:**

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.

**Learning Outcomes:**

1. Ability to evaluate the Gradient, Curl and Divergence of Scalar and Vector Fields in Cartesian Coordinates, Cylindrical Polar Coordinates and Spherical Polar Coordinates.
2. Ability to deal with the Electric and Magnetic fields in space as well as in matter in static as well as time variable situations.
3. Ability to understand Maxwell's equations.

**COURSE HANDOUT**

Number of Lectures	Learning Objectives	Topics to be covered	Chapter in the Text Book
1	Feel of Electromagnetism	Introduction: The scope of EMT 1	CLASS LECTURE
9	Vector Analysis	Vector differential and integral calculus; Gradient, Curvilinear co-ordinates,	1.2-1.5

		Dirac Delta Function	
5	Electrostatics	Application of Gauss Theorem in the context of curvilinear systems, Electric potential, work and energy in electrostatics in curvilinear systems	2.2, 2.4
3	Some special mathematical techniques	Introduce physics of conductors as prelude to Method of images, Multipole expansion in general, <b>exclude quadrupole moment calculations</b>	3.2 and 3.4 (Exclude 3.3),
4	Electric Fields in Matter	Polarization, bound charges, electric displacement, Linear dielectrics.	4.1 - 4.4
5	Magneto statics	Divergence and curl of B Magnetic vector potential.	5.3 - 5.4
4	Magnetic fields in Matter	Magnetization, the field of a magnetized object, Ampere's law in magnetized materials	6.1-6.3,
6	Electrodynamics	Maxwell's equations	,7.3.1 to 7.3.5 exclude 7.3.4
5	Electromagnetic Waves	EM waves in vacuum,	9.2

#### Evaluation Scheme:

EC No.	Evaluation Component	Duration	Weightage (%)	Date, Time	Remarks
1	Quiz	50 Min.	20		Open Book
3	Mid-Sem	90 Min.	35	30/9, 11.00 -- 12.30 PM	Close Book
4	Comprehensive	180 Min.	45	4/12 AN	Closed Book

**Chamber Consultation Hour:** To be announced in class

**Notices:** Notices and solutions of Quizzes, Mid-Semester & Final Comprehensive Examination will be displayed only on the **Physics** notice board.

**Make-up Policy:** In case of all pre-compre evaluation components, make up will be granted in the following two cases only and it is permissible only on production of evidential documents.

(i) Debilitating illness.

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

**Academic Honesty and Integrity Policy:** Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.

**Instructor-in-Charge**