BIRLA INSTITUTRE OF TECHNOLOGY AND SCIENCE, PILANI- HYDERABAD CAMPUS
SECOND SEMESTER 2018-2019
COURSE HANDOUT

Date: 07.01.2019

Course No.	**:**	**PHY F241**
Course Title	**:**	**Electromagnetic Theory II**
Instructor-in-charge	**:**	**SOURI BANERJEE**
Instructor	**:**	**Souri Banerjee**

1. Course Description: The course covers the following main topics: Electrostatics, Magnetostatics, Conservation Laws, Electromagnetic Waves, Potentials and Fields, Radiation, Electrodynamics and Relativity and, Scattering.

2. Scope and objective: Classical electromagnetic theory along with Classical mechanics and Quantum mechanics form the foundation of theoretical physics. Working knowledge of electromagnetic theory (EMT) is a must to be a good physicist. Knowledge of EMT will also be beneficial for engineers too. The present course lays the conceptual foundation of the theory.

3. Text Book: David Griffiths, J., *Introduction to Electrodynamics*, PHI, 3rd ed. 1999.

4. Reference Book: R1: Reitz & Millford, *Foundations of Electromagnetic Theory*, Narosa Pub. House, 3rd 1997; **R2**: J. D. Jackson, *Classical Electrodynamics*, Wiley, 3rd 1999.

5. Course Plan:

Lecture Number	Learning Objectives	Topics to be Covered	Chapter in the Text Book
1-3	Review of Magnetostatics	Underlying symmetry of electrostatics and magnetostatics, Magnetic Vector potential, Multipole expansion of vector potential	5
4-7	Magnetic fields in Matter	Magnetization, the field of a magnetized object, Ampere's law in magnetized materials, Magnetic susceptibility and permeability, Ferromagnetism	6
7-9	Maxwell's equations	Maxwell's equations in space, in matter, boundary conditions of electric and magnetic fields	7.3
10-15	Conservation laws	Conservation of Charge, Energy momentum, Poynting theorem, Maxwell stress Tensor	8.1, 8.2
16-24	Electromagnetic Waves	Electromagnetic waves in dielectric matter, reflection, refraction and	9.2,9.3,9.4,9.5

		transmission at interfaces, Wave propagation in metals, Absorption & Dispersion, Guided waves.	
25-33	Potentials and Fields	The Potential formulation, Retarded potentials, Lienard-Wiechert potential and fields of a moving point charge	10.1,10.2,10.3
34-40	Electromagnetic Radiation	Electric Dipole Radiation, Radiation from Point Charge, Abraham-Lorentz formula	11.1,11.2

6. Evaluation Scheme:

EC No.	Evaluation Component	Duration	Weightage (%)	Date, Time	Nature of Component
1.	Midsem		30	15/3 1.30 -3.00 PM	Closed Book
2.	Comprehensive exam		40	11/05 FN	Close Book
3.	a.) Quiz (best 2 out of 3) b) Seminar	20 mins	30		Open Book

7. Chamber Consultation Hour: Any time when I am not teaching

8. Notices: Notices for the course will be displayed on the Physics Dept notice board & CMS

9. Make-up Policy: Make up will be given only in cases of genuine sickness or unavoidable need to go out of the campus. Make up requests (hard copy) must be given at least one day before the test.

10. 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
PHY F241