Birla Institute of Technology & Science, Pilani
Hyderabad Campus

SECOND SEMESTER 2021-2022

Course Handout Part II

Date: 15.01.2022

In addition to part-I (General Handout for all courses appended to the time table) this portion gives further specific details regarding the course.

Course No. : **PHY F241**
Course Title : *Electromagnetic Theory II*
Instructor-in-Charge : ***SARMISTHA BANIK***

Scope and Objective of the Course:

Working knowledge of EMT is a must to be a good physicist. It is the foundation for the technologies of EE, ECE and computer engineering, spanning the entire electromagnetic spectrum, from dc to light. In EMT-I we assembled electrodynamics piece by piece and stopped at Maxwell's equations. Now it's time to appreciate the extraordinary power and richness of electrodynamics. We will see that Maxwell's equations represent a fundamental unification and interdependence of electric and magnetic fields and predict electromagnetic wave phenomena. These waves move with speed of light and here we make a connection between EMT and optics. Also we study the physical phenomenon of electromagnetic radiation through Maxwell's equations. Finally, we introduce the other major conceptual advance in electromagnetic theory i.e. Einstein's special theory of relativity.

Textbooks:

1. David Griffiths, J., *Introduction to Electrodynamics*, PHI, 4th ed.

Reference books

1. Feynman Lectures on Physics Vol II

Course Plan:

Lecture Number	Learning Objectives	Topics to be Covered	Chapter in the Text Book
1-2	Introduction and recapitulation of EMT1	Magnetic Field in Matter*(mostly self study)*, Maxwell's equations	6.1.4, 6.2,6.3,7.3
3-5	Conservation laws	Conservation of Charge, Poynting theorem, Linear and Angular momentum	8.1, 8.2
6-15	Electromagnetic Waves	Wave Equation, Electromagnetic waves in free space, Electromagnetic waves in dielectric matter, reflection, refraction and transmission at	9.1,9.2,9.3,9.4, 9.5

		interfaces, Wave propagation in metals, Absorption & Dispersion, Guided waves.	
16-23	Electrodynamics and Relativity	The Special Theory of Relativity, Relativistic Mechanics, Relativistic Electrodynamics	11.1,11.2,11.3
	Mid Sem		
24-27	Seminar/Poster Presentations		
28-32	Potentials and Fields	The Potential formulation, Retarded potentials, Jefimenko's Eqns, Lienard-Wiechert potential and fields of a moving point charge	12.1,12.2,12.3
33-40	Electromagnetic Radiation	Electric Dipole Radiation, Radiation from Point Charge, Radiation reaction	10.1,10.2
14 classes	Tutorials		

Evaluation Scheme:

EC No.	Evaluation Component	Duration	Weightage (%)	Date, Time	Nature of Component
1.	Midsem	90 mins.	30%	10/03 9.00am to10.30am	Open
2.	Poster/seminar	-	10%	TBA	Open
3	Tutorial tests (3)	45 min	25%	tutorial hour	Open
4.	Comprehensive Examination	120 mins.	35%	06/05 FN	Open

Consultation Hour: Through email and google classroom

Notices: Notices for the course will be displayed on CMS and google classroom.

Make-up Policy: Make up will be given only in cases of genuine sickness or unavoidable technical issues. Make up requests must be given at least one day before the test.

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