HALDIA INSTITUTE OF TECHNOLOGY

LECTURE PLAN

Serving Department:Applied Science **Dept.:**
Semester: 3rd & 4th **Session:**
Paper Name: Physics-II **Paper Code: PH-301&PH-401**
Allotted Hour(s): 30 **Actual Hour(s): 29**
Name of the Teacher:Dr. Rajesh Das

Sl. No.	Date	Topics	Hours	Remarks/Books
Module – 1 :				
1.		Basic Concept of scalar, Vector, product of scalar and vectors, Physical significances of grad, div, curl, Problems. Line integral, surface integral, volume integral.	**1**	***Vector Analysis*** **1. Spigel,** **2. Harper**
2.		Line integral, surface integral, volume integral - physical examples in the context of electricity and magnetism, Problems. Statements of Stokes theorem and Gauss theorem. Expression of grad, div, curl and Laplacian in Spherical and Cylindrical co-ordinates.	**1**	
Module – 2 :				
3.		Coulombs' law in vector form. Electrostatic field and potential. Gauss's law in integral form and conversion to differential form.	**1**	**1. *Electricity and Magnetism*** **D. Chattopadhyay & P.C. Rakshit**
4.		Application of Gauss's law in various problems.	**1**	
5.		Electrostatic potential and field, Poisson's Eqn. Laplace's eqn., application to Cartesian, Spherically and Cylindrically symmetric systems – effective 1D problems.	**1**	**2. *Electrodynamics*** **D.J. Griffith**
6.		Electric current, drift velocity,current density, continuity equation, steady current.	**1**	
7.		Dielectrics-concept of polarization, the relation $D=\varepsilon_0 E+P$, Polarizability, Gausses' law for dielectric polarization.	**1**	
8.		Localized fields, Electronic polarization, Polarization in monoatomic and polyatomic gases.	**1**	
9.		Tutorial1 – Electrostatics, Dielectrics	**1**	

Module – 3 :				
10.		Lorentz force, force on a small current element placed in a magnetic field. Divergence of magnetic field, vector potential, Ampere's law in integral form and conversion to differential form.	**1**	**1. *Electricity and Magnetism* D. Chattopadhyay & P.C. Rakshit 2. *Electrodynamics* D.J. Griffith**
11.		Biot-Savart law and its applications.	**1**	
12.		Faraday's law of electro-magnetic induction in integral form and differential form, Motional emf.	**1**	
13.		Tutorial 2 – Magnetostatics, em induction	**1**	
Module – 4 :				
14.		Maxwell's field equations; Concept of displacement current.	**1**	**1. *Electricity and Magnetism* D. Chattopadhyay & P.C. Rakshit 2. *Electrodynamics* D.J. Griffith**
15.		Maxwell's wave equation and its solution for free space and associated problems.	**1**	
16.		E.M. wave in a charge free conducting media, Skin depth, Analysis of Skin Depth for good and bad conductors.	**1**	
17.		E.M. energy flow & Poynting Vector.	**1**	
18.		Tutorial 3 –Maxwell's field theory	**1**	
Module – 5 :				
19.		Degrees of freedom, Generalised coordinates, velocity, momentum, energy, force, potential,.	**1**	***Classical Mechanics* 1. Gupta Kumar 2. Goldstein**
20.		Principle of virtual work, De'Alembart's principle, Lagrange's Equation of motion and Lagrangian.	**1**	
21.		Lagrange's Equation of motion for electrical circuit, Several problem analysis using Lagrangian in 1-D.	**1**	
22.		Hamilton's Equation of motion and Hamiltonian. Configuration space, phage space, Properties of Hamilton.	**1**	
23.		Formulation of Hamilton's equation of motion and its problems.	**1**	
Module – 6 :				
24.		Concept of energy levels and energy states. Microstates, macrostates and thermodynamic probability, equilibrium macrostate, Concept of ensembles, classifications of ensembles, Concept of phage space and Configuration space.	**1**	***Statistical Mechanics* by 1. Gupta Kumar 2. B.B. Laud 3. R.K. Pathria**

25.		Properties of MB, FD, BE statistics fermions, bosons, physical significance and application, Classical limits of quantum statistics.	**1**	
26.		Fermi distribution at zero & non-zero temperature. MB, BE distribution variation analysys, Density of states.	**1**	
27.		Calculation of Fermi level in metals, also total energy at absolute zero of temperature and total number of particles.	**1**	
28.		Bose-Einstein statistics. Planck's law of blackbody radiation.	**1**	
29.		Tutorial 4 – Statistical Mechanics	**1**	
		Total-	**29**	