Semester-IV		
Paper Code	**Theory**	**Credits:3**
403101	**Title: Thermodynamics and Electrodynamics**	**45 L**
Unit 1		**15 L**
	Temperature and the Kinetic Theory of Gases*:* Temperature and the Zeroth Law of Thermodynamic, Thermometers and Temperature Scales, Thermal Expansion of Solids and Liquids, Macroscopic Description of an Ideal Gas,The Kinetic Theory of Gases. Ref.: SJ2 chapter 1 ***Energy in Thermal Process:*** Heat and Internal Energy, Specific Heat, Latent Heat and Phase Changes , Work in Thermodynamic Processes, The First Law of Thermodynamics ,Some Applications of the First Law of Thermodynamics, Molar Specific Heats of Ideal Gases Adiabatic Processes for an Ideal Gas, Molar Specific Heats and the Equal partition of Energy, Energy Transfer, Mechanisms in Thermal Processes. Ref.: SJ2 Chapter 2 ***Heat Engines and the Second Law of Thermodynamics:*** Reversible and Irreversible Processes, The Carnot Engine , Heat Pumps and Refrigerators An Alternative Statement of the Second Law, Entropy, Entropy and the Second Law of Thermodynamics, Entropy Changes in Irreversible Processes. Ref.: SJ 2 Chapter 3.	
Unit 2		**15 L**
	Electric Forces and fields: Historical Overview, Properties of Electric Charges, Insulators and Conductors, Coulomb's Law, Electric Fields, Electric Field Lines, Motion of Charged Particles in a Uniform Electric Field, Electric Flux, Gauss's Law, Application of Gauss's Law to Symmetric Charge Distributions, Conductors in Electrostatic Equilibrium. Ref.: SJ 2 Chapter 4.	

	Electric potential and capacitance: Potential Difference and Electric Potential, Potential Differences in a Uniform Electric Field, Electric Potential and Electric Potential Energy Due to Point Charges, Obtaining Electric Field from Electric Potential, Electric Potential Due to Continuous Charge Distributions, Electric Potential of a Charged Conductor, Capacitance, Combinations of Capacitors , Energy Stored in a Charged Capacitor, Capacitors with Dielectrics. Ref.: SJ 2 Chapter 5. ***Direct Current Circuits:*** Electric Current, Resistance and Ohm's Law, Superconductors ,A Structural Model for Electrical Conduction, Electric Energy and Power, Sources of emf ,Resistors in Series and in Parallel ,Kirchhoffs Rules ,RC Circuits. Ref.: SJ 2 Chapter 6.	
Unit 3		**15 L**
	Magnetic forces and Magnetic Fields: Historical Overview, The Magnetic Field, Motion of a Charged Particle in a Uniform Magnetic Field , Applications Involving Charged Particles Moving in magnetic fields, Torque on a Current Loop in a Uniform Magnetic Field , The Biot-Savart Law The Magnetic Force Between two Parallel Conductors**,** Ampere's Law. The Magnetic Field of a Solenoid, Magnetism in Matter. Ref.: SJ 2 Chapter 7. **Faraday's Law and Inductance** Faraday's Law of Induction, Motional emf ,Lenz'sLaw,Induced emfs and Electric Fields,Self-Inductance , RL Circuits, Energy Stored in a Masnetic Field. Ref.: SJ 2 Chapter 8. **Electromagnetic Waves:** Displacement Current and the Generalized Ampere's Law,Maxwell's Equations,Electromagnetic Waves, Hertz's Discoveries,Energy Carried by Electromagnetic Waves, Momentum and Radiation Pressure, The Spectrum of Electromagnetic Waves,Polarization. Ref.: SJ 2 Chapter 9.	
References:		
Physics: A Calculus based approach (Volume II) by Serway and Jewett (SJ2)		
Additional References:		
1) Physics: (Volumes I and II) H. C. Verma. 2) Physics: (Volumes I and II) by Resnick, Halliday and Krane- Wiley India Edition (5^{th} Edition)		