Course Code	Course Name	Credits
26PH004	ELECTRICITY AND MAGNETISM	04

Course Objectives

- Investigation of the properties of magnets.
- Finding the relationships between magnetism and electricity.
- Determine practical applications of electricity and magnetism.

Learning Outcomes

Upon successful completion of this course it is intended that a student will be able to:

- Fundamental laws and concepts in electricity and magnetism, especially with regard to Maxwell's laws
- Electrical circuits and the most common components in such: resistors, capacitors, and inductors- The properties of static electric and magnetic fields.
- The properties of simple, time-dependent electric and magnetic fields and what kind of physical phenomena.
- Electromagnetic waves and their properties- Important historical experiments in the field of electricity and magnetism.

Unit 1 - Electrostatics (12 Hrs.)

Gauss law and its applications- Electric field due to uniformly charged sphere-Electric field due to uniform cylindrical charge-Electric field due to infinite plane sheet of charge-Coulomb's theorem-Deduction of Coulomb's law of Gauss law-Principle of a capacitor – Capacity of a spherical and cylindrical capacitors – Energy stored in a capacitor – Loss of energy due to sharing of charge-Types of capacitors.

Unit 2 – Current Electricity (12 Hrs.)

Kirchoff's law- Wheatstone condition for bridge balance – Carey Foster's Bridge Potentiometer principle-Calibration of ammeter and voltmeter- Seebeck effect- Law of thermos emf- Measurement of thermos emf using potentiometer – Theory of moving coil ballistic galvanometer- Correction for damping–Figure of merit.

Unit 3 - Magnetism And Magnetic Effect (12 Hrs.)

Basic definitions - Susceptibility –Properties of para, dia and ferro magnetic materials Experiment to draw B-H curve by ballistic method–Energy loss due to hysteresis-Importance of hysteresis – Maxwell's screw rule-Fleming's left hand rule-Biot-Savart law-Magnetic induction at a point due to a straight conductor- Magnetic induction at a point on the axis of circular coil- Force on a current carrying conductor in a magnetic field-Force between two parallel current carrying conductors.

Unit 4 – Electromagnetic Induction (12 Hrs.)

Faradays Law, Lenzs Law, Self-Inductance and Mutual Inductance, Reciprocity Theorem, Energy stored in a Magnetic Field, Introduction to Maxwells Equations - Mutual inductance between two co-axial solenoids – Experimental determination of mutual inductance- Coefficient of coupling –Earth inductor-Determination of BH.

Unit 5 - Alternating Current Circuits (12 Hrs.)

EMF induced in a coil- Impedance, admittance and reactance- Power in A. C. circuits - Peak value and r.m.s value of an AC – AC circuit containing L, C and R in series– Q factor – Comparison of Series and parallel resonance circuits – Sharpness of resonance– Power factor – Growth decay of current in circuit containing L and R- Charging and discharging of capacitor through R- High resistance by leakage - Choke coil.

Reference Books:

1. Sehgal D L, Chopra K L, Sehgal N K – Electricity and Magnetism, Sultan Chand
2. & Sons, New Delhi. Brijlal and Subramanian, Electricity and Magnetism, 6th Edn.,Ratan&Prakash, Agra.
3. David J Griffiths, Introduction to Electrodynamics, 2nd Edn. 1997, Prentice Hall of India pvt. Ltd., New Delhi.
4. Electricity & Magnetism by K KTewari, S Chand & Co., 3rd Edition, 2001

Websites and eLearning Sources:

1. https://nptel.ac.in/courses/108105479
2. https://youtube.com/watch?v=3HyORmBip-w&feature=shared
3. https://youtu.be/xKNv2gXYzlk?si=1GhcJtatt-OObEpJ

COs and Bloom's Taxonomy Mapping – 26PH004		
Course Outcomes	**On successful completion of this course, students will be able to**	**BTL**
CO1	Recall and explain the fundamental laws of electrostatics, magnetism, and electromagnetic fields.	K1, K2
CO2	Apply circuit laws and electromagnetic principles to solve problems in electrical systems.	K3
CO3	Analyze magnetic and electromagnetic phenomena using theoretical and mathematical approaches.	K4
CO4	Evaluate the behavior of electrical and magnetic systems in practical applications.	K5
CO5	Design and analyze circuits and electromagnetic systems for real-world applications.	K6

BTL (Bloom's Taxonomy Level) - K1 – Remembering, K2 – Understanding, K3- Applying, K4 – Analyse, K5- Evaluate and K6 - Create

Relationship Matrix – 26PH004													
Course Outcomes	**Programme Outcomes (POs)**						**Programme Specific Outcomes (PSOs)**						**Mean Score of Cos**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	
CO1	3	2	1	1	1	1	3	2	2	1	1	1	1.58
CO2	3	3	2	1	1	1	2	3	3	2	2	1	2.00
CO3	3	2	2	1	1	1	2	2	2	2	2	1	1.75
CO4	3	3	3	2	2	1	2	3	3	3	3	2	2.50
CO5	2	2	3	1	2	2	2	2	3	2	3	3	2.17
												Total	2.00

Mean Score: 3- High, 2- Medium/Moderate, 1-Low

FULLY HUMAN
Fully
Alive