North Bengal St. Xavier's College

Department of Physics

LESSON PLAN

Subject: PHYSICS MAJOR

Paper Title: ELECTRICITY AND MAGNETISM

Semester:2nd

Paper Code:PHYMAJ103

Unit	Unit Name	Chapter	Class	Topic Discussed	No. of	Metho
					Lecture	dology
						used
1.	Electric	Field and Potential	1.	 Coulomb's law Electric field Quantization of charges Electric field due to 	17	
	Field and Electric			different charge distributions		
	Potential		2.	 Field intensity due to line charge Field intensity on the axis of a ring of charge 		
			3.	 Electric potential Relationship between field and potential Electrostatic field is 		
			4.	 Calculation of potential at a point in an electric field due to a point charge 		
			5.	 Potential Due to a uniformly charged hollow sphere 		
			6.	 Electric Dipole and Dipole moment Potential and intensity due to an electric dipole 		
			7.	 Potential and energy due to a uniformly charged disc Electric line of force Numericals 		
		Gauss's Law and Applicati on	8.	 Gauss's Theorem(proof) Differential form of Gauss's theorem Poisson and Laplace's equation. 		

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			9.	•	Field intensity at a point		
					due to uniformly charged		
					wire		
			10.	•	Field intensity at a point		
					due to uniformly charged		
					thin spherical shell		
			11.	•	Field intensity at a point		
					due to uniformly charged		
			l		solid sphere.		
			12.	•	Field intensity at a point		
					due to hollow charged		
			l		infinite cylinder		
			13.	•	Field intensity at a point		
					due to infinite plane sheet		
					of charge		
				•	Field intensity at a point		
					due to parallel plane		
					charged conductor.		
			14.	•	Coulomb's law from		
					Gauss's law		
			l	•	Energy stored up in an		
			l		electric field		
		Capacitor	15.	•	Capacitor principle		
		s	l	•	Combination of capacitor		
				•	Capacitance		
			16.	•	Capacitance of a parallel		
					plate capacitor		
				•	Guard ring capacitor		
			17.	•	Capacitance of a spherical		
			l		capacitor		
				•	Capacitance of a cylindrical		
					capacitor		
			l	•	Energy stored in a charged		
			l		capacitor		
2.	Dielectric		1.	•	Dielectric and polarization	3	
	properties		l	•	Relationship between D,E		
	of matter				and P		
				•	Relative Permittivity and		
					electric susceptibility		
			2.	•	Capacitance of a parallel		
					plate capacitor with		
					compound dielectric		
			3.	•	Capacitance of a spherical		
					capacitor with mixed		
					dielectric		
				•	Gauss's Law of Dielectric		
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Unit	Unit Name	Cla	Topic Discussed	No. of	Methodology
		SS		Lecture	used
3.	Magnetic Field	1.	 Bar magnet Oersted experiment, and concept of magnetic field B. Magnetic force 	12	
		2.	 Magnetic force on a point charge Magnetic force on a current carrying wire Numericals on magnetic force 		
		3.	 Biot-Savart law Direction of magnetic field (Right hand law) Magnetic field due to a straight current carrying wire 		
		4.	 Magnetic field due to a circular current carrying loop Numericals 		
		5.	 Magnetic field due to a solenoid Ampere's circuital law Differential form of Ampere's law (curl of B) 		
		6.	 Magnetic field due to a straight current carrying wire Magnetic field due to a long solenoid 		
		7.	 Magnetic field due to a toroid Infinite sheet of current 		
		8.	 Magnetic force between two infinitely long current carrying conductors/wires Magnetic force between two current carrying loops Divergence of magnetic field 		
		9.	 Magnetic vector potential Biot-Savart law from magnetic vector potential Ampere's law from magnetic vector potential Magnetic vector potential due to straight current carrying wire 		

		10.	 Magnetic vector potential due to two long straight parallel wires carrying same current Magnetic vector potential due to infinite sheet of current Magnetic vector potential 		
			 due to long solenoid Torque on a current loop in a uniform magnetic field. 		
		12.	Numerical		
4.	Magnetic properties of matter	1.	 Magnetization vector Magnetic intensity Magnetic susceptibility and permeability Relation between B, H, and M. 	1	
5.	Electromagneti c induction	1.	 EMF and magnetic flux Faraday's experiment of electromagnetic induction Faraday's law, and Lenz's law Integral, and differential form of Faraday's law 	5	
		2.	 Self-inductance Self-inductance due to a single coil Self-inductance due to a solenoid 		
		3.	 Self-inductance due to a toroid Self-inductance in coaxial cable Self-inductance in transmission lines 	1	
		4.	 Mutual inductance Mutual inductance due to two coils Mutual inductance due to two solenoids Coefficient of coupling Series and parallel connections of inductors Energy stored in a 		

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		6.	 Charge conservation and displacement current Modified Ampere's law Maxwell's equations 	
		7	Numericals	
	Electrical Circuits	1.	 Components of a circuit 8 (passive, active) Voltage source, current source AC circuits Voltage and current waveform Mean, RMS, form factor, and peak factor of ac Power in ac circuits 	
		2.	Current-voltage relationship in pure resistance, inductor, and capacitor	
		3.	AC LR, and CR circuit	
		4.	Series LCR circuit	
		5.	Parallel LCR circuit	
		6.	 Ideal voltage source Ideal current source KCL, KVL Numerical 	
		7.	Thevenin's theoremNorton's theorem	
		8.	 Superposition theorem Maximum power transfer theorem 	