Lecture Plan

Name of the College: Government College of Arts, Science and Commerce. Sanquelim - Goa

Name of Faculty: Suvarna Patil	**Subject:** Physics	
Paper code: PYC107	**Program: T.Y.B.Sc**	**Division:**
Academic year: 2024-25	**Semester: V**	**Total Lectures: 60**

Course Objectives: .

Course Outcome: 1.Use advanced mathematical tool i.e. vector calculus to understand mathematical modelling of Electrostatics 2. Explain types of differential equation, partial differential equations and realize the importance of these equations in Physics, as nature itself is dynamic and evolving. 3. Solve problems from Electrostatics efficiently and swiftly by selecting appropriate mathematical tool such as gradient, divergence, curl and Laplace operator etc. 4. Develop problem solving skills and explore possibilities for newer applications of these concepts.

Student Learning Outcome: **Student will be able to use mathematics to solve Electromagnetic Equations and understand how electromagnetic theory is used in solving the equations.**

Month	Lecture From	Lecture To	No. of lectures allotted	Topic, Subtopic to be covered	Exercise/ Assignment	ICT Tools	Reference books
June- july	28-06-2024	06-07-2024	4L+1P	Vector Analysis Vectors and scalar fields, differentiation and integration of scalar and vector fields, directional	Solving Problems	Chalk and Board	H.K. Dass & R. Verma, Mathematical Physics, S. Chand.

				derivative, gradient, the del operator, divergence and curl			
				Measurement of Dielectric constant of solids by using parallel plate capacitor. Measurement of dielectric constant & susceptibility of liquid using two co-axial metal tubes		Chalk and Board	
	08-07-2024	13-07-2024		Solving Problems+			
			4L+	Laplacian operator, Integration of Vector Functions - Line, Surface and Volume Integrals, Gauss Divergence Theorem (without proof), Greens Theorem, Stokes Theorem (without proof),	Solving Problems	**Chalk and Board**	H.K. Dass & R. Verma, Mathematical Physics, S. Chand.
			1P	**1.Measurement of Dielectric constant of solids by using parallel plate capacitor. 2. Measurement of dielectric constant & susceptibility of liquid using two co-axial metal tubes**			
	15-07-2024	20-07-2024	4L+1P	Differential vector Identities,	Solving Problems	Chalk and Board	H.K. Dass & R. Verma,

				Expression for Laplacian operator in Cartesian, spherical and cylindrical coordinates. **Absolute capacity by ballistic galvanometer. Variation of A.C. Resistance of a coil with frequency.**			Mathematical Physics, S. Chand.
	22-07-2024	27-07-2024		Dirac delta function and its application + solving Problems **Absolute capacity by ballistic galvanometer. Variation of A.C. Resistance of a coil with frequency.**	Solving Problems	Chalk and Board	H.K. Dass & R. Verma, Mathematical Physics, S. Chand.
August	29-07-2024	03-08-2024	4L+1P	Differential equations			
			4L+1P	Partial differentiation - definition of the partial derivative, Total differential, Chain rule, Exact and inexact differentials **Equipotential lines & electric field**	Solving Problems	Chalk and Board	H.K. Dass & R. Verma, Mathematical Physics, S. Chand.
	05-08-2024	10-08-2024	4L+1P	Useful theorems of partial differentiation, Change of variables, Partial	Solving Problems	Chalk and Board	

				differential equations and separable solutions, **Proof of differential vector identities.**			
	12-08-2024	17-08-2024		Solving Problems	Solving Problems	Chalk and Board	H.K. Dass & R. Verma, Mathematical Physics, S. Chand.
				Some special functions in Mathematical Physics	Solving Problems	Chalk and Board	H.K. Dass & R. Verma, Mathematical Physics, S. Chand.
				Introduction to Legendre‟s equation, Legendre polynomials and Fourier series **First order differential equation.**	Solving Problems	Chalk and Board	H.K. Dass & R. Verma, Mathematical Physics, S. Chand.
	19-08-2024	24-08-2024		Introduction to beta and gamma functions.Electrostatics Coulomb‟s Law, Electric Field and electrostatic potential **Partial differential equations**	Solving Problems	Chalk and Board	H.K. Dass & R. Verma, Mathematical Physics, S. Chand.Reitz and Milford, Foundations of Electromagnetic Theory, Addision-Wesley Publishing Company.
			4L+1P				

	26-08-2024	31-08-2024		Continuous Charge distribution, field lines, flux and Gauss‟ law with applications, the electric dipole- field and potential.	Solving Problems	Chalk and Board	Reitz and Milford, Foundations of Electromagnetic Theory, Addision-Wesley Publishing Company.
September	02-09-2024	05-09-2024		Techniques to solve electrostatic problems The electrostatic potential, Poisson‟s equation, Laplace‟s equation in one independent variable, solutions to Laplace‟s equation in spherical co-ordinates (zonal harmonics) **Revision**	Solving Problems		Reitz and Milford, Foundations of Electromagnetic Theory, Addision-Wesley Publishing Company.
	13-09-2024	14-09-2024	4L+1P	conducting sphere in a uniform electric field, method of electrostatic images, point charge in front of grounded conducting plane. **Revision**	Solving Problems	Chalk and Board	Reitz and Milford, Foundations of Electromagnetic Theory, Addision-Wesley Publishing Company.
	16-09-2024	21-09-2024	4L+1P	Electric Fields in matter Polarization, Fields outside a dielectric medium, electric field inside a dielectric, Gauss‟s law in a dielectric, the electric displacementSolving Problems vector,		Chalk and Board	Reitz and Milford, Foundations of Electromagnetic Theory, Addision-Wesley Publishing Company.

				Revision			
	23-09-2024	28-09-2024	4L+1P	Electric susceptibility and dielectric constant. Boundary conditions on the field vectors, Dielectric sphere in a uniform electric field,Microscopic Theory of Dielectrics Molecular field in a dielectric, induced dipoles **Revision**	Solving Problems	Chalk and Board	Reitz and Milford, Foundations of Electromagnetic Theory, Addision-Wesley Publishing Company.
October	30-09-2024	05-10-2024	4L+1P	A simple model, polar molecules, Langevin-Debye formula, permanent polarization, ferroelectricity.Work and Energy in electrostatics Work and Potential energy of discrete and continuous charge distributions, Energy density of an electric field. **Revision**	Solving Problems	Chalk and Board	Reitz and Milford, Foundations of Electromagnetic Theory, Addision-Wesley Publishing Company.
	07-10-2024	12-10-2024	4L+1P	Work and Potential energy of discrete and continuous charge distributions, Energy density of an electric field. **Revision**	Solving Problems	Chalk and Board	Reitz and Milford, Foundations of Electromagnetic Theory, Addision-Wesley Publishing Company.

	14-10-2024	22-10-2024	4L+1P	**Revision**	Solving Problems	Chalk and Board	

Assessment Rubrics

Component	**Max Marks**
ISA 1	10
ISA 2	10
Practical	50
Semester End Exam	80