Lecture Plan

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

Name of Faculty: Ms. Raksha. R. Sankatala	**Subject:** Mathematics	
Paper code: MAT-524	**Program: M**.Sc.	**Division: -**
Academic year: 2024-25	**Semester:** I	**Total Lectures: 60**

Course Objectives: This course develops the ability to solve partial differential equations of first and second order by standard methods.

Expected Course Outcome:
1) Solve partial differential equations of first and second order.
2) Model initial and boundary value problems.
3) Analyse the properties of solution.
4) Interpret solutions in a physical contest.
5) Understand analogies between mathematical descriptions of different (wave) phenomena in physics and engineering.

Student Learning Outcome: Student will be able to
1) Distinguish between types of partial differential equations.
2) Solve problems of linear and nonlinear partial differential equations.
3) Solve problems of heat and wave equation.

Month	Lecture From	Lecture To	No. of lectures allotted	Topic, Subtopic to be covered	Exercise/ Assignment	ICT Tools	Reference books
	08/07/2024	13/07/2024	4	**Simultaneous differential equations of the first and first degree in three variables**: Methods of solutions of $\frac{dx}{P} = \frac{dy}{Q} = \frac{dz}{R}$. Pfaffian differential forms and equations.	Exercises on the topic covered	Smart Board, Chalk Board	T. Amarnath, An elementary course in Partial Differential Equations
	15/07/2024	20/07/2024	4	Solutions of Pfaffian differential equations in three variables.	Exercises on the topic covered	Smart Board, Chalk Board	T. Amarnath, An elementary course in Partial Differential Equations
	22/07/2024	27/07/2024	4	**First order PDE's**: Origin and classification. Solutions of linear and Nonlinear First order PDE's.	Exercises on the topic covered	Smart Board, Chalk Board	T. Amarnath, An elementary course in Partial Differential Equations
July August	29/07/2024	03/08/2024	4	Methods of characteristics. Charpit's Methods.	Exercises on the topic covered	Smart Board, Chalk Board	T. Amarnath, An elementary course in Partial Differential Equations
August	05/08/2024	10/08/2024	4	Jacobi's method.	Exercises on the topic covered	Smart Board, Chalk Board	T. Amarnath, An elementary course in Partial Differential Equations
	12/08/2024	17/08/2024	4	**Second Order Linear Partial Differential Equations**: Origin. Linear equations with constant coefficients in	Exercises on the topic covered	Smart Board, Chalk Board	T. Amarnath, An elementary course in

				two independent variables. Linear equations with variable coefficients.			Partial Differential Equations
	19/08/2024	24/08/2024	4	Classification. Reduction to canonical form. (only for the case of two independent variables).	Exercises on the topic covered	Smart Board, Chalk Board	T. Amarnath, An elementary course in Partial Differential Equations
	26/08/2024	31/08/2024	4	**Methods of solving PDE**: Method of separation of variables. Use of integral transforms. (Laplace and Fourier).	Exercises on the topic covered	Smart Board, Chalk Board	T. Amarnath, An elementary course in Partial Differential Equations
September	02/09/2024	07/09/2024	4	**Wave Equation**: One dimensional Wave equation. D'Alembert solution, Wave equation -Infinite string case.	Exercises on the topic covered	Smart Board, Chalk Board	T. Amarnath, An elementary course in Partial Differential Equations
	16/09/2024	21/09/2024	4	**Laplace Equation**: Harmonic function. Basic properties of harmonic functions.	Exercises on the topic covered	Smart Board, Chalk Board	T. Amarnath, An elementary course in Partial Differential Equations
	23/09/2024	28/09/2024	4	**Laplace Equation:** Laplace equation. Translational and rotational invariance of Laplace equations.	Exercises on the topic covered	Smart Board, Chalk Board	T. Amarnath, An elementary course in Partial Differential Equations
September October	30/09/2024	05/10/2024	4	Boundary value problems. Uniqueness of solutions of Dirichlet and Neumann problems.	Exercises on the topic covered	Smart Board, Chalk Board	T. Amarnath, An elementary course in Partial Differential Equations

October	07/10/2024	12/10/2024	4	Mean value theorem for harmonic functions. Maximum and minimum principle for harmonic functions.	Exercises on the topic covered	Smart Board, Chalk Board	T. Amarnath, An elementary course in Partial Differential Equations
	14/10/2024	19/10/2024	4	Uniqueness and stability for Dirichlet problem	Exercises on the topic covered	Smart Board, Chalk Board	T. Amarnath, An elementary course in Partial Differential Equations
	21/10/2024	23/10/2024	4	**Heat Equation**: Infinite rod case. Non homogeneous equation.	Exercises on the topic covered	Smart Board, Chalk Board	T. Amarnath, An elementary course in Partial Differential Equations

* Assessment Rubrics

Component	Max Marks
ISA 1	20
ISA 2	20
ISA 3	20
Semester End Exam	40