Lecture Plan

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

Name of Faculty: Minoshka D'Souza	**Subject:** Mathematics	
Paper code: MAT 5005 Differential Equations	**Program:** M.Sc. Mathematics	**Division: -**
Academic year: 2025-26	**Semester:** II	**Total Lectures:** 60

Course Objectives: This course develops the ability to understand the qualitative theory and properties of solutions of differential equations

Expected Course Outcome: On completion of this course the learner will be familiar with the qualitative theory and properties of solutions of differential equations.

Student Learning Outcome: At the end of the course the student will be able to

1. Recall and explain concepts in first & higher order differential equations, existence and uniqueness of solutions of differential equations, systems of linear differential equations, oscillations of second order equations and boundary value problems
2. Prove important theorems in ordinary differential equations
3. Apply knowledge gained to solve problems in ordinary differential equations.
4. Analyze, compare and differentiate between various concepts in in first & higher order differential equations, existence and uniqueness of solutions of differential equations, systems of linear differential equations, oscillations of second order equations and boundary value problems

Month	Lecture From	Lecture To	No. of lectures allotted	Topic, Subtopic to be covered	Exercise/ Assignment	ICT Tools	Reference books
December	01/12/2025	06/12/2025	2	**Basic Concepts and Linear Equations of First Order:** Review	Exercises on topics covered	Latex	Deo S.G.; Raghvendra V.; RasmitaKar, Lakshmikantham V. : Text book of Ordinary Differential equations, 3rd edition
	08/12/2025	13/12/2025	4	**Basic Concepts and Linear Equations of First Order:** Review **Existence and Uniqueness of Solutions:** Introduction, Preliminaries	Exercises on topics covered	Latex	Deo S.G.; Raghvendra V.; RasmitaKar, Lakshmikantham V. : Text book of Ordinary Differential equations, 3rd edition
	15/12/2025	20/12/2025	0				
	22/12/2025	23/12/2025	0				
January	02/01/2026	03/01/2026	2	**Existence and Uniqueness of Solutions:** Introduction, Preliminaries	Exercises on topics covered	Latex	Deo S.G.; Raghvendra V.; RasmitaKar, Lakshmikantham V. : Text book of Ordinary Differential equations, 3rd edition
	05/01/2026	10/01/2026	4	**Existence and Uniqueness of Solutions:** Picard's Successive Approximations, Picard's	Exercises on topics covered	Latex	Deo S.G.; Raghvendra V.; RasmitaKar,

				Theorem			Lakshmikantham V. : Text book of Ordinary Differential equations, 3rd edition
	12/01/2026	17/01/2026	4	**Existence and Uniqueness of Solutions:** Continuation and Dependence on Initial Conditions	Exercises on topics covered	Latex	Deo S.G.; Raghvendra V.; RasmitaKar, Lakshmikantham V. : Text book of Ordinary Differential equations, 3rd edition
	19/01/2026	24/01/2026	4	**Existence and Uniqueness of Solutions:** Existence of Solutions in the Large	Exercises on topics covered	Latex	Deo S.G.; Raghvendra V.; RasmitaKar, Lakshmikantham V. : Text book of Ordinary Differential equations, 3rd edition
	26/01/2026	31/01/2026	4	**Linear Differential Equations of Higher Order:** Review	Exercises on topics covered	Latex	Deo S.G.; Raghvendra V.; RasmitaKar, Lakshmikantham V. : Text book of Ordinary Differential equations, 3rd edition
February	02/02/2026	07/02/2026	4	**Systems of Linear Differential Equations:** Introduction, Systems of First Order Equations	Exercises on topics covered	Latex	Deo S.G.; Raghvendra V.; RasmitaKar, Lakshmikantham V. : Text book of Ordinary Differential equations, 3rd edition
	09/02/2026	14/02/2026	4	**Systems of Linear Differential Equations:** Existence and Uniqueness Theorem	Exercises on topics covered	Latex	Deo S.G.; Raghvendra V.; RasmitaKar, Lakshmikantham V. : Text book of

							Ordinary Differential equations, 3rd edition
	16/02/2026	21/02/2026	4	**Systems of Linear Differential Equations:** Fundamental Matrix, Non-Homogeneous Linear Systems	Exercises on topics covered	Latex	Deo S.G.; Raghvendra V.; RasmitaKar, Lakshmikantham V. : Text book of Ordinary Differential equations, 3rd edition
	23/02/2026	28/02/2026	4	**Systems of Linear Differential Equations:** Linear Systems with Constant Coefficients, Linear Systems with Periodic Coefficients	Exercises on topics covered	Latex	Deo S.G.; Raghvendra V.; RasmitaKar, Lakshmikantham V. : Text book of Ordinary Differential equations, 3rd edition
March	02/03/2026	07/03/2026	2	**Systems of Linear Differential Equations:** Linear Systems with Periodic Coefficients	Exercises on topics covered	Latex	Deo S.G.; Raghvendra V.; RasmitaKar, Lakshmikantham V. : Text book of Ordinary Differential equations, 3rd edition
	09/03/2026	14/03/2026	4	**Oscillations of Second Order Equations:** Introduction, Sturm's Comparison Theorem	Exercises on topics covered	Latex	Deo S.G.; Raghvendra V.; RasmitaKar, Lakshmikantham V. : Text book of Ordinary Differential equations, 3rd edition
	16/03/2026	21/03/2026	2	**Oscillations of Second Order Equations:** Sturm's Comparison Theorem, Elementary Linear Oscillations	Exercises on topics covered	Latex	Deo S.G.; Raghvendra V.; RasmitaKar, Lakshmikantham V. : Text book of Ordinary Differential equations, 3rd edition

	23/03/2026	28/03/2026	4	**Oscillations of Second Order Equations:** Comparison Theorem of Hille-Wintner, Oscillations of x''+a(t)x=0 **Boundary-Value Problems:** Introduction, Sturm-Liouville Problem	Exercises on topics covered	Latex	Deo S.G.; Raghvendra V.; RasmitaKar, Lakshmikantham V. : Text book of Ordinary Differential equations, 3rd edition
	30/03/2026	31/03/2026	0				
April	01/04/2026	04/04/2026	4	**Boundary-Value Problems:** Green's Function, Picard's Theorem	Exercises on topics covered	Latex	Deo S.G.; Raghvendra V.; RasmitaKar, Lakshmikantham V. : Text book of Ordinary Differential equations, 3rd edition

*** Assessment Rubrics**

Component	Max Marks
ISA 1	15
ISA 2	15
Mid Sem	30
Semester End Exam	40