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 505 - Differential Equations	**Program:** M.Sc. Mathematics	**Division:** -

Academic year: 2024-25	**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	4 Dec 2024	7 Dec 2024	1	**Basic Concepts and Linear Equations of First Order:** Introduction, Classification, Initial and Boundary Value Problems, Definition of Solution	Exercises on topics covered	Latex, Smart Board	Deo S.G.; Raghvendra V.; RasmitaKar, Lakshmikantham V. : Text book of Ordinary Differential equations, 3rd edition
December	9 Dec 2024	14 Dec 2024	3	**Basic Concepts and Linear Equations of First Order:** First Order Linear Equations, Exact Equations, Separable Equations	Exercises on topics covered	Latex, Smart Board	Deo S.G.; Raghvendra V.; RasmitaKar, Lakshmikantham V. : Text book of Ordinary Differential equations, 3rd edition
December	16 Dec 2024	21 Dec 2024	3	**Existence and Uniqueness of Solutions:** Introduction, Preliminaries	Exercises on topics covered	Latex, Smart Board	Deo S.G.; Raghvendra V.; RasmitaKar, Lakshmikantham V. : Text book of Ordinary Differential equations, 3rd edition
January	2 Jan 2024	4 Jan 2025	1	**Existence and Uniqueness of Solutions:** Introduction, Preliminaries	Exercises on topics covered	Latex, Smart Board	Deo S.G.; Raghvendra V.; RasmitaKar, Lakshmikantham V. : Text book of Ordinary Differential equations, 3rd edition
January	6 Jan 2025	11 Jan 2025	4	**Existence and Uniqueness of Solutions:** Picard's Successive Approximations, Picard's Theorem	Exercises on topics covered	Latex, Smart Board	Deo S.G.; Raghvendra V.; RasmitaKar, Lakshmikantham V. : Text book of

							Ordinary Differential equations, 3rd edition
January	13 Jan 2025	18 Jan 2025	4	**Existence and Uniqueness of Solutions:** Continuation and Dependence on Initial Conditions	Exercises on topics covered	Latex, Smart Board	Deo S.G.; Raghvendra V.; RasmitaKar, Lakshmikantham V. : Text book of Ordinary Differential equations, 3rd edition
January	20 Jan 2025	25 Jan 2025	4	**Existence and Uniqueness of Solutions:** Existence of Solutions in the Large	Exercises on topics covered	Latex, Smart Board	Deo S.G.; Raghvendra V.; RasmitaKar, Lakshmikantham V. : Text book of Ordinary Differential equations, 3rd edition
January - February	27 Jan 2025	1 Feb 2025	4	**Linear Differential Equations of Higher Order:** Introduction, Higher Order Equations, Linear Dependence and Wronskian, Basic Theory for Linear Equations, Homogeneous Linear Equations with Constant Coefficients	Exercises on topics covered	Latex, Smart Board	Deo S.G.; Raghvendra V.; RasmitaKar, Lakshmikantham V. : Text book of Ordinary Differential equations, 3rd edition
February	3 Feb 2025	8 Feb 2025	4	**Linear Differential Equations of Higher Order:** Equations with Variable Coefficients, Method of Variation of Parameters **Systems of Linear Differential Equations:** Introduction, Systems of First Order Equations	Exercises on topics covered	Latex, Smart Board	Deo S.G.; Raghvendra V.; RasmitaKar, Lakshmikantham V. : Text book of Ordinary Differential equations, 3rd edition
February	10 Feb 2025	15 Feb 2025	4	**Systems of Linear Differential Equations:** Existence and	Exercises on topics covered	Latex, Smart Board	Deo S.G.; Raghvendra V.; RasmitaKar,

			Uniqueness Theorem			Lakshmikantham V. : Text book of Ordinary Differential equations, 3rd edition
February	17 Feb 2025	22 Feb 2025	4	**Systems of Linear Differential Equations:** Fundamental Matrix, Non-Homogeneous Linear Systems	Exercises on topics covered	Latex, Smart Board	Deo S.G.; Raghvendra V.; RasmitaKar, Lakshmikantham V. : Text book of Ordinary Differential equations, 3rd edition
February - March	24 Feb 2025	1 Mar 2025	4	**Systems of Linear Differential Equations:** Linear Systems with Constant Coefficients	Exercises on topics covered	Latex, Smart Board	Deo S.G.; Raghvendra V.; RasmitaKar, Lakshmikantham V. : Text book of Ordinary Differential equations, 3rd edition
March	3 Mar 2025	8 Mar 2025	4	**Systems of Linear Differential Equations:** Linear Systems with Periodic Coefficients	Exercises on topics covered	Latex, Smart Board	Deo S.G.; Raghvendra V.; RasmitaKar, Lakshmikantham V. : Text book of Ordinary Differential equations, 3rd edition
March	10 Mar 2025	15 Mar 2025	4	**Systems of Linear Differential Equations:** Variation of Parameters	Exercises on topics covered	Latex, Smart Board	Deo S.G.; Raghvendra V.; RasmitaKar, Lakshmikantham V. : Text book of Ordinary Differential equations, 3rd edition
March	17 Mar 2025	22 Mar 2025	4	**Oscillations of Second Order Equations:** Introduction, Sturm's Comparison Theorem, Elementary Linear Oscillations	Exercises on topics covered	Latex, Smart Board	Deo S.G.; Raghvendra V.; RasmitaKar, Lakshmikantham V. : Text book of

						Ordinary Differential equations, 3rd edition
March	24 Mar 2025	29 Mar 2025	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, Smart Board	Deo S.G.; Raghvendra V.; RasmitaKar, Lakshmikantham V. : Text book of Ordinary Differential equations, 3rd edition
March - April	31 Mar 2025	5 Apr 2025	4	**Boundary-Value Problems:** Green's Function, Picard's Theorem	Exercises on topics covered	Latex, Smart Board	Deo S.G.; Raghvendra V.; RasmitaKar, Lakshmikantham V. : Text book of Ordinary Differential equations, 3rd edition

* Assessment Rubrics

Component	Max Marks
ISA 1	20
ISA 2	20
ISA 3	20
ISA 4	20
Semester End Exam	40