Analysis of Functions of Single Variable and ODE
MC114: Course Detail

COURSE OBJECTIVE: This course aims at building an advance understanding of calculus in single variable and ordinary differential equation.

PREREQUISITE: None.


COURSE CONTENTS
UNIT-1: Real numbers system: Properties of real numbers, sequence and series. Limit, continuity and differentiability of functions of single variables.

UNIT-2: Differentiation: Implicit differentiation, Mean value theorems and applications, Linear approximation, Power Series, Taylor’s Series, Maxima and Minima. Orthogonal Trajectories.

UNIT-3: Integration: Definite Integrals and their properties, Riemann Sums, Riemann Integral, The fundamental theorem of Integral Calculus and Improper Integrals. Application of Integration:

UNIT-4: Introduction and Motivation to Differential Equations, Order and Degree of Ordinary differential equations (ODEs); First Order ODEs: Geometrical Interpretation of Solution, Picard’s Theorem for IVP and Picard’s iteration method, Exact equations, integrating factor, linear equations, Euler’s Method, Modified Euler’s Method; Linear ODE of second and higher order with constant and variable coefficients, non-homogenous ODEs, power series solutions to second order ODEs.

UNIT-5: Sturm-comparison theorem, Sturm-Liouville BVP, Orthogonal Functions, Fourier Series and integrals, Laplace Transform and its application to ODEs.

Text and Reference Books:


Course Delivery Mechanism:

- Deliver lectures preferably via Cisco Webex or any other equivalent platform.
- Share recordings of delivered lectures via YouTube or any other equivalent platform.
- Give at least one home assignment based on each unit of the course.

Course Evaluation Scheme:

MID-SEM + END-SEM + Project + Assignment + Quizzes.

- 25% Marks based on Mid-Sem Examination.
- 45% Marks based on End-Sem Examination.
- 30% Marks based on Home Assignments, Quizzes and Project.