

SEMESTER- I
DIFFERENTIAL EQUATIONS

Theory: 5 hours /week and Tutorials: 1 hour /week

DSC-I

Objective: The main aim of this course is to introduce the student to the techniques of solving Differential Equations and to apply their skills in solving some of the problems of Engineering and Science.

Outcome: After learning the course, the student will be equipped with various tools to solve few types of Differential Equations that arise in several branches of science.

UNIT- I

Differential Equations of First Order and First Degree: Introduction- Equations in Which Variables are Separable – Homogeneous Differential Equations - Differential Equations Reducible to Homogeneous Form – Linear Differential Equations - Differential Equations Reducible to Linear Form – Exact Differential Equations – Integrating Factors – Change in Variables (Text Book : 2.1 to 2.9)

UNIT- II

Equations of First Order But Not of The First Degree: Case I: Equations Solvable for p -Case II : Equations Solvable for y - Equations Solvable for x – Equations that do not Contain x (*or* y) - Equations Homogeneous in x and y – Equations of First Degree in x and y – Clairaut's Equation.

Applications of First Order Differential Equations: Growth and Decay – Dynamics of Tumor Growth – Radioactivity and Carbon Dating – Compound Interest – Orthogonal Trajectories.

(Text Book : 3.1 to 3.2 & 4.1 to 4.4 & 4.20)

UNIT- III

Higher Order Linear Differential Equations: Introduction - Solution of Homogeneous Linear Differential Equations of Order n with Constant Coefficients - Solution of the Non-Homogeneous Differential Equations with Constant Coefficients by Means of Polynomial Operators - Method of Undetermined Coefficients. (Text Book : 5.1 to 5.4)

UNIT- IV

Method of variation of Parameters – Linear Differential Equations with Non-Constant Coefficients – The Cauchy – Euler Equation – Legendre's Linear Equations – Miscellaneous Differential Equations.

Total Differential Equations – Simultaneous Total Differential Equations – Equations of the form $\frac{dx}{P} =$

$\frac{dy}{Q} = \frac{dz}{R}$. (Text Book : 5.5 to 5.9 & 2.10 to 2.12)

TEXT BOOK:

Zafar Ahsan, Differential Equations and Their Applications (Second Edition)

REFERENCE BOOKS :

1. Frank Ayres Jr, Theory and Problems of Differential Equations.
2. Ford, L.R ; Differential Equations.
3. Daniel Murray, Differential Equations.
4. S. Balachandra Rao, Differential Equations with Applications and Programs.
5. Stuart P Hastings, J Bryce McLead; Classical Methods in Ordinary Differential Equations.