

MEHRAN UNIVERSITY OF ENGINEERING AND TECHNOLOGY, JAMSHORO
DEPARTMENT OF BASIC SCIENCE AND RELATED STUDIES

Title of Subject	: Linear Algebra, Differential Equations and Analytical Geometry	Code: MTH 103
Discipline	: ME/IN	
Semester	: 2 nd semester	
Effective	: 17 Batch onwards	
Pre-requisites	: Pre – Engineering	
Assessment	: 20% sessional work	Mid-sem. Exam: 20% End-Sem Exam: 60%
Marks	: TH: 100 PR: 00	
Credit Hours	: TH: 03 PR: 00	
Min. Contact Hours	: TH: 45 PR: 00	

Course Learning Outcomes

On completion of this course the students should be able to:

CLO	Description	Taxonomy Level	PLOs
1	Determine the basic operation of matrix algebra and solution of system of linear equations. Apply the concepts of two and three dimensional geometry.	C2	1
2	Apply first and higher order and differential equations methods.	C2	1
3	Analyze area and volume of bounded regions by using multiple integrals	C3	1

Assessment Methods of CLOs of Subject name

CLOS	Sessional Tests and Assignments	Mid Exam	Final Exam	Learning Levels	PLOs
CLO 1	20%	70%	10%	C2	1
CLO 2	40%	30%	30%	C2	1
CLO 3	40%	-----	60%	C3	1

Contents

Introductions to matrices and elementary row operations. Brief introduction of matrices. Types of matrices. Introduction to elementary row operations. Echelon and reduced echelon forms. Rank of a matrix. Inverse of a matrix using elementary row operations.

System of linear equations. System of non-homogeneous and homogeneous linear equations. Gaussian elimination method, Gauss Jordan method. Consistence criterion for solution of homogeneous and non-homogeneous system of linear equations. Application of system of linear equations.

Determinants. Introduction to determinants. Properties of determinants of order n. Rank of a matrix by using determinants.

Analytic geometry of 3-dimensions. Introduction; Coordinates in R³.

Line: Coordination of a point dividing a line segment in a given ratio. Straight line, in R³. Vector form of a straight line, parametric equations of a straight line, equation of a straight line in symmetric form, direction ratios and direction cosines, angle between two straight lines; distance of a point from a line.

Plane: Equation of a plane, angle between two planes, intersection of two planes, a plane and a straight line; skew lines. Cylindrical and spherical coordinates.

Sphere: General equation of sphere.

Differential equations of first order: Ordinary differential equations and their classification, formation of differential equations, solution of differential equations; initial and boundary conditions. Methods of solution of differential equation of first order and first degree; geometrical and physical applications.

Higher order linear differential equations: Homogeneous and non-homogeneous linear equations of order n with constants coefficients. Cauchy Euler equation. Method of variation of parameters. Application of higher order linear differential equations.

Multiple Integrals: Evaluation of double and triple integrals in Cartesian and polar coordinates.

Books Recommended:

- Dr. S.M.Yusuf, Calculus and analytical geometry
- Dr. S.M.Yusuf, Mathematical methods
- Schaum outline series, Differential equations.
- Dr. B.S.Grewall, Higher Engineering Mathematics.

Approval:	Board of Studies: 01/2018	Res. No. 01, dated: 26-03-2018
	Board of FOST&H,	Res. No. 3.1, dated: 11-4-2018
	Academic Council:	Res. No. 17 (ii), dated: 23-4-2018