



SARDAR VALLABHBHAI PATEL EDUCATION SOCIETY'S
R. N. G. PATEL INSTITUTE OF TECHNOLOGY - RNGPIT

An Autonomous Institute u/s UGC Act 1956

Approved by AICTE & affiliated to Gujarat Technological University

Bardoli - Navsari Road, At: Isroli (tadjore), Po: Aftwa, Tal: Bardoli, Dist: Surat, Pin - 394620
 Phone: 95129 00457, 95129 00458 • Email: Info@rngpit.ac.in • Website: www.rngpit.ac.in

Program Name: Integrated M.Sc. (IT)

Level: Post Graduate Program

Branch: Integrated M.Sc. (IT)

Course / Subject Code: 2BS102

Course / Subject Name : Fundamentals of Mathematics

w. e. f. Academic Year:	2025-26
Semester:	1 st
Category of the Course:	Multi-Disciplinary Course

Prerequisite:	Mathematics Fundamentals
Rationale:	The study of Set, Function, Matrices, Eigen values, Eigen vectors, Diagonalization, Limit, Continuity, Derivatives, Fundamental Theorems of Calculus, Partial differentiation and its applications.

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes
01	Recognize and use the language of set theory, prove and disprove assertions using a variety of techniques.
02	Apply the concepts of matrices to compute quantities that deal with linear systems.
03	Demonstrate the application of determinants in solving linear systems.
04	Apply concept of linear algebra such as eigenvalue, eigen vector, Canonical form, Diagonalization.
05	Learn the concept of Limit, Continuity, Differentiability.
06	Compute the power series expansion of a function and the maxima and minima of function of two variables.

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
L	T	PR	C	Theory		Tutorial / Practical		
				ESE (E)	PA / CA (M)	PA/CA (I)	ESE (V)	
3	0	0	3	70	30	0	0	100

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	Set & Function Set: Basic Concepts of Set Theory: Definitions, Representation, Inclusion, Equality of Sets. Types of Set, Operations on Sets. Venn Diagrams, Cartesian product. Functions: Introduction & definition, Co-domain, range, image value of a function. Types of Functions. Identity map, Composition of functions, Properties of Composite functions. Condition of a function to be invertible, Inverse function, Inverse of composite functions	08	15%
2.	Matrices: Basic concept of Matrices, Order and properties of Matrices, Types of Matrices, Operation on Matrices, Elementary row and column operations on a matrix, Rank of matrix, Normal form, Inverse of a matrix using elementary operations, Consistency and solutions of systems of linear equations using elementary operations.	10	25%
3.	Determinant: Determinants and their properties, Cramer's rule.	02	10%
4.	Eigen Values, Eigen Vectors, Canonical form and Diagonalization Characteristic roots and vectors of a matrix, Caley-Hamilton theorem and its applications, Complex matrices, Hermitian and Unitary Matrices, Reduction to diagonal form, Reduction of a quadratic form to canonical form, orthogonal transformation and congruent transformation, Diagonalization.	10	25%
5.	Introduction to Calculus: Basic concepts of Limit, Continuity and Derivatives, Derivatives of Composite and Implicit functions. Trigonometric functions and its derivatives, Second ordered Derivatives.	07	10%
6.	Differential Calculus: Rolle's theorem; Mean value theorem; Taylor's and Maclaurin's theorems with remainders, Expansions; Indeterminate forms; Functions of several variables, Partial Differentiation, Total Differentiation, Euler's theorem and generalization, maxima and minima of functions of several variables (two and three variables).	08	15%
	Total	45	100

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
10	25	35	-	-	-

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:**(a) Books:**

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, John Wiley and Sons, July 2020.
2. B. S. Grewal, Higher Engineering Mathematics, 44th Edition Khanna Publications, 2021.
3. J. P. Tremblay and R. Manohar, Discrete Mathematical Structures with Applications to Computer Science, Tata McGraw-Hill, 1997.
4. A Textbook of Discrete Mathematics, 9th Edition, Dr. Swapan kumar Sarkar, S Chand And Company Limited, 2016.
5. Advanced Engineering Mathematics, 22nd Edition H. K. Dass, S. Chand Publication, 2019.

(b) Open-source software and website:

1. <https://www.edx.org/learn/math> (edX Engineering Service Company)
2. <https://ocw.mit.edu/search/?q=mathematics> (MIT opencourseware)

CO- PO Mapping:

Semester 2	Fundamentals of Mathematics(1BS102)										
	POs										
Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	1	1	1	1	1	1	1	1	1	1	1
CO2	1	1	1	1	1	1	1	1	1	1	1
CO3	1	1	1	1	1	1	1	1	1	1	1
CO4	1	1	1	1	1	1	1	1	1	1	1
CO5	1	1	1	1	1	1	1	1	1	1	1
CO6	1	1	1	1	1	1	1	1	1	1	1

Legend: '3' for high, '2' for medium, '1' for low and '-' for no correlation of each CO with
