



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Bachelor of Engineering

Level: UG

Branch:

Course / Subject Code : BE01000171

Course / Subject Name : Remedial Mathematics

(Bridge course for Biology students)

w. e. f. Academic Year:	2024-25
Semester:	I st Year
Category of the Course:	

Teaching Scheme			Credits C	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
0	0	0	0	70	0	0	0	70

Sr. No.	Topic	Teaching Hours
1	Introduction: Signs of the Coordinates of a Cartesian system, Distance formula Straight Lines: Slope of a line, angle between two lines, Various forms of equations of a line: parallel to axes, point -slope form, slope-intercept form, two-point form, intercept form and normal form. General equation of a line. Distance of a point from a line.	3
2	Functions of a Single Variable: Definition of real valued function, domain, co-domain, range of a function, Classification of real valued functions, constant, identity, polynomial, rational, modulus, signum, exponential, logarithmic and greatest integer functions. Trigonometric functions, their range and domain, Expressing $\sin(x \pm y)$ and $\cos(x \pm y)$ in terms of $\sin x$, $\sin y$, $\cos x$, $\cos y$, Expressing $\tan(x \pm y)$ in terms $\tan x$ and $\tan y$ Deducing trigonometric identities for $\sin 2x$, $\cos 2x$, $\tan 2x$, $\sin^2 x$, $\cos^2 x$, $\sin^3 x$ and $\cos^3 x$.	4
3	Limit and Continuity: Definition of limit of functions of a single variable, Limits of polynomials, rational, trigonometric, exponential and logarithmic functions, Continuity of a function and examples based on it.	2
4	Differentiation: Introduction, Derivative introduced as rate of change, relate it to slope of tangent of the curve, derivative of sum, difference, product and quotient of functions. Derivatives of polynomial, logarithmic, exponential and trigonometric functions, derivative of composite functions, chain rule, derivative of inverse trigonometric functions, derivative of implicit functions, derivative of functions expressed in parametric forms, second order derivatives.	5
5	Integration: Integration as inverse process of differentiation. Basic formulae for integrations of various functions, integration by substitution, integration by partial fractions and integration by parts, evaluation of simple integrals, Fundamental Theorem of Calculus (without proof), basic properties of definite integrals, evaluation of definite integrals.	6



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6	Differential Equations: Definition, order and degree, general and particular solutions of a differential equation. Solution of differential equations by method of separation of variables, solutions of homogeneous differential equations of first order and first degree of the type: $dy/dx = f(y/x)$, solutions of linear differential equation of the type: $(dy/dx) + py = q$, where p and q are functions of x or constant.	5
7	Matrices and Determinant: Introduction matrices, Types of matrices, zero and identity matrix, Operation on matrices, Transpose of a matrix, symmetric and skew symmetric matrices Matrix Multiplication, Operation on matrices: : Addition and multiplication and multiplication with a scalar. Simple properties of addition, multiplication and scalar multiplication. Non-commutativity of multiplication of matrices, Invertible matrices Determinant, properties of determinants , Minors and co-factors, Adjoint or adjugate of a square matrix , singular and non-singular matrices, inverse of a matrix, solution of system of linear of equations using matrix method, Cramer's rule, characteristic equation and roots of a square matrix	5
Total Teaching hours		30

Recommended Books:

1. Differential Calculus by Shanthinarayan
2. Integral Calculus by Shanthinarayan
3. Mathematics Textbook for Class XI, NCERT Publications
4. Mathematics Part I - Textbook for Class XII, NCERT Publication
5. Mathematics Part II - Textbook for Class XII, NCERT Publication

Course Outcome:

After learning the course the students shall be able to:

1. To understand the basic concept of straight lines and different types of functions.
2. To understand the basic concepts of limit and differentiability and apply it on different types of functions.
3. To understand the different ways to find the integration.
4. To apply effective mathematical tools for the solutions of first order ordinary differential equations.
5. To perform matrix computation in a comprehensive manner
