PARUL UNIVERSITY
FACULTY OF ENGINEERING & TECHNOLOGY
DEPARTMENT OF APPLIED SCIENCES & HUMANITIES
SYLLABUS FOR 1st SEMESTER B. TECH. PROGRAMME (ALL BRANCHES)
MATHEMATICS – I (303191101)
ACADEMIC YEAR 2022-23

Type of Course: B.Tech

Prerequisite: Knowledge of Mathematics up to 12th science level

Rationale: To acquire fundamental knowledge and apply in Engineering discipline

Teaching and Examination Scheme:

Teaching Scheme			Credit	Examination Scheme					Total
				External		Internal			
Lect Hrs/ Week	Tut Hrs/ Week	Lab Hrs/ Week		T	P	T	CE	P	
4	0	0	4	60	-	20	20	-	100

Lect - Lecture, **Tut** - Tutorial, **Lab** - Lab, **T** - Theory, **P** - Practical, **CE** - CE, **T** - Theory, **P** - Practical

Contents:

Sr.	Topic	Weightage	Teaching Hrs.
1	**Improper Integral & Application of Definite Integral**: Evaluation of definite and improper integrals, Beta and Gamma functions and their properties Area bounded by curves in Cartesian and Polar form, Area of a region bounded by function, Area of a region bounded by curves in Parametric form, Volume by slicing, Volume of solid by revolution.	8%	5
2	**First order Ordinary Differential equation:** Exact, linear and Bernoulli's equations, Euler's equations, Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type, Applications	15%	9
3	**Matrices**: Matrices & Determinants with Properties, Linear Independence, Rank of Matrix, System of Linear Equations, Consistency of System, Solution of system of Linear Equations by Gauss Jordan and Gauss-Elimination Method, Eigen values, Eigenvectors, Symmetric, Skew-symmetric, and orthogonal Matrices, Eigen bases, Diagonalization, Cayley Hamilton Theorem and its Applications, Diagonalization, Orthogonal Transformation, Quadratic form.	25%	15
4	**Sequences and Series**: Basic of Sequences, Bounded and Monotonic Sequences, Series, Convergence of sequence and series, Geometric series, P- series, Cauchy's Integral Test, Comparison Test, Alternating Series, Absolute and Conditional convergence, Ratio test, Cauchy's Root Test, Power series, Taylor's and Maclaurin's series.	17%	10

5	**Fourier Series:** Fourier Series of $2n$ periodic functions, Dirichlet's conditions for representation by a Fourier series, Fourier Series of a function of period $2n$, Fourier Series of even and odd functions, Half range series.	10%	6
6	**Multivariable Calculus (Differentiation)**: Functions of Several Variables, Limit, Continuity, Partial Derivatives, Homogeneous function, Euler's Theorem for homogeneous function, Modified Euler's Theorem, Chain Rule, Implicit function, Jacobian, Tangent plane and Normal line, Maximum and Minimum Values, Lagrange's Multiplier, Taylor's and Maclaurin's Series for functions of two variables.	25%	15

*Continuous Evaluation:

It consists of Assignments/Seminars/Presentations/Quizzes/Surprise Tests (Summative/MCQ) etc.

Text Book:

1. Calculus and Analytic Geometry, G.B. Thomas and R.L. Finney; Addison Wesley
2. Elementary Linear Algebra, Howard Anton, Chris Rorres; Willy India Edition; 9th Edition
3. Advanced Engineering Mathematics, Erwin Kreyszig; Willey India Education

Reference Books:

1. Calculus with early transcendental functions
   James Stewart; Cengage Learning
2. Higher Engineering Mathematics
   B. S. Grewal; Khanna Publications
3. A text book of Engineering Mathematics
   N.P. Bali and Manish Goyal; Laxmi Publications

Course Outcome:

After learning the course the students will be able to

1. Apply differential and integral calculus to improper integrals and to determine applications of definite integral. Apart from some other applications they will have a basic understanding of indeterminate forms, Beta and Gamma functions.

2. Apply effective mathematical tools for the solutions of first order ordinary differential equations.

3. Apply the various tests of convergence to sequence, series and the tool of power series and Fourier series for learning advanced engineering mathematics.

4. Compute maximum or minimum rate of change and optimum value of functions of several variables.

5. Perform matrix computation in a comprehensive manner.