Course Syllabus
Gyanmanjari Institute of Technology
Semester-1

Subject: Mathematics-I (BETXX10201)

Type of course: Multidisciplinary

Prerequisite: Basic Algebra, Trigonometry, Geometry, Calculus etc.

Rationale: This aims to equip the students to recognize the appropriate tools of Calculus using Limit, Derivatives, and Integrals to solve real-world problems to develop and apply problem-solving skills through the introduction of numerical methods and various methods for the solution of ordinary differential equations.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks					Total Marks
				Theory Marks		Practical Marks		CA	
CI	T	P	C	ESE	MSE	V	P	ALA	
4	0	0	4	60	30	10	-	50	150

Legends: CI-Class Room Instructions; T – Tutorial; P - Practical; C – Credit; ESE - End Semester Examination; MSE- Mid Semester Examination; V – Viva; CA - Continuous Assessment; ALA- Active Learning Activities.

Continuous Assessment:

Sr. No.	Active Learning Activities	Marks
1.	**Assignment:** Unit wise assignment will be given. Five numerical per assignment.	10
2.	**Functionality of scientific calculator:** List of functions will be assigned by faculty. Students have to prepare the flowchart for solution and upload to the MOODLE (in group of three students).	10
3.	**Puzzle:** Various problems based on series, geometry, clock, calendar etc. will be assigned to the students. Students need to submit Mathematical logic and solution via MOODLE (in group of three students).	10
4.	**Quiz:** Unit wise MCQ test. 10 MCQ per unit.	10
5.	Student's choice activity relevant to course.	10
	Total	**50**

Course Content:

Unit No.	Course content	Hrs	% Weightage
1	**Chapter-1: Theory of Matrices** Basics of Matrix, Types and Operation on Matrices, Row-Echelon and Reduced Row-Echelon Form and Rank of Matrix, System of Linear Equations: Gauss Elimination and Gauss-Jordan Elimination Method, Inverse of Matrix by Gauss-Jordan Method, Eigen Values and Eigen Vectors, Diagonalization, Cayley-Hamilton Theorem.	12	25 %
2	**Chapter-2: Differential Calculus** Function of single variable: Indeterminate forms and L'Hospital Rule, Taylor and Maclaurin Series; Functions of Several Variables: Limits and Continuity. **Chapter-3: Partial Derivatives** Introduction to Partial Derivatives, Chain Rule, Eulers Theorem for Homogeneous Function, Jacobian.	14	25 %
3	**Chapter-4: Multiple Integrals** Double Integral over General Regions, Change of Order of Integration, Change of Variables in Integrals, Area by Double Integration, Basic of Triple Integral.	16	25 %
4	**Chapter-5: First Order Ordinary Differential Equation** First Order ordinary Differential Equations: Solutions of First order and First-degree Differential Equations: Variable Separable Equation, Homogeneous Equations, Exact and Non-Exact Differential Equation, Linear Differential Equation, Bernaulli's Equations, Clairaut's Equation. **Chapter-6: Higher Order Ordinary Differential Equations:** Homogeneous & Non-Homogeneous Linear Differential Equation of higher order with constant co-efficient, Methods for finding Complementary functions and Particular Integral, Cauchy-Euler Equation, Undetermined Coefficient Method, Variation Parameter Method.	18	25 %

Suggested Specification table with Marks (Theory):60

Distribution of Theory Marks (Revised Bloom's Taxonomy)						
Level	Remembrance (R)	Understanding (U)	Application (A)	Analyze (N)	Evaluate (E)	Create (C)
Weightage	20 %	20 %	60 %	0	0	0

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcome:

After learning the course, the students should be able to:	
CO1	Apply mathematical tool for practical applications of matrix theory in fields such as Image processing, computer graphics, signal processing and Machine learning etc.
CO2	Apply partial differentiation to solve optimization problems, such as finding maximum or minimum values of functions subject to constraints.
CO3	Expose to applications of multiple integrals in various fields, such as calculating mass, center of mass, moments of inertia, volume, work, and fluid flow.
CO4	Develop their ability to construct mathematical proofs related to the existence, uniqueness, and stability of solutions to ordinary differential equations.

Instructional Method:

The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MCQ etc.

From the content 10% topics are suggested for flipped mode instruction.

Students will use supplementary resources such as online videos, NPTEL/SWAYAM videos, e-courses, Virtual Laboratory

The internal evaluation will be done on the basis of Active Learning Assignment

Practical/Viva examination will be conducted at the end of semester for evaluation of performance of students in laboratory.

Reference Books:

[1] Advanced Engineering Mathematics by Erwin Kreyszig, John Wiley & Sons 9th Edi.

[2] Ordinary and Partial Differential Equations by Dr. M. D. Raisighania, S. Chand pub.

[3] Numerical method for Engineering by S. C. Chapra&Raymond P. Canale, McGraw Hill

[4] Elementary Linear Algebra: Applications Version by Howard Anton and Chris Rorres, J. Wiley & Sons

[5] Engineering Mathematics for First Year by Veerarajan T., Tata Mc-Graw Hill pub.