



<b>Program</b>	MASTER OF SCIENCE (INFORMATION TECHNOLOGY) - INTEGRATED (IMSc-IT)	<b>Semester - 3</b>
<b>Type of Course</b>	Multidisciplinary	
<b>Prerequisite</b>		
<b>Rationale</b>	-	
<b>Effective From A.Y.</b>	2025-26	

Teaching Scheme (Contact Hours)				Examination Scheme				
Lecture	Tutorial	Lab	Credit	Theory Marks		Practical Marks		Total Marks
				SEE	IAT	SEE	CCE	
3	-	-	3	70	30	-	-	100

SEE - Semester End Examination, IAT - Internal Assessment Test, CCE - Continues & Comprehensive Evaluation

Course Content		T - Teaching Hours   W - Weightage	
Sr.	Topics	T	W
1	<b>Curve Fitting</b> Least Square method, Curve Fitting of Linear, quadratic and exponential curves.	6	15
2	<b>Approximations, Errors and Roots of Equations</b> <b>Approximations and Errors:</b> Approximate numbers, Significant figures, Rounding off, Types of errors, Error in the approximation of a function, Order of approximation. <b>Roots of Equations:</b> Bisection method, Regula Falsi method(Method of False Position or Interpolation method), NR method, Secant method, Successive approximation method, Budan's Theorem.	7	15
3	<b>Interpolation</b> Newton's Forward Difference Interpolation, Newton's Backward Difference Interpolation. Lagrange's Interpolation method, Inverse Interpolation, Newton's Divided Difference Interpolation, Error Estimates.	10	20
4	<b>Numerical Differentiation &amp; Numerical Integration</b> <b>Numerical Differentiation:</b> Using Newton's Forward Difference, Newton's Backward Difference, Stirling, Newton's Divided Difference formula (First and Second Order Differentiation only) <b>Numerical Integration:</b> Newton-Cotes integration formulas: trapezoidal rule, Simpson's 1/3 rule, Simpson's 3/8 rule.	10	20
5	<b>Ordinary Differential Equations</b> Taylor Series method, Euler's method, Modified Euler's method, Runge – Kutta methods.	6	15
6	<b>Systems of Linear Equations</b> Matrix inversion, Gauss elimination method with partial pivoting. <b>Iterative methods:</b> Gauss Jacobi and Gauss-Seidel methods.	6	15
<b>Total</b>		<b>45</b>	<b>100</b>

Suggested Distribution Of Theory Marks Using Bloom's Taxonomy						
Level	Remembrance	Understanding	Application	Analyze	Evaluate	Create
<b>Weightage</b>	15	35	50	0	0	0

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

**Course Outcomes**

At the end of this course, students will be able to:

C01	Apply the method of least squares to fit different types of curves to data.
C02	Solve algebraic, transcendental equations and system of linear equations by various methods and find approximate roots.
C03	Use relevant numerical techniques for interpolation with equal and unequal intervals.
C04	Compute definite integral for given data and calculate value of derivative of a function at some assigned value of $x$ .
C05	Find numerical solution of ordinary differential equation by various methods.
C06	Apply iterative techniques such as Gauss-Seidel and Jacobi methods to solve systems of linear equations.

**Reference Books**

1.	<b>Introductory methods of numerical analysis</b> By Shankar S. Sastry   PHI Learning Pvt. Ltd.
2.	<b>Numerical Methods for Engineers</b> By S C Chapra, and R C Canale   McGraw-Hill
3.	<b>Numerical Methods in Engineering &amp; Science</b> By B S Grewal   Khanna Publication
4.	<b>Numerical methods for scientific and engineering computations</b> By S.R.K. Iyengar, R.K. Jain and Mahinder   New Age International Publisher