



GUJARAT TECHNOLOGICAL UNIVERSITY
Syllabus for Integrated MSc, 3rd Semester
Branch: Information Technology
Subject Name: Computer Oriented Numerical Methods
Subject Code: 1330502

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
			ESE(E)	PA (M)	PA (I)	ESE (V)		
3	0	2	4	70	30	20	30	150

Course Content:

Sr. No.	Content	Teaching Hours	Module Weightage (%)
1	Approximations and Errors: Approximate numbers, Significant figures, Rounding off, Types of errors, Error in the approximation of a function, Order of approximation. Roots of Equations: Bisection method, Regula Falsi method (Method of False Position or Interpolation method), NR method, Secant method, Successive approximation method, Budan's Theorem.	08	20
2	Interpolation: Newton's Forward Difference Interpolation, Newton's Backward Difference Interpolation, Gauss's forward interpolation, Gauss backward interpolation, Stirling's formula. Lagrange's Interpolation method, Inverse Interpolation, Newton's Divided Difference Interpolation, Error Estimates, Cubic Spline Interpolation.	10	25
3	Numerical Integration: Newton-Cotes integration formulas: trapezoidal rule and Simpson's rules, Numerical Differentiation: Using Newton's Forward Difference, Newton's Backward Difference, Stirling, Newton's Divided Difference formula (First and Second Order Differentiation only)	06	15
4	Ordinary differential equations: Taylor Series method, Euler's method, Modified Euler's method, Picard's method, Runge – Kutta method of order two, Runge –Kutta method of order Four, Milne and Adam's Predictor-Corrector Methods.	08	20
5	Curve Fitting: Least Square method, Curve Fitting of Linear, quadratic and exponential curves.	04	10
6	Systems of linear equations: Matrix inversion, Gauss elimination method with partial pivoting, Iterative methods: Gauss Jacobi and Gauss-Seidel methods.	04	10



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Suggested Specification table with Marks (Theory):

Distribution of Theory Marks				
R Level	U Level	A Level	N Level	E Level
7	28	35	-	-

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate and above Levels (Bloom's Taxonomy)

Reference Books:

1. Steven C Chapra, Raymond P Canale, "Numerical Methods for Engineers", 5th Edition, McGraw Hill Publication, Special Indian Edition.
2. Introductory Methods of Numerical Analysis, S. S. Sastry, PHI Publication.
3. Numerical Methods in Engineering & Science, Dr. B. S. Grewal, Khanna Publication.
4. Computer Oriented Numerical Methods, R. S. Salaria, Khanna Publisher.
5. Numerical Methods for Scientific and Engineering Computation, M.K.Jain, S.R.K. Iyenger, R.K.Jain, New Age publication.

Course Outcome:

After learning the course, the students should be able to:

No.	CO statement
CO-1	Solve algebraic, transcendental equations and system of linear equations by various methods and find approximate roots.
CO-2	Use relevant numerical techniques for interpolation with equal and unequal intervals.
CO-3	Evaluate definite integral for given data and calculate value of derivative of a function at some assigned value of x.
CO-4	Solve first order ordinary differential equation by various methods.
CO-5	Find best fit curve for given data.