FACULTY OF COMPUTER APPLICATIONS
Bachelor of Computer Applications

- **Sem.** : 2
- **Subject Code** : 05BC1201
- **Subject** : Computer Oriented Numerical methods
- **Course Objectives** :

1. To enable students to understand concept of error handling in these methods and need to analyze and predict it
2. To able to understand current iterative algorithms to develop efficient solutions in science, engineering, technology, insurance and banking.
3. To enable to obtain an intuitive and working understanding of numerical methods for the basic problems of numerical analysis and gain an experience in the implementation of numerical methods.

- **Prerequisites** : Basic knowledge of Functions, Differentiation & Integration.

Unit No	Topics Covered	No of lectures required
1	**FLOATING-POINT ARITHMETIC:** Addition, Operation, Subtraction Operation, Multiplication Operation, Division Operation • **ERRORS:** Data Errors Truncation Errors Round-off Errors Computational Errors • **MEASURES OF ACCURACY:** Absolute Error, Relative Error	10
2	**ITERATIVE METHODS FOR FINDING ROOTS:** • Bisection Method(without proof) • False position Methods(without proof) • Secant Methods(without proof) • Successive Approximation Method(without proof)	10

3	INTERPOLATION : • Lagrange Interpolation, • Newton's Forward Difference Interpolation, • Newton's Backward Difference Interpolation, • Newton's Divided Difference Interpolation	10
4	NUMERICAL DIFFERENTIATION & INTEGRATION: • Differentiation : • Using Newton's Forward Difference, Newton's Backward Difference, Newton's Divided Difference (First Order Differentiation only) • Integration : • Using Trapezoidal rule, Simpson's 1/3 &Simpson's 3/8 rules	10
5	SOLUTION OF SIMULATANEOUS LINEAR & DIFFERENTIAL EQUATIONS: • Solution of Simultaneous Linear Equations: • Gauss Elimination method, Gauss-Jordan method, Gauss- Seidel Method • Solution of Ordinary Differential Equations: • Runge-Kutta 2nd Order and 4th Order methods • Predictor-Corrector Methods: • Milne Simpson and Adam's Moulton methods	10

Course Outcomes:

1. Able to apply different type of errors rules occurring in numerical calculation & solution of them.
2. Ability to apply of numerical iterative methods for the basic problems of numerical analysis.
3. Able to apply algorithmic implementation of different interpolation methods.
4. Application of concept of differentiation, integration in numerical calculation.
5. Able to understand and apply the application and solution of linear differential equations & predictor –corrector methods.

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Text Book :

1. "Computer Oriented Numerical Methods" by R. S. Salaria, Khanna Publisher.

Reference Books :

1. T Veerarajan, T Ramachandran, "Numerical Methods with Programs in C", 2nd Edition, Tata McGraw Hill Publication
2. V. Rajaraman, "Numerical Methods", 3rd Edition, Prentice-Hall India Pvt. Ltd.
3. R M Somasundaram, R M Chandrasekaran, "Numerical Methods with C++Programming", Prentice-Hall India Pvt. Ltd.
4. C F Gerald, P O Wheatley, "Applied Numerical Analysis", 7th Edition, Pearson Education Asia, New Delhi
5. Atkinson, Han, "Elementary Numerical Analysis", Wiley India Edition
6. Dr. V N Vedamurthy, Dr. N. Ch. S N Iyengar, "Numerical Methods", Vikas Publication
7. Richard L Burden, J Douglas Faires, "Numerical Analysis", Cengage Publication
8. Srimanta Pal, "Numerical Methods", Oxford University Press

Web References :

1. https://nptel.ac.in/courses/122106033/

App References :

1. Numerical Method Calculators: https://play.google.com/store/apps/details?id=com.bragitoff.numericalmethods

Syllabus Coverage from text /reference book & web/app reference:

UNIT	TOPICS/SUBTOPICS
1	Text Book , Ch. – 2 (2.5, 2.7, 2.8)
2	Text Book , Ch. – 3 (3.6, 3.7, 3.8, 3.10)
3	Text Book , Ch. – 6 [6.4, 6.5, 6.6(6.6.1 to 6.6.3), 6.7(6.7.1 to 6.7.3), 6.8]
4	Text Book , Ch. – 8 (8.1 to 8.3)
	Text Book , Ch. – 9 [9.2(9.2.1, 9.2.2, 9.2.3)]
5	Text Book , Ch. – 5 [5.1, 5.2, 5.3, 5.4(5.4.1 & 5.4.2), 5.5.2 , 5.6]
	Text Book , Ch. – 10 [10.8, 10.9(10.9.2 & 10.9.3)]