ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS), VISAKHAPATNAM

VI SEMESTER **MATHEMATICS** **TIME: 5 Hrs/Week**

M 6302-(4) **ELECTIVE VII(B) : NUMERICAL ANALYSIS** **Max. Marks:100**

w.e.f. 2017-2018

SYLLABUS

OBJECTIVES : To enable the students to

- Know and understand Numerical Methods .
- Distinguish between Numerical differences , integration and classical difference & Integration .
- Apply the knowledge Extensively in Engineering and Statistics.

COURSE :

UNIT I : THE CALCULUS OF FINITE DIFFERENCES :

Finite Differences – Introduction , Forward and Backward Differences, Differences Formulae, Fundamental theorem of the differential calculus. The Difference table. Effects of an error in a tabular value – To express any value of the function in terms of leading term and the leading differences of a difference table, The Operator E of finite differences and differential coefficient D of differential calculus, one or more missing terms, Factorial Notation. Generalized factorial notations, Methods of representing any given polynomial in factorial notation. Differences of zero, Recurrence relation between $\Delta^n O^m, \Delta^{n-1} O^{m-1} and \Delta^n O^{m-1}$, method of separation of symbols

UNIT II : INTERPOLATION WITH EQUAL INTERVALS :

Newton-Gregory forward formula for Interpolation, Newton-Gregory formula for backward Interpolation.

INTERPOLATION WITH UNEQUAL INTERVALS :

Introduction, Divided differences, Properties of divided differences, Relation between divided differences and ordinary differences, Newton's divided difference formula, Lagrange's interpolation formula for unequal intervals.

UNITI III: CENTRAL DIFFERENCE INTERPOLATION FORMULAE : Introduction , Gauss's Forward interpolation formula, Gauss's Backward Interpolation formula, Stirling's formula, Bessel's formula, Laplace-Everett formula, The Central Difference Operator (δ) , The Average Difference Operator (μ) , Uses of various interpolation formulae.

NUMERICAL DIFFERENTIATION : Introduction, Illustration examples of Newton – Gregory forward (backward) formula, Central Difference Formulae, Newton's divided difference formula .

UNIT IV : NUMERICAL INTEGRATION : Introduction – A general quadrature formula for equidistant ordinates – The Trapezoidal rule, Simpson's one third rule, Simpson's three-eighth's rule, Weddle's rule, The Euler's Maclaurin's Summation Formula.

UNIT V : SOLUTION TO NUMERICAL ALGEBRAIC AND TRANSCENDENTAL EQUATIONS : Introduction, Bisection Method, Method of Successive Approximation or Iteration Method, Method of False position or Regula False Method, Newton-Raphson method.

TEXT BOOK : Calculus of Finite Differences And Numerical Analysis by Prof. P.P.Gupta and G.S. Malik – Krishna Prakashan Media (P) Ltd. Meerut (U.P) (2006)

REFERENCES :

1. Numerical Methods – Dr. V.N.Vedamurthy & Dr. N.Ch.S.N.lyenger – Vikas Publishing House Pvt. Ltd. Jangpura, New Delhi (2005)
2. Numerical Analysis – G.Shankar Rao – New Age International Pvt. Ltd. New Delhi.(1997)
3. Numerical Analysis – R.Gupta – Laxmi Publications, New Delhi (1997)
4. Numerical Analysis – B.S.Goyal & S.K.Mittal – Pragathi Prakashan , Meerut(U.P) (1973)
5. Introductory Methods of Numerical Analysis – S.S.Sastry – Prentice Hall of India (Pvt) Ltd. New Delhi (1985)

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ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS), VISAKHAPATNAM

VI SEMESTER **MATHEMATICS** **TIME: 1 Hr/Week**

M 6351-(4) **ELECTIVE VII(B) : NUMERICAL ANALYSIS** **Max. Marks:100**

w.e.f. 2017-2018

PRACTICAL SYLLABUS

OBJECTIVES : To enable the students to

- Know and understand Numerical Methods .
- Distinguish between Numerical differences , integration and classical difference & Integration .
- Apply the knowledge Extensively in Engineering and Statistics.

COURSE :

UNIT I : THE CALCULUS OF FINITE DIFFERENCES :

Finite Differences – Introduction , Forward and Backward Differences, Differences Formulae, Fundamental theorem of the differential calculus. The Difference table. The Operator E of finite differences and differential coefficient D of differential calculus, one or more missing terms, Factorial Notation. Generalized factorial notations, Methods of representing any given polynomial in factorial notation. Differences of zero, Recurrence relation between $\Delta^n O^m, \Delta^{n-1} O^{m-1} and \Delta^n O^{m-1}$, method of separation of symbols

UNIT II : INTERPOLATION WITH EQUAL INTERVALS :

Newton-Gregory forward formula for Interpolation, Newton-Gregory formula for backward Interpolation.

INTERPOLATION WITH UNEQUAL INTERVALS :

Introduction, Divided differences, Properties of divided differences, Relation between divided differences and ordinary differences, Newton's divided difference formula, Lagrange's interpolation formula for unequal intervals.

UNITI III: CENTRAL DIFFERENCE INTERPOLATION FORMULAE : Introduction , Gauss's Forward interpolation formula, Gauss's Backward Interpolation formula, Stirling's formula, Bessel's formula, Laplace-Everett formula, The Central Difference Operator (δ) , The Average Difference Operator (μ) , Uses of various interpolation formulae.

NUMERICAL DIFFERENTIATION : Introduction, Illustration examples of Newton – Gregory forward (backward) formula, Central Difference Formulae, Newton's divided difference formula .

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TEXT BOOK : Calculus of Finite Differences And Numerical Analysis by Prof. P.P.Gupta and G.S. Malik – Krishna Prakashan Media (P) Ltd. Meerut (U.P) (2006)

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7. Numerical Analysis – G.Shankar Rao – New Age International Pvt. Ltd. New Delhi.(1997)
8. Numerical Analysis – R.Gupta – Laxmi Publications, New Delhi (1997)
9. Numerical Analysis – B.S.Goyal & S.K.Mittal – Pragathi Prakashan , Meerut(U.P) (1973)
10. Introductory Methods of Numerical Analysis – S.S.Sastry – Prentice Hall of India (Pvt) Ltd. New Delhi (1985)

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