**17SH1104 - NUMERICAL ANALYSIS**

**(Common to all Branches)**

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| **Course Category** | Basic Science | **Credits** | 3 |
| **Course Type** | Theory | **Lecture-Tutorial-Practical** | 2 - 2 - 0 |
| **Prerequisite** | Intermediate Mathematics | **Sessional Evaluation** | 40 |
| **Semester End Exam Evaluation** | 60 |
| **Total Marks** | 100 |

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| **Course**  **Objectives** | 1. The bisection, false position, iteration and Newton-Raphson Methods. 2. The basic concepts of numerical solutions of simultaneous linear and non-linear algebraic equations. 3. The concepts of interpolation. 4. The concepts of numerical differentiation and integration. 5. The numerical methods to solve ordinary differential equations by using Taylor’s series method, Picard’s method, Euler’s and Modified Euler’s Methods and Runge-Kutta methods of 2nd and 4th order. 6. The concepts of curve fitting and regression analysis. | |
| **Course Outcomes** | CO1 | Acquire knowledge in solving algebraic and transcendental equations by using the appropriate numerical methods. |
| CO2 | Develop skills in analyzing the simultaneous linear and non-linear algebraic equations by various numerical methods. |
| CO3 | Attain skills in analyzing the methods of interpolating the given data. |
| CO4 | Acquire knowledge in numerical differentiation by Newton’s formula and in numerical integration by trapezoidal, Simpson’s 1/3 and Simpson’s 3/8 rules. |
| CO5 | Apply appropriate numerical methods to solve ordinary differential equations. |
| CO6 | Develop skills in designing mathematical models for fitting geometrical curves to the given data and also acquire knowledge in regression analysis. |

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| **Course**  **Content** | **UNIT - I**  **SOLUTION OF ALGEBRAIC AND TRANSCENDENTAL EQUATIONS:** Bisection - False position - Iteration - Newton-Raphson methods.  **UNIT - II**  **SOLUTION OF SIMULTANEOUS LINEAR AND NON-LINEAR ALGEBRAIC EQUATIONS:** Iteration method – Gauss Jordon method – Gauss elimination with pivotal condensation method – Triangular factorization method – Gauss-Seidal method – Newton-Raphson method.  **UNIT - III**  **INTERPOLATION:** Newton’s forward and backward interpolation formula – Lagrange’s interpolation – Gauss forward and backward formulae – Stirling’s formula.    **UNIT - IV**  **NUMERICAL DIFFERENTIATION AND INTEGRATION:** First and second order derivatives at given points by Newton’s formula. Trapezoidal rule – Simpson’s 1/3 rule and Simpson’s 3/8 rule.  **UNIT – V**  **NUMERICAL SOLUTION OF ORDINARY DIFFERENTIALEQUATIONS:** Solution by Taylor’s series - Picard’s method of successive approximations –Euler’s and modified Euler’s methods – Runge-Kutta method of 2nd order and 4th order.  **UNIT - VI**  **CURVE FITTING:** Introduction – Method of least squares – Linear and non-linear equations – Correlation coefficient: Lines of regression – Rank correlation coefficient (Spearman’s Rank - Correlation). |

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| **Textbooks**  **&**  **Reference books** | **TEXTBOOKS:**   1. Higher Engineering Mathematics – B.S. Grewal, Khanna Publishers, New Delhi. 2. Mathematical Methods – Dr. T.K.V. Iyengar, Dr. B. Krishna Gandhi,   S. Ranganatham, Dr. M.V.S.S.N. Prasad, S. Chand Publication, New Delhi.  **REFERENCE BOOKS:**   1. Introductory Methods of Numerical Analysis - S.S. Sastry, Prentice Hall India Learning Private Limited, New Delhi. 2. Numerical Methods - E. Balagurusamy, Tata McGraw-Hill Education Pvt. Ltd, New Delhi. 3. Numerical Methods for Scientific & Engineering Computation - S.R.K. Iyengar, R.K. Jain and M.K. Jain, New Age International Publishers, New Delhi. |