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| Semester | III |
| Course | Minor |
| Paper Code | B1MT230321T |
| Paper Title | Numerical Methods [Economics +Computer Science] |
| No. of Credits | 4 |
| Theory / Practical / Composite | Theory |
| Minimum No. of preparatory hours per week a student has to devote | 4 |
| Number of Modules | Nil |
| Syllabus | <p>Sources of Error in Numerical Methods [4]: Accuracy and Precision, Absolute error , Relative Error, Sources of Error : Truncation error and Round-Off error ;[2]; Error of a sum, difference, product & quotient of two approximate numbers [2].</p> <p>Operators in Finite Differences [4]: Δ , ∇ , μ , δ , E (Definitions and simple relations among them)[4].</p> <p>Interpolation [12]: Polynomial Interpolation, Difference Tables, (Deduction) of Newton's Forward and Backward interpolation; Lagrange's interpolation formula; Newton's Divided Difference formula; properties and related problems. [12]</p> <p>Numerical Integration [6]: Integration of Newton's interpolation formula. Newton-Cotes' formula. Basic Trapezoidal, Simpson's 1/3 rd, rule and their composite forms. Degree of precision (definition only) and related problems. [6]</p> <p>Numerical solution to non-linear equations [10]: Location of a real root by Tabular method. Bisection method. Regula-Falsi and Newton-Raphson methods, their geometrical significance. Fixed point iteration method.[10]</p> <p>Numerical solution of a system of linear equations [8]: Direct methods— [Gauss elimination method, Operation count. Gauss-</p> |

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| | <p>Jordan elimination method][4]. Iterative methods—[Jacobi iteration method, Gauss-Seidel method] [4]</p> <p>Solution of Ordinary Differential equations [8]—Euler’s method, Picard’s method, Runge-Kutta method fourth order)[4]. (Single step methods) Multistep methods: Adam’s Bashforth method. [4]</p> | |
| Learning Outcomes | <ul style="list-style-type: none"> • Learning different types of error and its source and propagation. • To be acquainted with different linear operators like $\Delta \nabla \delta \mu E$. • To estimate value of unknown function and its derivative and corresponding error management. • To find the value of an integral whose analytical solution is not known. • To solve transcendental equation and linear system of equations and corresponding error estimation. • To be acquainted with various technique of solving ODE. | |
| Reading/Reference Lists | <p>(1) Elementary Numerical Analysis — Conte de Boor (2) Elementary Numerical Analysis — Atkinson (3) Numerical Analysis and Computational Procedures: S.A.Mollah</p> | |
| Evaluation | 70 | 30 |
| Paper Structure for Theory Semester Exam | 7 questions each carrying 10 marks needs to be answered out of 12/13 questions. | |