Enclosure-I(A)

Generic Elective Courses for PG courses in Mathematics offered by Department of Mathematics
Students admitted from A.Y.-2019-20 & onwards

Semester – III		
Course Code	**Course Title**	**Course Credit and hrs**
19PMTGE302	Numerical Methods	Credit-2 and 2hrs/wk

Course Description:
Derive numerical methods for various mathematical operations and tasks, such as interpolation, differentiation, integration, the solution of linear and nonlinear equations, and the solution of differential equations. Analyse and evaluate the accuracy of common numerical methods.

Course Purpose:
To enhance the problem solving skills of students using an extremely powerful problem solving tool namely numerical methods. The tool is capable of handling large system of equations. Students can handle physical problems to find an approximated solution. After getting trained a student can opt for advance courses in Numerical analysis in higher mathematics.

Course Outcomes: Upon completion of this course, the learner will be able to		
CO No.	**CO Statement**	**Blooms taxonomy Level (K_1 to K_6)**
CO_1	Understand and Evaluate solution of simultaneous linear equation.	K_1,K_2, K_3
CO_2	Understand the difference operators and the use of interpolation.	K_2, K_3
CO_3	Understand numerical differentiation and apply numerical solution	K_2, K_3
CO_4	Understand numerical integration and apply numerical solution	K_2, K_3, K_4
CO_5	Work numerically on the ordinary differential equations using different methods	K_2,K_3

Course Content **Hours**

Module-I : Simultaneous linear equation 12hrs

- Algorithms, Convergence
- Bisection method

- False position method
- Fixed point iteration method
- Newton's method
- Secant method

Module-II : Simultaneous linear equation 12hrs

- Gauss Elimination and Gauss Jordan methods
- LU decomposition
- Gauss-Jacobi's method
- Gauss-Siedel's method

Module-II : Lagrange and Newton interpolation 12hrs

- linear and higher order
- finite difference operators

Module-III : Numerical differentiation 12hrs

- Forward difference
- Backward difference
- Central Difference

Module-IV : Numerical Integration 6hrs

- trapezoidal rule
- Simpson's rule

Module-V : Numerical solution of ordinary differential equation 6hrs

- Euler's method
- Runge-Kutta methods of orders two and four

Suggested laboratory experiments:

- Not applicable

Pedagogic tools:

- Chalk and Board
- LCD and Videos.

Text books

- M.K. Jain, S.R.K. Iyengar and R.K. Jain, *Numerical Methods for Scientific And Engineering Computation*, 5th Ed., New age International Publisher, India,2007.

Reference Books

- S. S. Sastry, Introductory method for Numerical Analysis, PHI New Delhi,2012.
- S. D. Conte and Carl De Boor, Elementary Numerical Analysis, Mc Grew Hill, 1980.

Laboratory Manual/ Book

- Not applicable

Suggested reading / E-resources

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Suggested MOOCs

- https://nptel.ac.in/courses/111/107/111107105/