UNIVERSITY OF MADRAS

B.Sc. DEGREE PROGRAMME IN PHYSICS

SYLLABUS WITH EFFECT FROM 2023-2024

337E6A

COURSE	**SIXTH SEMESTER –ELECTIVE – III**
COURSETITLE	**NUMERICAL METHODS**
CREDITS	**3**
COURSE OBJECTIVES	To study the computational techniques involved in different mathematical manipulation. On completion of the course the students will be able to ➢ Solve simultaneous equations using method of triangularisation ➢ Find the inverse of a matrix using Gauss Jordan Method ➢ Solve Algebraic, Transcendental and Differential Equation using different methods ➢ To fit a curve for the given data using principles of least squares ➢ Integrate the functions using different rules like Simpsons1/3rule

UNITS	COURSE DETAILS
UNIT-I	**SIMULTANEOUS LINEAR ALGEBRAIC EQUATIONS (12 Hours)** Gauss elimination method - Gauss- Jordan method- Inverse of a matrix using Gaussian Elimination Method - Method of Triangularisation- Gauss Jacobi method of Iteration.
UNIT-II	**NUMERICAL SOLUTION OF ALGEBRAIC, TRANSCENDETIAL AND DIFFERENTIAL EQUATION (12 Hours)** Bisection method –Method of Successive Approximations- Regula falsi method - Newton - Raphson method - - Horner's method - Solution of ordinary differential equation - Euler's method-Taylor series method- Runge Kutta methods
UNIT-III	**INTERPOLATION (12 Hours)** Finite differences – forward, backward and central Differences -Properties of Operators Δ, E,D – Relation between operators –Linear interpolation – Interpolation with equal intervals – Newton forward interpolation formula –Newton backward interpolation formula.

UNIT-IV	**CURVE FITTING (12 Hours)** Principles of least squares -fitting a straight line- Fitting a parabola - linear regression- fitting an exponential curve.
UNIT-V	**NUMERICAL INTEGRATION (12 Hours)** Trapezoidal Rule - Simpson's1/3 rule and 3/8 rule-Applications-Weddle'srule
TEXT BOOKS	1. Numerical methods, M.K.Venkatraman, National Publishing Company,(1990). 2. Numerical methods, V.Rajaraman, Prentice-Hall India Pvt. Ltd., (2003). 3. Numerical methods, P.Kandasamy, K.Thilagavathy and K.Gunavathy, S.Chand &Co. (2002).
Books for References	1. Numerical methods for Scientific and Engineering computation, Jain Iyenger and Jain, New Age International (P) Ltd.,(2004). 2. Numerical methods, S.S.Sastry, Prentice Hall of India Pvt. Ltd., New Delhi(2003).
Website	http://www.sst.ph.ic.ac.uk/angur/lectures/compphys/compphys.html.

MAPPING WITH PROGRAM OUT COMES:

Map course outcomes**(CO)** for each course with program outcomes**(PO)** in the 3-point scale of STRONG(**S**) , MEDIUM(**M**) and LOW(**L**).

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	S	S	S	S	S	M	S	S
CO2	S	S	M	S	M	M	S	M	M	S
CO3	S	M	S	M	S	M	S	S	S	M
CO4	S	S	S	M	S	S	M	M	M	S
CO5	S	M	S	S	M	M	S	M	M	M