Paper Code	THEORY	Credits:3
MT402	**Title: Numerical Methods**	**45 L**
Unit 1	**Roots of Non-Linear equations**	**15 L**
	Approximations and errors in computing, significant digits, types of errors, Convergence of an iterative process. Roots of non – Linear equations, Bisection Method, Convergence of bisection method, False position method, its convergence, Newton – Raphson method, its convergence, Secant Method, its convergence.	
Unit 2	**System of linear equations & Eigenvalues**	**15 L**
	Iterative solutions of Linear Equations, Gauss Jocobi Iteration method, Gauss - Seidal iterative method Eigenvalue problem, eigenvalues of symmetric tridiagonal matrix.	
Unit 3	**Numerical Solution of Ordinary Differential equations**	**15 L**
	Numerical Solution of Ordinary Differential equations –Picard's method , Euler's Method, modified Euler's method, Runge –Kutta Methods.	

References:

1. M.K Jain, R.K Iyengar, R.K Jain " Numerical Methods for Scientific and Engineering Computation". Wiley Eastern Ltd, New Delhi-1997.
2. M.K.Venkataraman– Numerical methods in Science and Engineering , National Publishing company 1990 edition

Additional References:

1. V. Rajaraman – Computer Oriented Numerical Methods , PHI Pub.
2. S.S. Sastry – Introductory methods of Numerical Analysis, PHI Pub.

Paper Code	Practical	Credits:3
MP401	**Title: Practicals based on MT401 and MT402**	**45 L**
	Group A :Linear Algebra-II	
	1. Gram-Schmidt orthogonalization process 2. Orthogonal transformations. 3. Cayley-Hamilton Theorem 4. Eigenvalues and eigenvectors 5. Diagonalization 6. Orthogonal diagonalization and quadratic form.	
	Group B: Numerical Methods	
	1. Solving non-linear equation using bisection method and false position method. 2. Solving non-linear equation using Newton-Raphson method and secant method. 3. Solving system of equations using Gauss-Jacobi method,	

	Gauss-Seidel method 4. Finding eigenvalues and eigenvectors. 5. Solving first order linear differential equations using Picards method, Euler method 6. Solving first order linear differential equations using Runge-Kutta Method.	

Workload

1. **Theory** 3 lectures per week per paper.
2. **Practical:** 1 practical each of 3 lecture periods per week per batch. Three lecture periods of the practicals shall be conducted in succession together on a single day.

Scheme of Examination

Theory examination for MT301, MT302, MT401 and MT402:

Duration - 3 Hours duration for each paper.

Theory Question Paper Pattern:

1. There shall be three questions. On each unit there will be one question of 20 marks and the fourth one will be based on entire syllabus of 15 marks.
2. All questions shall be compulsory with internal choice within the questions. (Each question on each unit will be of 25 to 27 marks with options and a question on entire syllabus will be of 20 to 23 marks with options)
3. Question may be subdivided into sub-questions a, b, c … and the allocation of marks depend on the weightage of the topic.

Practical examination for MP301 (MP401):

(a) Duration - 3 Hours duration for each practical.
(b) Practical examination is conducted out of 75 marks.
(c) Students must complete all the practicals to the satisfaction of the teacher concerned.
(d) Students must produce at the time of practical examination, the laboratory journal along with the completion certificate signed by the Head of the Department.
(e) Question Paper Pattern:
(1) There will be four questions of 30 marks each.
(2) First two questions will be on group A and attempt any one of them. Remaining two will be on group B and attempt any one of them.
(3) 5 marks for record book and 10 marks for viva/ presentation/ assignment.