Session: 2026-27			
Part A – Introduction			
Subject	Mathematics/Statistics		
Semester	VI		
Name of the Course	Numerical Methods		
Course Code	MIC-6		
Course ID			
Course Type: (CC/MIC/ MDC/ /VOC/AEC/VA C/SEC)	MIC		
Course Learning Outcomes(CLOs)	**After completing this course, the learner will be able to**: 1. Understand theoretical concepts of numerical methods for solving algebraic and transcendental equations and attain practical skills for their implementation. 2. Gain deep theoretical knowledge of techniques of solving the system of simultaneous equations by using different numerical methods. 3. Understand the concepts of finite differences and interpolation. 4. Write and execute program of numerical methods based on C language.		
Credits	**Theory**	**Practical**	**Total**
	2	2	3
Contact Hours	2	4	6
Internal Assessment Marks	15	15	30
End Term Assessment Marks	35	35	70

Examination Time	3 Hours	---	100

Part B - Course Content

Instructions for Paper- Setter Note: The examiner will set 9 questions asking two questions from each unit and one compulsory question by taking Course Learning Outcomes (CLOs) into consideration. The compulsory question (Question No. 1) will contain 5 parts covering entire syllabus. The examinee will be required to attempt 5 questions, selecting one question from each unit and the compulsory question.

Unit	Topic	Contact Hours
I	Solution of algebraic and Transcendental equations : Bisection Method, Regula-Falsi method, Secant method, Newton-Raphson's method, Newton's iterative method for finding *pth* root of a number, order of convergence of above methods.	**30 hrs**
II	Simultaneous linear algebraic equations : Gauss elimination method, Gauss-Jordon method, Triangulaization method (LU decomposition method), Crout's Method	
III	Iterative method, Jacobi's method, Gauss-Seidel's method, Relaxation Method	
IV	Finite Difference Operators: Forward difference, Backward difference, Shift Operator, central difference operator, their properties and relations. Construction of table using these operators. Interpolation : Newton's forward difference formula, Newton's Backward difference formula	

Practical

The practical component of the course has two parts **(A) Problem Solving- Questions related to the following problems will be solved and their record will be maintained in the Practical Notebook:** 1. Problem on solving the algebraic and transcendental equation using Bisection Method. 2. Problem on solving the algebraic and transcendental equation using Regula-Falsi Method.	**60 hrs**

3. Problem on solving the algebraic and transcendental equation using Newton Raphson Method.
4. Problem on solving the system of simultaneous equations using Gauss-elimination Method.
5. Problem on solving the system of simultaneous equations using Gauss-Jordon Method.
6. Problem on solving the system of simultaneous equations using Crout's method.
7. Problem on solving the system of simultaneous equations using Triangularisation Method.
8. Problem on solving the system of simultaneous equations using Gauss-Seidel's Method.
9. Construct a table using Forward difference operator.
10. Construct a table using Backward difference operator.

(B) The following practicals will be done using C programming and their record will be maintained in the practical note book:

1. Write a program to find roots of algebraic and transcendental equations using Bisection method and draw the flowchart.
2. Write a program to find the roots of algebraic and transcendental equations using Newton Raphson method and draw the flowchart.
3. Write a program to find the roots of algebraic and transcendental equations using Regula Falsi method and draw the flowchart.
4. Write a program to find the solution of system of equations using Gauss Elimination method and draw the flowchart.
5. Write a program to find the solution of system of equations using Gauss-Seidel's method and draw the flowchart.
6. Write a program to find the solution of system of equations using Gauss Jordon method and draw the flowchart
7. Write a program to demonstrate Crout's method and draw a flow chart.
8. Write a problem to estimate function using Newton's Forward difference formula.
9. Write a problem to construct a table using finite differences.
10. Write a problem to estimate function using Newton's Backward difference formula.

Suggested Evaluation Methods

Internal Assessment:

➢ **Theory 15**

- Class Participation: 5
- Seminar/presentation/assignment/quiz/class test etc.: 5
- Mid-Term Exam: 5

➢ **Practicum 15**

- Seminar/Demonstration/Viva-voce/Lab records etc.: 15

End Term Examination:

➢ **Theory 35**

- Written Examination

➢ **Practicum 35**

- Lab record, viva-voce, write up and execution of the program

Part C-Learning Resources	
Recommended Books: **1.** S.D. Conte and C.D. Boor (2018). *Elementary Numerical Analysis: An algorithmic Approach*. SIAM. **2.** A. Gupta and S.C. Bose (2012). *Introduction to Numerical Analysis (3rd Edition)*. Academic Publishers. **3.** M.K. Jain, S.R.K. Iyengar and R. K. Jain (2012). *Numerical Methods for Scientific and Engineering Computation (6th Edition)*. New Age International Publishers. **4.** B. Bradie (2007). *A Friendly Introduction to Numerical Analysis*. Pearson India. **5.** C. F. Gerald and P. O. Wheatley (2007). *Applied Numerical Analysis (7th Edition).* Pearson Education India. **6.** F.B. Hildebrand (2003). *Introduction to Numerical Analysis (2nd Edition).* Dover Publication Inc. **7.** R. J. Schilling and S. L. Harris (1999). *Applied Numerical Methods for Engineers using MATLAB* and C. S. Chand (G/L) & Company Ltd.	