

M. Sc. I Year		MPH-C104			Semester-I	
		COMPUTATIONAL METHODS AND PROGRAMMING				
Total Lectures	Time Allotted for End Semester Examination	Marks Allotted for Continuous Assessment	Marks Allotted for End Semester Examination (ESE)	Maximum Marks (MM)	Total Credits	
60	3 Hrs	30	70	100	04	

**Learning Objectives-** The course is designed to develop an understanding of the elements of numerical methods among students. The main objective of this course is to provide students with an introduction to the field of numerical analysis and to derive appropriate numerical methods to solve interpolation based problems. This course also aims to deal with the numerical differentiation and integration as well as to deal with functions. Derive Problem solution using C programming.

**NOTE:** The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain 10 short answer type questions of six marks each and student shall be required to attempt any five questions. Sec.-B shall contain 8 descriptive type questions of ten marks each and student shall be required to attempt any four questions. Questions shall be uniformly distributed from the entire syllabus. The previous year paper/model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

### COMPUTATIONAL METHODS

#### UNIT-I

#### SOLUTIONS OF ALGEBRAIC & TRANSCENDENTAL EQUATIONS

Algebraic & transcendental equations, Numerical solution, Method of bisection, Method of false position, Newton-Raphson iteration, Direct iterative method, Convergence. (12 Lectures)

#### UNIT-II

#### INTERPOLATION & CURVE FITTINGS

Errors in polynomial interpolation, Finite differences, Differences of a polynomial, Newton's formula for interpolation, Central differences, Interpolation formulae- Gauss's, Stirling & Bessel formula- Interpolation with unevenly space points- Lagranges interpolation formula, Errors in Lagranges interpolation formula, Curve fitting - Least square curve fitting, Weighted least square approximation. (12 Lectures)

#### UNIT- III

#### NUMERICAL DIFFERENTIATION AND INTEGRATION

Numerical differentiation, Errors in numerical differentiation, Cubic spline method, Numerical integration Trapezoidal rule, Simpson's 1/3 rule, Simpson's 3/8 rule- use of cubicsplines, Newton's cotes integration, Gaussian integration. (12 Lectures)

### C PROGRAMMING

#### UNIT- IV

Computer languages, Introduction to algorithm, C character set, Identifiers and key words, Data types, Declarations, Expressions, Statements and symbolic constants, #include, #define, Preparing and running a complete C program; Arithmetic, Relational, Logical, Assignments and conditional operators; Precedence rule, Associative law; If-else, Switch, Break, Continue statements; While, Do-while, For statements, Nested loops; Go to statements; One and two dimensional arrays, Basic concept of pointer. (12 Lectures)

#### UNIT- V

Functions: Defining and accessing, Formal and actual parameters, Function prototypes, Recursion, Storage classes (basic concept); Structures: Defining and processing; Data files: Open, Close, Create, Process. (12 Lectures)

(12 Lectures)

#### Text Books / Reference Books

1. Introductory Methods of Numerical Analysis - Sastry
2. Numerical Methods in Engg. & Sciences - Grewal B.S. Khanna Pub. N Delhi
3. Numerical Analysis - Rajaraman
4. Computers Today - Byron D.H. Mc Hill
5. Programming in ANSI C - E. Balaguruswamy, TMH
6. Numerical Method for Scientific & Engg Computation - Jain, Iyengar, Wiley, 1987

**Learning Outcomes -** After the completion of the course, students will be able to understand the theoretical and practical aspects of the use of numerical analysis in solving different problems those are not possible to solve analytically. The students will become proficient in implementing numerical methods for a variety of multidisciplinary applications such as interpolation, differentiation, integration, the solution of linear and nonlinear equations, and the solution of differential equations. The students will also have expertise to understand the syntax of C language and to develop the programme using it for the solution of a particular problem.