FACULTY OF COMPUTER SCIENCE

Master of Computer Application (Sem-II)

In Effect from Academic Year 2016-17

Subject Code: 1CS2010205	Subject Title: COMPUTER-ORIENTED NUMERICAL & STATISTICAL METHODS
Pre-requisite	-

Course Objective:

The objective of this course is to enable students to obtain an intuitive and working understanding of numerical and statistical methods for the basic problems and gain experience in the solving of numerical and statistical problems using a computer.

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
				Theory		Practical		
Lecture	Tutorial	Practical	Credit	University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	Total
4	-	2	6	60	40	30	20	150

Subject Contents			
Sr. No.	Topic	Total Hours	Weight (%)
1	**Error, Solution of Algebraic & Transcendental Equations:** Motivation, Errors: truncation error rounded off error, absolute error, relative error and percentage error, Bisection, False position, Secant, Newton-Raphson iteration and Rate of convergence of methods without proof. **System of Linear Algebraic Equations:** Solution of simultaneous linear equations by using Gauss elimination, Gauss-Jordan, Gauss-Seidal & Gauss-Jacobi iteration method.	12	25
2	**Interpolation:** Newton's Forward Difference Interpolation, Newton's Backward Difference Interpolation, Lagrange's Interpolation and its inverse interpolation, Newton's Divided Difference Interpolation. **Numerical Integration:** Numerical integration by Newton-Cote's formula. Trapezoidal rule, Simpson's 1/3rd & 3/8th rules. **Numerical Solution of first order ordinary differential equations:** Taylor series method, Picard's method, Euler's method, Euler's modified method, Runge-Kutta method of 2nd & 4th order.	12	25
3	**Descriptive Statistics:** Introduction to Statistics, Frequency distribution, Charts, Mean, Median, Mode, Percentiles, Variance, Standard Deviation, Coefficient of Variation, correlation coefficient. **Curve Fitting:** Least Squares Approximation, Linear Least Square Approximation, Nonlinear least square approximation of higher order polynomial & Principle of Least squares, Sampling and large sample tests.	12	25
4	**Basic Concepts of Probability:** Definition of probability, Application of permutations and combination to probability problems, Conditional probability, Baye's theorem, Binomial, Poisson and normal probability distributions	12	25

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Course Outcome:

At the end of this course, the student would be able

- To have a clear perception of the power of statistical and numerical techniques& ideas
- To demonstrate the applications of these techniques to problems drawn from industry, management and other IT fields.

List of References:

1. Computer Oriented Numerical Methods, R. S. Salaria, Khanna Publisher
2. Numerical Methods in Science & Engineering Prog.- By Dr. B. S. Grawal, Khanna Pub., New Delhi.
3. Numerical Methods for engineers. S C Chapra and R P Canale. McGrow Hill International Edition.
4. Numerical Methods for Scientific & Engineering Computation, M. K. Jain, S.R.K
5. Statistical methods, Gupta S.P., S. Chand & Sons Pub, Delhi.
6. Fundamentals of Statistics, Gupta S.S, Himalaya Publications House.
7. Computer Oriented Numerical Methods by Dr. N Datta, Vikas Publication

List of Experiments:

Note: The experiment list provided beneath is for reference only. The course teacher may change/formulate it as per his/her methodology and requirement.

1. 1.1 Develop a C program to find a root of a non-linear equation using Bisection method.
1.2 Develop a C program to find a root of a nonlinear equation using False Position method.
1.3 Develop a C program to find a root of a non-linear equation using Secant method.
1.4 Develop C program to find a root of a non-linear equation using Newton-Raphson method.
1.5 Develop a C program to solve linear equation using Gauss Elimination method.
1.6 Develop a C program to solve linear equation using Gauss Seidel method.
1.7 Develop a C program to compute the Gauss Jacobi Interactive methods.

2. 2.1 Develop a C program to compute the interpolation value using Newton's Forward Difference formula.
2.2 Develop a C program to compute the interpolation value using Newton's Backward Difference formula
2.3 Develop a C program to compute derivatives of a tabulated function at a specified value using the Newton interpolation approach.
2.4 Develop a C program to implement Runge-Kutta 2nd order method.

3. 3.1 Write a program to find mean for direct series.
3.2 Write a program to find median for direct series.
3.3 Write a program to calculate different percentiles.
3.4 Write a program to calculate mode for discrete distribution.
3.5 Write a program to calculate harmonic and geometric means for any distribution.
3.6 Write a program to calculate probability using binomial distribution and Poisson distribution.