# 20SH2103 - NUMERICAL METHODS, PROBABILITY AND STATISTICS

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| Course Category: | Basic Science | Credits: | 3 |
| Course Type: | Theory | Lecture-Tutorial-Practical: | 3-0-0 |
| Prerequisite: | Intermediate Mathematics | Sessional Evaluation:  Univ. Exam Evaluation:  Total Marks: | 40  60  100 |
| Objectives: | To make the student learn about   * To provide the numerical methods of solving the non-linear equations * To improve the student’s skills in numerical methods by using the numerical differentiation and integration. * To introduce the fundamentals of numerical methods used for the solution of engineering problems like ordinary differential equations. * Fitting a curve to the given data and the correlation between two variables. * Basic concepts of Probability like Addition theorem, Multiplication theorem and Bayee’s theorem. Observed the difference between Discrete and continuous random variable. * Binomial, poison and Normal distribution for analyzing probability. | | |

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| Course Outcomes | Upon successful completion of the course, the students will be able to: | |
| CO1 | Apply numerical methods to find numerical solution of system of algebraic equations by different Methods. |
| CO2 | Work out numerical differentiation and integration whenever and wherever routine methods are not applicable. |
| CO3 | Work numerically on the ordinary differential equations using different methods through the theory of finite differences. Familiar with programming with numerical packages like MATLAB |
| CO4 | Construct a function which closely fits the given n points in the plane by using Least squares method. Student observed the relation between two variables. |
| CO5 | A good understanding of elementary probability theory and its application. How to apply discrete and continuous probability distributions to various business problems. |
| CO6 | A good understanding of the concept of a statistical distribution. |
| Course Content | UNIT-I  **Solution of Simultaneous Linear and Non-linear Algebraic Equations:** Iteration method, Gauss Jordon method, Gauss Elimination with Pivotal condensation method, Triangular Factorization method, Gauss-Seidal method and Newton-Raphson method  UNIT-II  **Numerical Differentiation and Integration:**First and Second Derivatives at given points by Newton’s formula – Maxima and Minima of a tabulated function. Trapezoidal rule,Simpson’s 1/3 rule and Simpson’s 3/8 rule.  UNIT-III  **Numerical Solution of Ordinary Differential Equations:** Taylor series Method - Euler’s Method – Runge-kutta methods (only second and fourth order) – Milne’s Predictor-Corrector Method. Partial Differential equations: Solution of Laplace equation by Gauss seidal iteration method.  UNIT-IV  **Curve fitting:** Introduction – Method of least squares – Linear and Non–linear equations. Correlation: Coefficient of correlation – Rank correlation – Regression of lines.  UNIT-V  **Probability and Statistics**: Introduction, Addition Theorem and Multiplication Theorem. Conditional Probability – Bayee’s Theorem. Random variables – Discrete and Continuous.  UNIT-VI  **Probability distributions:** Binomial, Poisson and Normal distributions. | |
| Text Books &  References  Books | **TEXT BOOKS:**   1. Higher Engineering Mathematics - B.S. Grewal, Khanna Publishers, New Delhi. 2. Numerical Methods by S. Arumugam, Sitech publications. 3. Probability and Statistics - Dr.T.K.V. Iyengar, Dr.B. Krishna Gandhi, S. Ranganatham, Dr.M.V.S.S.N. Prasad, S. Chand Publication, New Delhi.   **REFERENCE BOOKS:**   1. Mathematical Methods - Dr.T.K.V. Iyengar, Dr.B. Krishna Gandhi, S.Ranganatham, Dr.M.V.S.S.N. Prasad, S.Chand Publication – New Delhi. 2. Introductory Methods of Numerical Analysis by S. S. Sastry, Prentice Hall India Learning Private Limited, New Delhi. 3. Numerical Methods by E. Balagurusamy, Tata McGraw-Hill | |