

# UTTAR PRADESH TECHNICAL UNIVERSITY LUCKNOW



## SYLLABUS

1. Mathematics (NAS-501 & NAS-551)
2. Humanities (NHU-501 & NHU-601)

3<sup>rd</sup> Year (V & VI Semester)

(Effective from Session 2015-2016)

• **Unit- I** [08]

**Problem Solving on Computer:** Algorithms and flow charts. Introduction to numerical computing, Approximations and Errors in numerical computations, Truncation, Chopping and Round off errors, Propagation of errors.

**Roots finding:** Secant Method, Fixed Point Iteration Method and their rate of Convergence, Muller's Method, Modified Newton Raphson Method for Multiple Roots, Chebyshev's Method, Birge-Vieta Method of Polynomials, Aitken Acceleration Method of Convergence, Lin-Bairstrow's Method of Quadratic Factor, Solution of Systems of Nonlinear Equations, Method for finding the Complex Roots

• **Unit II** [06]

**Solution of Simultaneous Linear Algebraic Equations:** Gauss Elimination, Gauss Jordan Method, Gauss Elimination Method with Pivoting, Cholesky Method, Ill Conditioned Systems, Method of Relaxation, Tridiagonal Systems and Thomas Algorithm, Computer Algorithms of these Methods

• **Unit III** [10]

**Interpolation and Extrapolation:** Various Difference Operators, Central Difference Interpolation Formulae, Cubic Spline Interpolation, Linear and Non Linear Least Square Approximations

**Numerical Differentiation:** Methods based on Interpolation and Finite Difference, Richardson Extrapolation

**Numerical Integration:** Error Analysis of Trapezoidal and Simpson's rules, Newton-Cotes Integration Formulas, Boole's Rule and Weddle's Rule, Romberg Integration, Gaussian Quadrature.

• **Unit IV** [08]

**Numerical solution of Ordinary Differential Equations:** Initial Value Problem, Single and Multistep Methods, Picard's Method, Modified Euler's Method, Runge -Kutta Method of Fourth Order, Predictor-Corrector Method, Milne's Method, Adam's Method, Accuracy, Convergence Criteria, Stiffness, Solution of Higher Order Equations and Systems of Equations.

• **Unit V** [08]

**Boundary Value Problems:** Finite Difference Method, Eigen Value Problems, Condition Number, Polynomial Method, Power Method, Numerical Solution of Partial Differential Equations. Elliptic, Parabolic and Hyperbolic Equations

**Books Recommended**

1. E. Balagurusamy: Numerical Methods, Tata McGraw Hill.
2. Jain, Iyengar and Jain.: "Numerical Methods for Scientific and Engineering Computation" (2003), New Age International, New Delhi.
3. Sastry, S. S.: "Introductory Methods of Numerical Analysis", 3rd ed. Prentice- Hall of India, New Delhi (2005)
4. Gerald, Curtis F., and Wheatley, Patrick O. : Applied Numerical Analysis
5. Atkinson, K.V.: Introduction to Numerical Analysis, Willey International

**Reference Books**

1. "Schaum's Outlines Series : Numerical Analysis", 2nd ed. Tata Mc Graw Hill Publishing Co. Limited (1968)

2. Grewal B.S., "Numerical Methods in Engineering and Science", Khanna Publishers, Delhi.
3. V. K. Singh "Numerical and Statistical Methods in Computer" (2005), Paragon International Publishers, New Delhi.
4. Kandasamy, P. Thialagawathy, K. & Gumawathy, K. "Numerical Methods", S. Chand & Company Ltd., New Delhi (1999).
5. T. Veerajan & T. Ramchandran, Theory and Problems in Numerical Methods, TMH, New Delhi

**Use of following Techniques in C/C++ Language**

1. Solution of Single non-linear equations by Secant Method
  2. Solution of Single non-linear equations by Fixed Point Iteration Method
  3. Solution of system of linear simultaneous equations by Gauss Elimination Method
  4. Solution of system of linear simultaneous equations by Cholesky Method
  5. Solution of Single First Order Ordinary Differential Equations by Runge-Kutta Method of Fourth order
  6. Solution of Heat Equations(Parabolic equations) by Finite Difference Method
  7. Solution of Laplace Equations(Elliptic equations) by Finite Difference Method
  8. Solution of Wave Equations(Hyperbolic equations) by Finite Difference Method
  9. Finding central difference interpolating polynomial for  $n$  points
  10. Find linear least square interpolating polynomial for  $n$  points
  11. Boole's rule for numerical integration
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# **NHU-501: Engineering Economics**

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## **Unit-1 Introduction to Engineering Economics and Managerial Economics**

Concept of Efficiency, Theory of Demand , Elasticity of Demand, Supply and Law of Supply indifference Curves, Budget Line, Welfare Analysis, Scope of Managerial Economics, Techniques and Applications of Managerial Economics.

## **Unit-2 Market Structure**

Perfect Competitions Imperfect- Monopolistic, Oligopoly, duopoly sorbent features of price determination and various market conditions.

## **Unit-3 Demand Forecasting and cost Estimation**

Characteristics of Forecasts, Forecasting Horizons, Steps to Forecasting, Forecasting Methods, Seasonal Adjustments, Forecasting Performance Measures, Cost Estimation, Elements of cost, Computation of Material Variances Break-Even Analysis.

## **Unit-4 Management Aspects**

Functions of Management, Project Management, Value Engineering, Project Evaluation, Decision Making.

# **NHU-601: INDUSTRIAL MANAGEMENT**

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## **Unit-I**

**Introduction:** Concept, Development, application and scope of Industrial Management.

**Productivity:** Definition, measurement, productivity index, types of production system, Industrial Ownership.

## **Unit-II**

**Management Function:** Principle of Management – Time and motion study, work simplification – process charts and flow diagrams, Production Planning.

## **Unit-III**

**Inventory Control:** Inventory, Cost, Deterministic Models, Introduction to supply chain management.

## **Unit-IV**

**Quality Control:** Process control, SQC, Control charts, Single, Double and Sequential Sampling, Introduction to TQM.