Objectives:
The objective is to find the relation between the variables \( x \) and \( y \) out of the given data \((x,y)\).
The aim to find such relationships which exactly pass through data or approximately satisfy the data under
the condition of least sum of squares of errors.
The aim of numerical methods is to provide systematic methods for solving problems in a numerical form
using the given initial data.
This topic deals with methods to find roots of an equation and solving a differential equation.
The numerical methods are important because finding an analytical procedure to solve an equation may not
be always available.
In the diverse fields like electrical circuits, electronic communication, mechanical vibration and structural
engineering, periodic functions naturally occur and hence their properties are very much required.
Indeed, any periodic and non-periodic function can be best analyzed in one way by Fourier series and
transforms methods.
The aim at forming a partial differential equation (PDE) for a function with many variables and their solution
methods. Two important methods for first order PDE’s are learnt. While separation of variables
technique is learnt for typical second order PDE’s such as Wave, Heat and Laplace equations.
In many engineering fields the physical quantities involved are vector-valued functions.
Hence the unit aims at the basic properties of vector-valued functions and their applications to line integrals,
surface integrals and volume integrals.

UNIT – I
Vector Calculus: Vector Calculus: Scalar point function and vector point function, Gradient- Divergence- Curl
and their related properties. Solenoidal and irrotational vectors – finding the Potential function. Laplacian
operator. Line integral – work done – Surface integrals -Volume integral. Green’s Theorem, Stoke’s theorem and
Gauss’s Divergence Theorems (Statement & their Verification).

UNIT – II:
Fourier series and Fourier Transforms: Definition of periodic function. Fourier expansion of periodic functions
in a given interval of length \( 2\pi \). Determination of Fourier coefficients – Fourier series of even and odd functions
– Fourier series in an arbitrary interval – even and odd periodic continuation – Half-range Fourier sine and cosine
expansions.
Fourier integral theorem - Fourier sine and cosine integrals. Fourier transforms – Fourier sine and cosine

UNIT – III:
Interpolation and Curve fitting
Interpolation: Introduction- Errors in Polynomial Interpolation – Finite differences- Forward Differences-
Backward differences –Central differences – Symbolic relations of symbols. Difference expressions – Differences
of a polynomial-Newton’s formulae for interpolation - Gauss Central Difference Formulae –Interpolation with
unevenly spaced points-Lagrange’s Interpolation formula.
Curve fitting: Fitting a straight line –Second degree curve-exponential curve-power curve by method of least
squares.

UNIT – IV : Numerical techniques
Solution of Algebraic and Transcendental Equations and Linear system of equations: Introduction –
Graphical interpretation of solution of equations .The Bisection Method – The Method of False Position – The
Iteration Method – Newton-Raphson Method .
Solving system of non-homogeneous equations by L-U Decomposition method (Crout’s Method). Jacobi’s and
Gauss-Seidel iteration methods.

UNIT – V
Numerical Integration and Numerical solutions of differential equations:
Numerical integration - Trapezoidal rule, Simpson’s 1/3rd and 3/8 Rule , Gauss-Legendre one point, two point
and three point formulas.
Numerical solution of Ordinary Differential equations: Picard’s Method of successive approximations. Solution by
Taylor’s series method – Single step methods-Euler’s Method-Euler’s modified method, Runge-Kutta (second
and classical fourth order) Methods.
Boundary values & Eigen value problems: Shooting method, Finite difference method and solving eigen
values problems, power method

TEXT BOOKS:

REFERENCES:
2. Introductory Methods of Numerical Analysis by S.S. Sastry, PHI Learning Pvt. Ltd.
5. Mathematics for Engineers and Scientists, Alan Jeffrey, 6ht Edi, 2013, Chapman & Hall/ CRC
7. Mathematics For Engineers By K.B.Datta And M.A S.Srinivas, Cengage Publications

Outcomes: From a given discrete data, one will be able to predict the value of the data at an intermediate point and by curve fitting, can find the most appropriate formula for a guessed relation of the data variables. This method of analysis data helps engineers to understand the system for better interpretation and decision making
- After studying this unit one will be able to find a root of a given equation and will be able to find a numerical solution for a given differential equation.
- Helps in describing the system by an ODE, if possible. Also, suggests to find the solution as a first approximation.
- One will be able to find the expansion of a given function by Fourier series and Fourier Transform of the function.
- Helps in phase transformation, Phase change and attenuation of coefficients in acoustics.

- After studying this unit, one will be able to find a corresponding Partial Differential Equation for an unknown function with many independent variables and to find their solution.
- Most of the problems in physical and engineering applications, problems are highly non-linear and hence expressing them as PDEs’. Hence understanding the nature of the equation and finding a suitable solution is very much essential.
- After studying this unit, one will be able to evaluate multiple integrals (line, surface, volume integrals) and convert line integrals to area integrals and surface integrals to volume integrals.
- It is an essential requirement for an engineer to understand the behavior of the physical system.
ELECTRICAL AND ELECTRONICS ENGINEERING

OBJECTIVE:
This course introduces the concepts of electrical DC and AC circuits, basic law’s of electricity, instruments to measure the electrical quantities, different methods to solve the electrical networks, construction operational features of energy conversion devices i.e. DC and AC machines, transformers. It also emphasis on basics of electronics, semiconductor devices and their characteristics and operational features.

UNIT-I:
Electrical Circuits: Basic definitions, Types of elements, Ohm’s Law, Resistive networks, Kirchhoff’s Laws, Inductive networks, capacitive networks, Series, Parallel circuits and Star-delta and delta-star transformations.

Instruments: Basic Principle of indicating instruments – permanent magnet moving coil and moving iron instruments.

UNIT-II:

UNIT-III:

UNIT–IV:
Diodes: P-n junction, symbol, V-I Characteristics, Diode Applications, and Rectifiers – Half wave, Full wave and Bridge rectifiers (simple Problems).
Transistors: PNP and NPN Junction transistor, Transistor as an amplifier, SCR characteristics and applications.

UNIT-V:

EEE: TEXT BOOKS:
1. Basic concepts of Electrical Engineering, PS Subramanyam, BS Publications.
2. Basic Electrical Engineering, S.N. Singh, PHI.

EEE: REFERENCE BOOKS:
4. Fundamentals of Electrical Engineering, RajendraPrasad, PHI.

ECE: TEXT BOOKS:
1. Electronic Devices and Circuits, S.Salivahanan, N.Suresh Kumar, A.Vallavaraj,Tata McGraw-Hill companies.
2. Electronic Devices and Circuits, K. Lal Kishore,BS Publications.

ECE: REFERENCE BOOKS:
2. Electronic Devices and Circuits, R.L. Boylestad and Louis Nashelsky,PEI/PHI.
3. Introduction to Electronic Devices and Circuits, Rober T. Paynter,PE.
5. Electronic Devices and Circuits, Anil K. Maini, Varsha Agarwal,Wiley India Pvt. Ltd.

OUTCOME:
After going through this course the student gets a thorough knowledge on basic electrical circuits, parameters, and operation of the transformers in the energy conversion process, electromechanical energy conversion, construction operation characteristics of DC and AC machines and the constructional features and operation of measuring instruments like voltmeter, ammeter, wattmeter etc...and different
semiconductor devices, their voltage-current characteristics, operation of diodes, transistors, realization of various electronic circuits with the various semiconductor devices, and cathode ray oscilloscope, With which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.
UNIT – I

UNIT – II
Shear Force and Bending Moment: Definition of beam – Types of beams – Concept of shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, uniformly distributed load, uniformly varying loads and combination of these loads – Point of contraflexure – Relation between S.F., B.M and rate of loading at a section of a beam.

UNIT – III

SHEAR STRESSES: Derivation of formula – Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T angle sections.

UNIT – IV
Principal Stresses and Strains: Introduction – Stresses on an inclined section of a bar under axial loading – compound stresses – Normal and tangential stresses on an inclined plane for biaxial stresses – Two perpendicular normal stresses accompanied by a state of simple shear – Mohr’s circle of stresses – Principal stresses and strains – Analytical and graphical solutions.


UNIT – V
Deflection of Beams: Bending into a circular arc – slope, deflection and radius of curvature – Differential equation for the elastic line of a beam – Double integration and Macaulay’s methods – Determination of slope and deflection for cantilever and simply supported beams subjected to point loads, U.D.L, Uniformly varying load-Mohr’s theorems – Moment area method – application to simple cases including overhanging beams.

Conjugate Beam Method: Introduction – Concept of conjugate beam method. Difference between a real beam and a conjugate beam. Deflections of determinate beams with constant and different moments of inertia.

TEXT BOOKS:
2) Strength of Materials by R.K.Rajput, S.Chand & Company Ltd.

REFERENCES:
7) Strength of Materials by R.Subramanian, Oxford University Press.
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

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SURVEYING

UNIT – I
Introduction: Overview of plane surveying (chain, compass and plane table), Objectives, Principles and classifications, Scales, Conventional Symbols, Signals

Distances and Direction: Distance measurement methods; use of chain, tape and Electronic distance measurements, Meridians, Azimuths and Bearings, declination, computation of angle.

UNIT – II

UNIT – III
Computation of Areas and Volumes: Area from field notes, computation of areas along irregular boundaries and area consisting of regular boundaries. Embankments and cutting for a level section and two level sections with and without transverse slopes, determination of the capacity of reservoir, volume of barrow pits.

UNIT – IV

UNIT – V
Tacheometric Surveying: Stadia and tangential methods of Tacheometry. Distance and Elevation formulae for Staff vertical position. Curves: Types of curves, design and setting out – simple and compound curves.

Introduction to Advanced Surveying: Total Station and Global positioning system, Introduction to Geographic information system (GIS).

TEXT BOOKS:

REFERENCES:
4 “Advanced Surveying Total Station GIS and Remote Sensing by Satheesh Gopi, R. Sathi Kumar and N. Madhu.
FLUID MECHANICS

UNIT I
Introduction: Dimensions and units – Physical properties of fluids specific gravity, viscosity, surface tension, vapor pressure and their influences on fluid motion pressure at a point, Pascal's law, Hydrostatic law - atmospheric, gauge and vacuum pressure - measurement of pressure. Pressure gauges, Manometers: differential and Micro Manometers.

Hydrostatic Forces: Hydrostatic forces on submerged plane, Horizontal, Vertical, inclined and curved surfaces – Center of pressure. Derivations and problems.

UNIT II
Fluid Kinematics: Description of fluid flow, Stream line, path line and streak lines and stream tube. Classification of flows: Steady, unsteady, uniform, non-uniform, laminar, turbulent, rotational and irrotational flows – Equation of continuity for one, two, three dimensional flows – stream and velocity potential functions, flownet analysis.

UNIT III
Fluid Dynamics: Surface and body forces – Euler’s and Bernoulli’s equations for flow along a stream line for 3-D flow, (Navier – stokes equations (Explanationary) Momentum equation and its application – forces on pipe bend.
Pitot tube, Venturi meter and orifice meter – classification of orifices, flow over rectangular, triangular and trapezoidal and Stepped notches – Broad crested weirs.

UNIT IV
Boundary Layer Theory: Approximate Solutions of Navier Stokes’s Equations – Boundary layer – concepts, Prandtl contribution, Characteristics of boundary layer along a thin flat plate, Vonkarmen momentum integral equation, laminar and turbulent Boundary layers (no deviation), BL in transition, separation of BL, control of BL, flow around submerged objects-Drag and Lift- Magnus effect.

UNIT V

TEXT BOOKS:

REFERENCES:
1. Fluid Mechanics Basic Concepts & Principles, Shiv Kumar, Ane Books Pvt Ltd.
2. Fluid Mechanics and Machinery, CSP Ojha, Oxford Higher Eduction
5. A text of Fluid mechanics and hydraulic machines by Dr. R.K. Bansal - Laxmi Publications (P) ltd., New Delhi.
MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Objectives:
To enable the student to understand and appreciate, with a practical insight, the importance of certain basic issues governing the business operations namely: demand and supply, production function, cost analysis, markets, forms of business organisations, capital budgeting and financial accounting and financial analysis.

Unit I

Unit II

Unit III

Unit IV

Unit V

TEXT BOOKS:

REFERENCES:

Outcomes:
At the end of the course, the student will
Understand the market dynamics namely, demand and supply, demand forecasting, elasticity of demand and supply, pricing methods and pricing in different market structures.

Gain an insight into how production function is carried out to achieve least cost combination of inputs and cost analysis.

Develop an understanding of:
- Analyse how capital budgeting decisions are carried out
- Understand the framework for both manual and computerised accounting process
- Know how to analyse and interpret the financial statements through ratio analysis.
LIST OF EXERCISES:
1. Survey of an area by chain survey (closed traverse) & plotting
2. Chaining across obstacles
3. Determination of distance between two inaccessible points with compass.
4. Surveying of a given area by prismatic compass (closed traverse) and plotting after adjustment.
5. Radiation method, intersection methods by plane table survey
6. Two point and three point problems in plane table survey
7. Traversing by plane table survey
8. Fly leveling (differential leveling)
10. Two exercises on contouring.

List of Major Equipment:
1. Chains, tapes, ranging rods, cross staff, arrows
2. Compasses and tripods, optical square.
3. Plane tables, alidade, plumbing fork, trough compasses
4. Leveling instruments and leveling staves
5. Box sextants, planimeter.

STRENGTH OF MATERIALS LAB
1. Tension test
2. Bending test on (Steel / Wood) cantilever beam.
3. Bending test on simple support beam.
4. Torsion test
5. Hardness test
6. Spring test
7. Compression test on wood or concrete
8. Impact test
9. Shear test
10. Verification of Maxwell’s reciprocal theorem on beams.
11. Use of electrical resistance strain gauges.

List of Major Equipment:
1. UTM for conducting tension test on rods
2. Steel beam for flexure test
3. Wooden beam for flexure test
4. Torsion testing machine
5. Brinnell’s / Rockwell’s hardness testing machine
6. Spring testing machine
7. Compression testing machine
8. Izod impact machine
9. Shear testing machine
10. Beam setup for Maxwell’s theorem verification.
11. Continuous beam setup