

2007-2008

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY  
HYDERABAD

B.TECH. CIVIL ENGINEERING

II YEAR I SEMESTER  
COURSE STRUCTURE

SUBJECT	T	P	C
Mathematics – II	4+1*	0	4
Electrical and Electronics Engineering	4+1*	0	4
Strength of Materials - I	4+1*	0	4
Building Materials and Construction	4+1*	0	4
Surveying	4+1*	0	4
Fluid Mechanics	4+1*	0	4
Strength of Materials Lab	0	3	2
Surveying Lab - I	0	3	2
<b>TOTAL</b>	<b>30</b>	<b>6</b>	<b>28</b>

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<b>4+1*</b>	<b>0</b>	<b>4</b>

**MATHEMATICS – II**

**UNIT – I**

Matrices: Elementary row transformations – Rank – Normal form - Echelon form – Consistency – Solution of system of simultaneous linear homogeneous and non-homogeneous equations.

**UNIT – II**

Eigen values, Eigen vectors – properties – Cayley-Hamilton Theorem - Inverse and powers of a matrix by Cayley-Hamilton theorem – Diagonalization of matrix. Calculation of powers of matrix – Modal and spectral matrices.

**UNIT-III**

Real matrices – Symmetric, skew - symmetric, orthogonal, Linear Transformation - Orthogonal Transformation. Complex matrices: Hermitian, Skew-Hermitian and Unitary – Eigen values and Eigen vectors of complex matrices and their properties Quadratic forms- Reduction of quadratic form to canonical form – Rank - Positive, negative definite - semi definite - index - signature - Sylvester law.

**UNIT –IV**

Fourier Series: Determination of Fourier coefficients – Fourier series – even and odd functions – Fourier series in an arbitrary interval – even and odd periodic continuation – Half-range Fourier sine and cosine expansions.

**UNIT-V**

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – solutions of first order linear (Lagrange) equation and nonlinear (standard type) equations.

**UNIT –VI**

Method of separation of variables – Classification of second order linear Partial Differential Equations, solutions of one dimensional heat equation, wave equation and two-dimensional Laplace's equation under initial and boundary conditions.

**UNIT –VII**

Fourier integral theorem – Fourier sine and cosine integrals. Fourier transforms – Fourier sine and cosine transforms – properties – inverse transforms – Finite Fourier transforms.

**UNIT-VIII**

Z-transform – inverse z-transform - properties – Damping rule – Shifting rule – Initial and final value theorems. Convolution theorem – Solution of difference equation by z-transforms.

**Text Books:**

1. A text Book of Engineering Mathematics, Vol-II T. K. V. Iyengar, B. Krishna Gandhi and Others, S. Chand & Company.
2. A text Book of Engineering Mathematics, C. Sankaraiah, V. G. S. Book Links.
3. A text Book of Engineering Mathematics, Shahnaz Bathul, Right Publishers.
4. A text Book of Engineering Mathematics, P. Nageshwara Rao, Y. Narasimhulu & N. Prabhakar Rao, Deepthi Publications.

**References:**

1. A text Book of Engineering Mathematics, B. V. Raman, Tata Mc Graw Hill.
2. Advanced Engineering Mathematics, Irvin Kreyszig, Wiley India Pvt. Ltd.
3. A text Book of Engineering Mathematics, Thomson Book Collection.

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**ELECTRICAL AND ELECTRONICS ENGINEERING**

**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 deltastar transformations.

**UNIT II DC MACHINES**

Principle of operation of DC Generator – emf equation - types – DC motor types – torque equation – applications – three point starter.

**UNIT III TRANSFORMERS**

Principle of operation of single phase transformers – emf equation – losses – efficiency and regulation

**UNIT IV AC MACHINES**

Principle of operation of alternators – regulation by synchronous impedance method – Principle of operation of induction motor – slip – torque characteristics – applications.

**UNIT V INSTRUMENTS**

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

**UNIT VI DIODE AND IT'S CHARACTERISTICS**

P-N junction diode, symbol, V-I Characteristics, Diode Applications, Rectifiers – Half wave, Full wave and Bridge rectifiers (simple Problems)

**UNIT VII TRANSISTORS**

P-N-P and N-P-N Junction transistor, Transistor as an amplifier, SCR characteristics and applications

**UNIT VIII: CATHODE RAY OSCILLOSCOPE**

Principles of CRT (Cathode Ray Tube), Deflection, Sensitivity, Electrostatic and Magnetic deflection, Applications of CRO - Voltage, Current and frequency measurements.

**TEXT BOOKS:**

1. Essentials of Electrical and Computer Engineering by David V. Kerns, JR. J. David Irwin
2. Principles of Electrical and Electronics Engineering by V.K.Mehta, S.Chand & Co.

**REFERENCES :**

1. Introduction to Electrical Engineering – M.S Naidu and S. Kamakshaiyah, TMH Publ.
2. Basic Electrical Engineering by Kothari and Nagarath, TMH Publications, 2nd Edition.

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**STRENGTH OF MATERIALS – I**

**UNIT – I**

**SIMPLE STRESSES AND STRAINS :**

Elasticity and plasticity – Types of stresses and strains – Hooke's law – stress – strain diagram for mild steel – Working stress – Factor of safety – Lateral strain, Poisson's ratio and volumetric strain – Elastic moduli and the relationship between them – Bars of varying section – composite bars – Temperature stresses.

**UNIT - II**

**STRAIN ENERGY** – Resilience – Gradual, sudden, impact and shock loadings – simple applications.

**UNIT – III**

**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 cantiliver, simply supported and overhanging beams subjected to point loads, u.d.l., 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 – IV**

**FLEXURAL STRESSES :**

Theory of simple bending – Assumptions – Derivation of bending equation:  $M/I = f/y = E/R$  Neutral axis – Determination bending stresses – section modulus of rectangular and circular sections (Solid and Hollow), I,T,Angle and Channel sections – Design of simple beam sections.

**UNIT – V**

**SHEAR STRESSES :**

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

**UNIT – VI**

**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.

**UNIT – VII**

**THIN CYLINDERS :**

Thin seamless cylindrical shells – Derivation of formula for longitudinal and circumferential stresses – hoop, longitudinal and Volumetric strains – changes in dia, and volume of thin cylinders – Thin spherical shells.

**UNIT – VIII**

**THICK CYLINDERS :**

Introduction Lamé's theory for thick cylinders – Derivation of Lamé's formulae – distribution of hoop and radial stresses across thickness – design of thick cylinders – compound cylinders – Necessary difference of radii for shrinkage – Thick spherical shells.

**TEXT BOOKS:**

1. Introduction to text book of Strength of materials by R.K.Bansal – Laxmi publications Pvt. Ltd., New Delhi.
2. Introduction to text book of Strength of Material by U.C. Jindal, Galgotia publications.
3. Strength of materials by R. Subramanian, Oxford university press, New Delhi

**REFERENCES :**

1. Mechanics of Solid, by Ferdinandp Beer and others – Tata Mc.Grawhill Publications 2000.
2. Strength of Materials by Schaum's out line series – Mc. Grawhill International Editions.
3. Strength of Materials by S. Ramakrishna and R.Narayan – Dhanpat Rai publications.
4. Strength of materials by R.K.Rajput, S.Chand & Co, New Delhi.
5. Strength of Materials by A.R.Basu, Dhanpat Rai & Co, Nai Sarah, New Delhi.
6. Strength of Materials by L.S.Srinath et al., Macmillan India Ltd., Delhi.
7. Strength of Materials by Bhavi Katti.

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**BUILDING MATERIALS AND CONSTRUCTION**

**UNIT – I**

**STONES, BRICKS AND TILES:**

Properties of building stones – relation to their structural requirements. Classification of stones – Stone quarrying – precautions in blasting, Dressing of stone, Composition of good brick earth, various methods of manufacture of bricks. Comparison between clamp burning and kiln burning.

**UNIT-II**

Qualities of a good brick. Characteristics of good tile – manufacturing methods, Types of tiles. Use of Materials like aluminium, gypsum, glass and bituminous materials – their quality.

**UNIT – III**

**LIME AND CEMENT:**

Various ingredients of lime – Constituents of lime stone – classification of lime – various methods of manufacture of lime. Various types of cement and their properties. Various field and laboratory tests for Cement. Various ingredients of Cement concrete and their importance – various test for concrete.

**UNIT-IV**

WOOD: Structure – properties – Seasoning of timber. Classification of various types of woods used in buildings – Defects in timber. Alternative materials for wood, Galvanized Iron, Fiber-reinforced plastics, steel, Aluminum.

**UNIT - V**

**MASONRY :**

Types of masonry, English and Flemish bonds , Rubble and Ashlar masonry, cavity and partition walls.

**UNIT – VI**

**FOUNDATIONS:**

Foundations : Shallow foundations – Spread, combined strap and mat footings.

**UNIT –VII**

**BUILDING COMPONENTS:** Lintels, Arches, Vaults-stair cases – Types. Different types of floors-Concrete, Mosaic, Terrazo floors, Pitched, flat and curved Roofs. Lean-to-Roof, Coupled Roofs, Trussed roofs- King and Queen Post Trusses. RCC Roofs, Madras Terrace/Shell Roofs.

**UNIT – VIII**

**FINISHINGS :** Proofing Damp and water proofing- materials used. Plastering, pointing, white washing and distempering – Painting – Constituents of a paint – Types of paints – Painting of new/old Wood – Varnish – Form work and scaffolding.

**TEXT BOOKS:**

1. Building material by S K Duggal – New Age International Publishers; Second Edition
2. Building Construction by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain - Laxmi Publications (P) Ltd., New Delhi
3. Building Construction by P.C. Varghese, Prentice-Hall of India private Ltd, New Delhi

**REFERENCES:**

1. R.Chudly “Construction Technology “– Volumes I and II” 2nd Edition, Longman, UK, 1987.
2. Building materials by P.C. Varghese, Prentice-Hall of India private Ltd, New Delhi

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**SURVEYING**

**UNIT – I**

**INTRODUCTION:** Overview of plane surveying (chain, compass and plane table), Objectives, Principles and classifications.

**UNIT – II:**

**DISTANCES AND DIRECTION:** Distance measurement conventions and methods; use of chain and tape, Electronic distance measurements, Meridians, Azimuths and Bearings, declination, computation of angle.

**UNIT – III**

**LEVELING AND CONTOURING:** Concept and Terminology, Temporary and permanent adjustments- method of leveling. Characteristics and Uses of contours- methods of conducting contour surveys and their plotting.

**UNIT – IV**

**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 - V**

**THEODOLITE:** Theodolite, description, uses and adjustments – temporary and permanent, measurement of horizontal and vertical angles. Principles of Electronic Theodolite. Trigonometrical leveling, Traversing.

**UNIT – VI**

**TACHEOMETRIC SURVEYING:**

Stadia and tangential methods of Tacheometry. Distance and Elevation formulae for Staff vertical position.

**UNIT – VII**

**Curves:** Types of curves, design and setting out – simple and compound curves.

**UNIT - VIII**

Introduction to geodetic surveying, Total Station and Global positioning system, Introduction to Geographic information system (GIS).

**TEXT BOOKS:**

1. "Surveying (Vol – 1, 2 & 3), by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain - Laxmi Publications (P) Ltd., New Delhi
2. Duggal S K, "Surveying (Vol – 1 & 2), Tata Mc.Graw Hill Publishing Co. Ltd. New Delhi, 2004.
3. Surveying and levelling by R. Subramanian, Oxford university press, New Delhi

**REFERENCES:**

1. Arthur R Benton and Philip J Taety, Elements of Plane Surveying, McGraw Hill – 2000
2. Aror K R "Surveying Vol 1, 2 & 3), Standard Book House, Delhi, 2004
3. Chandra A M, "Plane Surveying", New age International Pvt. Ltd., Publishers, New Delhi, 2002.
4. Chandra A M, "Higher Surveying", New age International Pvt. Ltd., Publishers, New Delhi, 2002.

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**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.

**UNIT – II**

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

**UNIT – III**

**FLUID KINEMATICS** : Description of fluid flow, Stream line, path line and streak lines and stream tube. Classification of flows : Steady, unsteady, uniform, nonuniform, laminar, turbulent, rotational and irrotational flows – Equation of continuity for one, two , three dimensional flows – stream and velocity potential functions, flownet analysis.

**UNIT – IV**

**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 (Explanatory) Momentum equation and its application – forces on pipe bend.

**UNIT – V**

Approximate Solutions of Navier Stoke'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 deviations BL in transition, separation of BL, control of BL, flow around submerged objects-Drag and Lift- Magnus effect.

**UNIT – VI**

Reynold's experiment – Characteristics of Laminar & Turbulent flows. Flow between parallel plates, Flow through long tubes, flow through inclined tubes.

**UNIT - VII**

**CLOSED CONDUIT FLOW:** Laws of Fluid friction – Darcy's equation, Minor losses – pipes in series – pipes in parallel – Total energy line and hydraulic gradient line. Pipe network problems, variation of friction factor with Reynold's number – Moody's Chart.

**UNIT – VIII**

**MEASUREMENT OF FLOW** : Pitot tube, Venturi meter and orifice meter – classification of orifices, flow over rectangular, triangular and trapezoidal and Stepped notches - –Broad crested weirs.

**TEXT BOOKS:**

1. Fluid Mechanics by Modi and Seth, Standard book house.
2. Introduction to Fluid Machines by S.K.Som & G.Biswas (Tata Mc.Grawhill publishers Pvt. Ltd.)
3. Introduction to Fluid Machines by Edward J. Shaughnessy, Jr, Ira M. Katz and James P. Schaffer , Oxford University Press, New Delhi

**REFERENCES:**

1. Fluid Mechanics by J.F.Douglas, J.M. Gaserek and J.A.Swaffird (Longman)
2. Fluid Mechanics by Frank.M. White (Tata Mc.Grawhill Pvt. Ltd.)
3. Fluid Mehanics by A.K. Mohanty, Prentice Hall of India Pvt. Ltd., New Delhi
4. A text of Fluid mechanics and hydraulic machines by Dr. R.K. Bansal - Laxmi Publications (P) ltd., New Delhi

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**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
12. Continuous beam – deflection test.

**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 / Rock well's hardness testing machine
6. Setup for spring tests
7. Compression testing machine
8. Izod Impact machine
9. Shear testing machine
10. Beam setup for Maxwell's theorem verification.
11. Continuous beam setup
12. Electrical Resistance gauges.



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**SURVEYING LAB – I**

**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)
9. An exercise of L.S and C.S and plotting
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.