# COURSE STRUCTURE: II B.Tech., I Semester

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# COURSE STRUCTURE: II B.Tech., II Semester

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II B.Tech. I Semester
10BT3BS04: MATRICES AND NUMERICAL METHODS
(Common to Biotechnology and Civil Engineering)

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UNIT - I
MATRICES AND LINEAR SYSTEM OF EQUATIONS:

UNIT - II
EIGEN VALUES AND EIGEN VECTORS:
Evaluation of eigen values - Eigen vectors - Properties - Cayley Hamilton theorem (without proof) - Inverse and powers of a matrix using Cayley Hamilton theorem - Diagonalization.

UNIT - III
SOLUTIONS OF ALGEBRAIC AND TRANSCENDENTAL EQUATIONS AND CURVE FITTING:
Solutions of algebraic and transcendental equations by bisection method - False position method - Newton Raphson’s Method - Iterative method - Curve fitting by the principle of least squares - fitting of a straight line, parabola, exponential and power curves.

UNIT - IV
INTERPOLATION:
Interpolation - Forward difference operator - Backward difference operator - Central difference operator - Relationship between the operators - Newton’s forward formula - Newton’s backward formula - Interpolation with unequal intervals - Lagrange’s interpolation formula.

UNIT - V
NUMERICAL DIFFERENTIATION AND INTEGRATION:
UNIT - VI

UNIT - VII

UNIT - VIII
FOURIER SERIES: Fourier series of functions in \((0, 2\pi), (-\pi, \pi), (0, 2l), (-l, l)\) - Determination of Fourier coefficients – Euler’s formulae – Even and odd functions – Periodic continuation – Half-range Fourier sine and cosine expansions.

TEXT BOOKS

REFERENCES
UNIT - I

UNIT-II
SHEAR FORCE AND BENDING MOMENT : Types of beams, supports and loads – Concept of shear force and bending moment – SF and BM diagrams for cantilever, simply supported and overhanging beams subjected to point loads, uniformly distributed load, uniformly varying load and combination of these loads – Point of contra flexure – Relation between SF, BM and rate of loading at a section of beam.

UNIT-III
STRESSES IN BEAMS :
Shear Stresses: Basic shear stress equation – Shear stress distribution: Rectangular, circular, triangular, I, T, Angle sections – Strain energy due to shear.

UNIT-IV
COMBINED DIRECT AND BENDING STRESSES : Stresses under the combined action of direct loading and bending moment – Core of a section – Stresses in chimneys, retaining walls and dams – Conditions for stability – Stresses due to direct loading and bending moment about both axes.

UNIT-V
UNIT-VI
SPRINGS: Deflection of close and open coiled helical springs under axial load and axial twist – Springs in series and springs in parallel – Carriage springs.

UNIT-VII
THIN CYLINDERS: Thin cylindrical shells – Longitudinal and circumferential stresses – Hoop, longitudinal and volumetric strains – Changes in diameter and volume of thin cylinders.

UNIT-VIII
THICK CYLINDERS: Lame’s theory – Distribution of hoop and radial stresses across thickness – Design of thick cylinders – Compound cylinders – Difference of radii for shrinkage.

TEXT BOOKS

REFERENCES
UNIT – I

UNIT – II

UNIT-III

UNIT-IV
OTHER MATERIALS IN CONSTRUCTION : Use of Materials like galvanized iron, steel, aluminium, gypsum, copper, glass, bituminous materials, rubber, fiber-reinforced plastics, ceramic products, asbestos and their quality.

UNIT – V
UNIT – VI
TESTS ON HARDENED CONCRETE: Compression test – Tension test – Factors affecting strength – Flexure test – Non-destructive testing methods

UNIT – VII
MIX DESIGN: Factors in the choice of mix proportions - BIS and ACI methods of mix design.

UNIT – VIII

TEXT BOOKS

REFERENCES
II B.Tech. I Semester
10BT30103 : BASICS OF ELECTRICAL AND MECHANICAL TECHNOLOGY

PART –A
ELECTRICAL TECHNOLOGY

UNIT - I
ELECTRICAL CIRCUITS AND CABLES : Basic definitions - Types of elements - Ohm’s law - Resistive networks - Kirchhoff’s laws - Inductive networks - Capacitive networks - Series and parallel circuits - Star-delta and delta-star transformations - Types of cables.

UNIT - II

UNIT - III

UNIT - IV

TEXT BOOKS

REFERENCES
PART - B
MECHANICAL TECHNOLOGY

UNIT - V
WELDING PROCESSES: Introduction, classification of welding processes - Arc welding and gas welding - Equipment, welding fluxes and filler rods - Submerged arc welding, TIG and MIG processes - Soldering and brazing importance - Applications.

UNIT - VI
INTERNAL COMBUSTION ENGINES: Introduction, Classification and Main components of IC Engines - Working principle of petrol and diesel engines - Four stroke and two stroke cycles - Comparison of four stroke and two stroke engines - Lubrication and fuel systems of petrol and diesel engines.

UNIT - VII
REFRIGERATION AND AIR CONDITIONING: Terminology of refrigeration and air conditioning - Refrigerants and their desirable properties - Methods of refrigeration: Vapour compression and vapour absorption systems - Basic principles of air conditioning - Room air conditioning systems - Comfort air conditioning systems.

UNIT - VIII
AIR COMPRESSORS AND EARTH MOVING MACHINERY: Working principles of air compressors - Reciprocating air compressor: single and multi stage compression - Earth moving machines and mechanical handling equipment - Bull dozers - Power showels - Excavators - Concrete mixer - Belt and bucket conveyors.

TEXT BOOKS

REFERENCES
UNIT – I

UNIT – II
COMPASS AND PLANE TABLE SURVEYING :
Compass Survey: Types of compass – Bearings - Included angles– Declination - Dip and local attraction.

UNIT – III
LEVELING AND CONTOURING : Types of levels - Dumpy level and tilting level - Temporary and permanent adjustments - Height of instrument and rise and fall methods - Effect of curvature and refraction - Characteristics of contours - Direct and indirect methods of contouring and plotting of contours - Uses of contour maps.

UNIT – IV
COMPUTATION OF AREAS AND VOLUMES :
Areas: Areas dividing into number of triangles - By offsets to a base line - By latitudes and departures (D.M.D. and D.P.D) - By coordinates - Areas from maps.
Volumes : Volume from cross-section - 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 - Spot levels from contours.

UNIT – V
UNIT – VI

UNIT – VII
CURVES: Types of curves - Linear and angular methods of setting out of simple curves – By offsets from long chord – By offsets from tangents - By successive bisection of arcs of chords – By offsets from chords produced – Two theodolite method.

UNIT – VIII
ELECTRONIC DISTANCE MEASUREMENT AND GIS:
Electronic Distance Measurement: Basic concepts - Classification of electronic radiation - Basic principle of electronic distance measurement - Computing the distance from the phase differences - Total station - Instrumental errors in EDM.
Geographical Information System: Introduction to geodetic surveying - Global positioning system (GPS) - Introduction to geographic information system (GIS).

TEXT BOOKS

REFERENCES
UNIT – I
PROPERTIES OF FLUIDS AND PRESSURE MEASUREMENTS:

UNIT – II
HYDROSTATIC FORCES: Hydrostatic forces on submerged plane surfaces – Total pressure and centre of pressure on plane and curved surfaces – Calculation of total pressure from pressure diagrams.

UNIT – III
FLUID KINEMATICS: Description of fluid flow - Stream line - Path line and streak lines - Stream tube - Classification of flows - Steady, unsteady, uniform, non-uniform, laminar, turbulent, rotational and irrotational flows – Equation of continuity for one dimensional flows – stream and velocity potential functions - Flownet and its uses.

UNIT – IV
FLUID DYNAMICS: Surface and body forces – Euler’s and Bernoulli’s equations for flow along a stream line – Momentum equation and its application – Momentum and kinetic Energy correction factors – Forces on pipe bend.

UNIT – V

UNIT – VI
MEASUREMENT OF FLOW: Pitot tube - Venturimeter and orifice meter – Orifices and mouthpieces - Rectangular, triangular and trapezoidal notches – Broad crested weirs.
UNIT – VII
LAMINAR AND TURBULENT FLOW : Reynold’s experiment - Characteristics of laminar and turbulent flows – Laminar flow through circular pipes - Flow between parallel plates - Hydrodynamically smooth and rough boundaries.

UNIT – VIII
HYDRAULIC SIMILITUDE : Dimensional analysis - Rayleigh’s method and Buckingham’s pi theorem - Model studies – Geometric, kinematic and dynamic similarities - Dimensionless numbers – Model laws – Scale effects.

TEXT BOOKS

REFERENCES
LIST OF EXERCISES

A) CHAIN SURVEY
1. Study of chains and its accessories - Aligning, Ranging and Chaining
2. Cross staff survey and plotting
3. Chaining across obstacles and plotting
4. Chain traversing and plotting

B) COMPASS SURVEY
5. Study of prismatic compass – Measurement of bearings of lines
6. Determination of area by radiation method and plotting
7. Determination of distance between two inaccessible points with compass
8. Compass traversing and plotting

C) PLANE TABLE SURVEY
9. Study of plane table and its accessories
10. Radiation and Intersection methods by plane table survey
11. Plane table traversing
12. Resection - Two point and three point problems

D) LEVELLING
13. Study of Dumpy level/Auto level and levelling staff
14. Fly levelling (differential levelling)
15. Longitudinal and cross-sectioning of a road profile and plotting.
16. Contouring exercise
LIST OF EXPERIMENTS

1. Tension test on mild steel / HYSD bar
2. Compression test on wood
3. Compression test on coiled spring
4. Tension test on coiled spring
5. Bending test on carriage spring
6. Brinell and Rockwell hardness tests
7. Charpy and Izod impact tests
8. Shear test on mild steel
9. Bending test on simply supported beam
10. Bending test on cantilever beam
11. Bending test on fixed beam
12. Bending test on continuous beam
13. Verification of Maxwell’s reciprocal theorem
14. Torsion test on mild steel
II B.Tech. II Semester
10BT3BS01 : PROBABILITY AND STATISTICS

UNIT - I
PROBABILITY MATHEMATICAL EXPECTATIONS :
Introduction to Probability : Definition of random experiment, events and sample space – Definition of probability – Addition and multiplication theorems - Conditional probability – Baye’s theorem – Simple problems on Baye’s theorem.

UNIT - II
PROBABILITY DISTRIBUTIONS :
Discrete Distributions : Binomial distribution – Mean and standard deviations of Binomial distribution – Poisson distribution – Mean and standard deviations of Poisson distribution – Applications.

UNIT-III
CORRELATION AND REGRESSION :
Correlation : Definition - Measures of correlation – Correlation for bivariate distribution – Rank correlation coefficients.
Regression : Simple linear regression – Regression lines and properties.

UNIT-IV

UNIT-V
LARGE SAMPLES TEST OF SIGNIFICANCE : Test of significance for single proportion – Test of significance for difference of proportions - Test of significance for a single mean - Test of significance for difference of means – Test of significance for difference of standard deviations.
UNIT – VI
SMALL SAMPLES TEST OF SIGNIFICANCE: Student’s t-test – F-test for equality of population variance – Chi-square test of goodness of test – Contingency table – Chi-square test for independence of attributes.

UNIT – VII

UNIT – VIII
QUEUING THEORY: Queuing theory – Pure birth and death process – M/M/1 Model – Problems.

TEXT BOOKS

REFERENCES
UNIT-I
PRINCIPAL STRESSES AND STRAINS : Stresses on an inclined plane 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.

UNIT-II
DEFLECTION OF BEAMS - I : Bending into a circular arc – Slope, deflection and radius of curvature – Differential equation for the elastic curve 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. and uniformly varying load.

UNIT-III
DEFLECTION OF BEAMS - II : Mohr’s theorems – Moment area method – Determination of slope and deflection for cantilever and simply supported beams subjected to point loads, U.D.L., Uniformly varying load - Application to simple cases including overhanging beams.

UNIT-IV

UNIT-V

UNIT-VI
UNSYMMETRICAL BENDING AND SHEAR CENTRE : Centroidal principal axes of section - Moment of inertia referred to any set of rectangular axes - Stress in beams due to unsymmetrical bending - Principal axes - Resolution of bending moment into two rectangular axes through the centroid - Location of neutral axis – Shear centre of channel section and unequal section.
UNIT-VII
FIXED BEAMS AND PROPPED CANTILEVERS: Introduction to statically indeterminate beams – Fixed end moment due to uniformly distributed load, point loads, uniformly varying load, couple and combination of loads - Shear force and Bending moment diagrams – Deflection of fixed beams - Effect of sinking of support - Effect of rotation of a support - Shear force and Bending moment diagrams of propped cantilever.

UNIT-VIII
CONTINUOUS BEAMS: Clapeyron’s theorem of three moments – Analysis of continuous beams with one or both ends fixed - Continuous beams with overhang.

TEXT BOOKS


REFERENCES

UNIT – I
BOUNDARY LAYER THEORY : Boundary layer concepts - Thickness of boundary layer - Characteristics of boundary layer along a thin flat plate - Vonkarmen momentum integral equation - Laminar and turbulent boundary layers (no derivation) - Laminar sub-layer separation of boundary layer - Control of boundary layer- Flow around submerged objects – Drag and lift - Magnus effect.

UNIT – II

UNIT – III

UNIT – IV
IMPACT OF JETS : Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes - Series of vanes - Jet striking centrally and at tip - Velocity triangles at inlet and outlet - Expressions for work done and efficiency - Applications to radial flow turbines.

UNIT – V

UNIT – VI
HYDRAULIC TURBINES – II : Governing of turbines - Surge tanks - Unit quantities and specific speed – Performance characteristics - Geometric similarity - Cavitation, causes, effects.
UNIT – VII

UNIT – VIII
HYDROPOWER ENGINEERING: Classification of hydropower plants – Load factor - Utilization factor - Capacity factor - Estimation of hydropower potential.

TEXT BOOKS

REFERENCES
II B.Tech. II Semester

10BT40103: REINFORCED CEMENT CONCRETE STRUCTURES - I

UNIT –I

UNIT –II

UNIT –III
BEAMS: Limit state design of singly reinforced, doubly reinforced, T and L beams for flexure.

UNIT – IV
SHEAR, TORSION AND BOND: Limit state design of section for shear and torsion – Concept of bond, anchorage and development lengths - I.S. Code provisions - Design of simply supported and continuous beams, including detailing.

UNIT – V
COLUMNS: Short and long columns under axial loads, uniaxial bending and biaxial bending – Slender columns – I S Code provisions.

UNIT –VI
FOOTINGS: Different types of footings – Design of isolated square, rectangular and circular footings.

UNIT – VII
SLABS: Design of one way slab - Two-way slab - Continuous slab using I S Coefficients.
UNIT – VIII
SERVICEABILITY : Limit state design of serviceability for deflection and cracking – I S Code provisions.

TEXT BOOKS

REFERENCES

Codes: IS 456-2000 code book is to be permitted into the examination hall.
UNIT – I
MASONRY AND FOUNDATIONS:

UNIT – II
BUILDING COMPONENTS: Lintels, arches, vaults, stair cases – Different types of floors - Concrete, mosaic, terrazzo 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 – III

UNIT – IV

UNIT – V
RESOURCE MANAGEMENT:
Machinery: Classification of construction equipment – Earth moving equipment - Excavation equipment - Hauling equipment - Earth compaction equipment - Hoisting equipment - Concreting plant and equipment – Time and motion study – Selection of equipment –
Task consideration – Cost consideration – Factors affecting the selection - Factors affecting cost owning and operating the equipment – Equipment maintenance.

UNIT – VI
PROJECT MANAGEMENT, BAR CHARTS AND MILESTONE CHARTS:

UNIT – VII
ELEMENTS OF NETWORK AND DEVELOPMENT OF NETWORK:

UNIT – VIII
PERT AND CPM:

TEXT BOOKS

REFERENCES
II B.Tech. II Semester

10BT3BS02 : ENVIRONMENTAL SCIENCES

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UNIT-I

**INTRODUCTION TO ENVIRONMENTAL SCIENCES:** Definition and concept of the term Environment – Various components of Environment – Abiotic and biotic – Atmosphere – Hydrosphere – Lithosphere – Biosphere – Inter relationships – Need for public awareness – Role of important National and International individuals and organizations in promoting Environmentalism.

UNIT-II

**NATURAL RESOURCES, CONSERVATION AND MANAGEMENT:** Renewable and Non renewable resources and associated problems – Forests: Deforestation, Causes, effects and remedies – Effects of mining, dams and river valley projects – case studies; Water resources: Water use and over exploitation – Conflicts over water – Large dams – benefits and problems; Food resources : World food problems – Adverse effects of modern agriculture – Fertilizer and pesticide problems; Land resources: Land degradation – Land slides- Soil erosion – desertification- water logging – salinity – Causes, effects and remedies; Mineral resources: Mining – Adverse effects; Energy resources: Growing needs – Renewable and Non renewable resources – Alternate resources: Coal, Wind, Oil, Tidal wave, Natural gas, Biomass and Biogas, Nuclear Energy, Hydrogen fuel, Solar - Impact on environment - Sustainable life styles.

UNIT-III


UNIT-IV

UNIT-V

UNIT-VI

UNIT-VII

UNIT-VIII
FIELD WORK/ ENVIRONMENTALIST’S DIARY / ASSIGNMENTS/ SEMINARS

TEXT BOOKS

REFERENCES
II B.Tech. II Semester
10BT40111 : SURVEYING LAB – II

LIST OF EXERCISES

A) THEODOLITE SURVEY

3. Finding out distance between two inaccessible points.
4. Trigonometric levelling - Measurement of heights and distances (Two Exercises)
5. Tacheometric surveying - Measurement of heights and distances (Two Exercises)
7. Setting out a circular curve by Double Theodolite method.
8. Setting out works for buildings and pipe lines.

B) TOTAL STATION SURVEY

9. Study of total station - Measurement of horizontal angles, vertical angles and distances
10. Determination of area using total station.
11. Determination of remote height using total station
12. Distance, gradient, and differential height between two inaccessible points using total station
13. Stake-out using total station
14. Traversing using total station
15. Contouring using total station
II B.Tech. II Semester
10BT40112 : FLUID MECHANICS AND HYDRAULIC MACHINERY LAB

LIST OF EXPERIMENTS

Any TWELVE experiments are to be conducted.

1. Calibration of venturimeter
2. Calibration of orificemeter
3. Determination of coefficient of discharge for a small orifice by a constant head method.
4. Determination of coefficient of discharge for an external mouth piece by variable head method.
5. Calibration of rectangular notch
6. Calibration of triangular notch
7. Determination of loss of head due to sudden contraction
8. Determination of loss of head due to sudden expansion
9. Determination of friction factor for pipes
10. Verification of Bernoulli’s equation.
11. Impact of jet on vanes
12. Study of hydraulic jump.
13. Performance test on Pelton wheel turbine
14. Performance test on Francis turbine
15. Performance test on Kaplan turbine.
16. Performance test on single stage centrifugal pump
17. Performance test on multi stage centrifugal pump
18. Performance test on reciprocating pump