

B.Tech. (Civil) 4th Semester (for 2017-18 admitted batch)

**SYLLABUS
OF
IV SEMESTER
B.TECH. (CIVIL ENGINEERING)
(FOR 2017-18 ADMITTED BATCH)**

B.Tech. (Civil) 4th Semester (for 2017-18 admitted batch)

4CEU01: STRENGTH OF MATERIALS–II (L-3 T-1)

Exam Hours: 3

Max. Marks: 150 (IA: 50, ETE: 100)

Credit: 4

CONTENTS	Hrs.
Introduction to objective, scope and outcome of the subject	1
Torsion: Elementary concepts of torsion, shear stress in solid and hollow circular shafts, angle of twist, power transmitted by a shaft, combined bending and torsion; Stiffness of springs, springs in series and parallel, close coiled helical springs.	5
Deflection of Beams: Differential relation between load, shear force, bending moment, slope deflection. Slope & deflection in determinate beams using double integration method, Macaulay's method, area moment method and conjugate beam method. Analysis of prop cantilever structures, Analysis of Indeterminate Structure using Area moment method, Conjugate beam method	8 5
Introduction to Indeterminate structures: Degrees of freedom per node, Static and Kinematic indeterminacy (i.e. for beams, frames & portal with & without sway etc.), Releases in structures, Maxwell's reciprocal theorem and Betti's theorem,	4
Fixed Beams & Continuous Beams: Analysis of fixed beams & continuous beams by three moments Theorem and Area moment method.	8
Introduction to Energy Methods: Strain energy for gradually applied, suddenly applied and impact loads, Strain energy due to axial loads, bending, shear and torsion;. Castiglione's theorems & their applications in analysis of determinate and redundant frames up to two degree of redundancy and trussed beams; Stresses due to temperature & lack of fit in redundant frames; deflection of determinate beams, frames using energy methods	6
Unit Load Method & its Applications: deflection of determinate beams and frames, analysis of determinate and redundant frames up to two degree of redundancy, lack of fit in redundant frames.	4
TOTAL	40

Suggested Readings:

1. *Strength of Materials & Mechanics of Structures: Vol. I* by Dr. B.C. Punmia Laxmi Publications (P) Ltd.
2. *Strength of Material* by Singer and Pytel, Harper Collins Publishers.
3. *Elements of Strength of Materials* by Timoshenko & Young, Mc Graw Hill Book Co.
4. *Mechanics of Structures* by Timoshenko & Gere, CBS Publishers and Distributers.
5. *Mechanics of Structures Vol. I & II* by S.B Junarkar, Charotar Publishing House.

B.Tech. (Civil) 4th Semester (for 2017-18 admitted batch)
4CEU02: HYDRAULICS AND HYDRAULIC MACHINES (L-3, T-1)

Exam Hours: 3

Max. Marks: 150 (IA: 50, ETE: 100)

Credit: 4

CONTENTS	Hrs.
Introduction to scope, objective and outcome of subject	1
Dimensional Analysis & Models: Dynamical Similarity and Dimensional Homogeneity Model experiment, geometric, Kinematic and Dynamic similarity. Reynold's, froudes, Weber's, Euler and Mach numbers. Distorted river models and undistorted models, proper choice of scale ratios. Scale effect.	3
Principle of dimensional analysis Rayleigh method, Buckingham theorem, applications of dimensional analysis to pipe Friction problems, resistance to motion of partially and fully submerged bodies and other simple problems. Ship model experiments.	4
Laminar Flow: Relation between shear & pressure gradient. Flow between plates & pipes. Equations for velocity distribution, pressure difference.	3
Turbulent Flow in pipes: Theories of Turbulence, Nikuradse's Experiments. Hydro dynamically smooth & rough boundaries. Laminar, Sub layer, Equations of velocity distribution and friction coefficient. Stanton Diagram, Moody's diagram.	5
Flow through channels: Uniform, Non-Uniform and variable flow. Resistance equations of Chezy, Mannring and Bazin. Section factor for uniform flow. Most Efficient rectangular, triangular and trapezoidal sections.	3
Equations of gradually varied flow in Prismatic channels. Limitation of its applicability and assumption made in its derivation. Specific energy of flow. Critical depth in prismatic channels. Alternate depths. Rapid, critical and sub critical Flow Mild, steep and Critical Slopes. Classification of surface curves in prismatic channels and elementary computation	5
Rapidly varied flow: Hydraulic jump or standing wave in rectangular channels. Conjugate or sequent depths Losses in jump, location of jump. Broad crested weirs for channel flow: Measurement, velocity distribution in open channels, parshall flume.	5
Impact of free Jets: Impact of a jet on a flat or a curved vane, moving and stationary vane, flow over radial vanes.	3
Centrifugal pumps and turbines: Volute and whirlpool chambers, Loses of head due to variation of discharge Manometric and Hydraulic efficiencies, Description of single and multistage pumps. Specific speed, characteristic curves. Model Test. Reaction and Impulse turbines, specific speed, Mixed flow turbines. Pelton wheel turbine, Francis turbine, propeller turbine and Kaplan turbine Efficiency, Characteristics of turbines. Basic principles of governing of turbines, Draft-tube, Selection of turbines, model tests.	8
TOTAL	40

Suggested Readings:

1. *Fluid Mechanics & Hydraulics* by Dr. K.R, Arora, Standard Publishers & Distributers, Delhi.
2. *Fluid Mechanics & Hydraulics* by John F.Douglas & Lynne B. Jack, Prentice Hall Inc.
3. *Fluid Mechanics & Hydraulics* by Dr. R.K. Bansal, Laxmi Publications (P) Ltd.
4. *Fluid Mechanics & Hydraulics* by Modi & Seth, Standard Publishers & Distributers, Delhi.
5. *Fluid Mechanics & Machinery* by C.S.P.Ojha, R.Berndtsson and P.N.Chandramauli, Oxford Publishers, Delhi.

B.Tech. (Civil) 4th Semester (for 2017-18 admitted batch)

4CEU03: CONCRETE TECHNOLOGY (L-3)

Exam Hours: 3

Max. Marks: 150 (IA: 50, ETE: 100)

Credit: 3

CONTENTS	Hrs.
Introduction to objective, scope and outcome of the subject	1
Ingredients of concrete: Cement: hydration of cement and its basic compounds, structure of hydrated cement, C-S-H gel, heat of hydration, gel-space ratio and its significance. Aggregates: types, physical properties and standard methods for their determination.	3
Concrete : Grade of concrete, proportioning of ingredients, water content and its quality for concrete, water/cement ratio and its role, Properties of fresh concrete including workability, air content, Flow ability, Segregation, Bleeding and Viscosity etc. - Factors affecting, methods of determination.	4
Properties of hardened concrete such as strengths, permeability, creep, shrinkage, factors influencing, Standard tests on fresh and hardened concrete as per IS code. Aggregate- cement interface, maturity concept.	4
NDT: Introduction and their importance. Application & use of Rebound Hammer, Ultra-sonic pulse velocity meter, Rebar & Cover meter, half cell potential meter, corrosion resistivity meter, core sampling.	4
Concrete Handling in Field: Batching, mixing, placing and transportation of concrete, equipment for material handling, various methods their suitability and precautions. Compaction of concrete: methods & equipment. Curing of concrete: various methods their suitability. Durability of concrete.	7
Concrete mix design (ACI, IS method), quality control for concrete.	3
Admixture in concrete: Chemical and mineral admixtures, their types and uses: water reducers, accelerator, retarders, water-proofing plasticizers, super plasticizers, air-entraining agents. Use of fly ash and silica fume in concrete, their properties and effect.	6
Form work: Requirements, their types and codal guidelines for the design. Typical formworks and shuttering/ cantering for Columns, beams, slabs, walls, arches and staircase. Slip and moving formwork.	4
Special types of concrete: Introduction to high strength concrete, high performance concrete, sulphate resisting concrete, under water concreting, self-compacting concrete, pumpable concrete: their salient properties and application.	4
TOTAL	40

Suggested Readings:

1. *Concrete Technology by Neville & Brooks, Pearson Education.*
2. *Concrete: Microstructure, Properties & Materials by Mehta P.K, Tata Mc Graw Hill.*
3. *Concrete Technology by M.S.Shetty, S.Chand & Co.*
4. *Concrete materials by Popovics, Standard Publishers.*
5. *Chemistry of Cement and Concrete by Peter C.Hewlett, Elsevier Butterworth Heinemann.*

B.Tech. (Civil) 4th Semester (for 2017-18 admitted batch)

4CEU04: SURVEYING (L-3)

Exam Hours: 3

Max. Marks: 150 (IA: 50, ETE: 100)

Credit: 3

CONTENT	Hrs.
Introduction to objective, scope and outcome the subject	1
LINEAR AND ANGULAR MEASUREMENTS Method of linear measurements, Correction to length measured with a chain/tape, Ranging a survey line; direct and indirect Angular measurement by compass, Designation of bearing, Traversing with tape and compass, Correction to measured bearing, Angular measurement by theodolite; Temporary adjustments, Method of horizontal angle measurement and vertical angle, Traverse computation, plotting of traverse and determining the closing error, Balancing traverse.	12
LEVELLING Measurements of elevations methods of levelling; direct/ differential, Indirect/ Trigonometrical, and Profile/Cross sectional levelling. Digital and Auto level, Errors in levelling, contours and contour lines; methods of contouring; direct and indirect, characteristics, uses, area and vol. measurements.	8
CURVE SURVEYING Elements of simple and compound curves, Types of curves, Elements of circular, reverse, and transition curves. Method of setting out simple, circular, transition and reverse curves, Types of vertical curves, length of vertical curves, setting out vertical curves. Tangent corrections.	5
TACHEOMETRY AND PHOTOGRAMMETRY SURVEYING Advantages of tacheometric surveying, different systems of tacheometric measurements, Stadia system of tacheometry, distance elevation formulae for horizontal sights. Determination of tacheometric constants, distance and elevation formulae for inclined sights with staff vertical. Introduction to basic concepts perspective geometry of aerial photographs, relief and tilt displacements, Terrestrial Photogrammetry, flight planning	8
SETTING OUT WORKS & MODERN FIELD SURVEY SYSTEMS Instruments and methods for laying out buildings, setting out culverts, setting out sewer lines. Principle of E.D.M. (Electronic Distance Measurements), Modulation, Types of E.D.M., Distomat, Total station, parts of total station, advantages and application.	6
TOTAL	40

Suggested Readings:

1. *Surveying Volume I* by Dr. B.C. Punamia Laxmi Publications (P) Ltd.
2. *Plane Surveying* by Dr. A.M. Chandra, New Age International.
3. *Surveying Volume –I & II* by Dr. K.R. Arora Standard Book House Delhi
4. *Surveying & Leveling* by Subramanian Oxford University Press.
5. *Surveying Vol.1* by S.K.Duggal Tata Mc Graw Hill, Delhi.

B.Tech. (Civil) 4th Semester (for 2017-18 admitted batch)

4CEU05: QUANTITY SURVEYING & VALUATION (L- 3)

Exam Hours: 3

Max. Marks: 150 (IA: 50, ETE: 100)

Credit: 3

CONTENTS	Hrs.
Introduction to scope, objective and outcome of subject	1
Introduction: Purpose and importance of estimates, principles of estimating. Methods of taking out quantities of items of work. Mode of measurement, measurement sheet and abstract sheet; bill of quantities. Types of estimate, plinth area rate, cubical content rate, preliminary, original, revised and supplementary estimates for different projects.	8
Rate Analysis: Task for average artisan, various factors involved in the rate of an item, material and labor requirement for various trades; preparation for rates of important items of work. Current schedule of rates. (C.S.R.)	8
Estimates: Preparing detailed estimates of various types of buildings, R.C.C. works, earth work calculations for roads and estimating of culverts, Services for building such as water supply, drainage and electrification.	10
Cost of Works: Factors affecting cost of work, overhead charges, Contingencies and work charge establishment, various percentages for different services in building.	5
Valuation: Purposes, depreciation, sinking fund, scrap value, year's purchase, gross and net income, dual rate interest, methods of valuation, rent fixation of buildings.	8
TOTAL	40

Suggested Readings:

1. *Estimating & costing* by B.N.Dutta, UBS Publishers & Distributers.
2. *Estimating Costing Specification & Valuation in Civil Engg.* M .Chakroborty, Bhakti Vedanta, Book Trust, delhi.
3. *Quantity Surveying and Valuation* by S.C. Rangawala , Charotar Publishing House.

B.Tech. (Civil) 4th Semester (for 2017-18 admitted batch)

4CEU06: BUILDING PLANNING (L-2)

Exam Hours: 3

Max. Marks: 150 (IA: 50, ETE: 100)

Credit: 2

CONTENTS	Hrs.
Introduction to scope, objective and outcome of subject	1
Introduction: Types of buildings, criteria for location and site selection, site plan and its detail.	2
Sun Consideration : Different methods of drawing sun chart, sun shading devices, design of louvers.	3
Climatic and comfort Consideration: Elements of climate, global climate, climatic zones of India, thermal comfort, bi climatic chart,	3
Orientation: Meaning, factors affecting orientation, orientation criteria for tropical climate.	1
Building Bye Laws and NBC Regulations: Objective of by-laws, regulation regarding; means of access, lines of building frontages, covered area, floor area ratio, open spaces around buildings, height & sizes of rooms, plinth regulation.	3
Principles of Planning: Different factors affecting planning viz-aspect, prospect, furniture requirement, roominess, grouping, circulation, elegance, privacy etc.	3
Vastu Shastra In Modern Building planning: Factors considered in Vastu, site selection, orientation, planning and design of residential buildings, school/hospital	3
Functional Design And Accommodation Requirements Of Non Residential Buildings: viz- school buildings, rest house, primary health centers, post office etc.	3
Services in Buildings (A) Lighting and ventilation, doors and windows, lifts. (B) Acoustics, sound insulation and noise control. (C) Fire-fighting provisions	6
TOTAL	28

Suggested Readings:

1. *Manual of Tropical Housing and Buildings* by Koenigs Berger Orient and Longman.
2. *Building Drawing* by M.G.Shah, C.M. Kala, S.Y.Patki , Tata Mc Graw Hills.
3. *SP.41 (S&T)- Handbook on functional Requirements of Buildings Part-I*
4. *National Building Code, BIS.*
5. *Architecture Drafting and Design* by Donald E. Helper, & Paul I Wallach.
6. *Time Saver Standards for Housing and Residential Development* by DE Chiara, Tata Mc Graw Hill, Delhi.

B.Tech. (Civil) 4th Semester (for 2017-18 admitted batch)

TYPICAL LIST OF EXPERIMENTS FOR LABS

4CEU11: SURVEYING LAB (P-3)

Credit: 2

Max. Marks: 75 (IA:50, ETE:25)

1. Linear Measurement by Tape:
 - a. Ranging and Fixing of Survey Station.
 - b. Plotting Building Block by offset with the help of cross staff.
2. Compass Survey: Using Surveyor's and Prismatic compass
 - a. Measurement of bearing of lines
 - b. Adjustment of included angles of compass traverse.
3. Levelling: Using Tilting/ Dumpy/ Automatic Level
 - a. To determine the reduced levels in closed circuit.
 - b. To carry out profile levelling and plot longitudinal and cross sections for road.
4. Theodolite Survey: Using Vernier Theodolite
 - a. To carryout temporary adjustment of Theodolite & Measurement of horizontal and vertical angle: by method of repetition and method of Reiteration.
 - b. To measure and adjust the angles of a braced quadrilateral.
5. Trigonometric Levelling: To determine the Height of an object by trigonometric levelling:
 - a. By using Instruments in same vertical plane.
 - b. By using Instruments in different vertical planes.
6. Tacheometry Survey:
 - a. To determine the tachometric constant.
 - b. To determine the horizontal and vertical distance by tachometric survey.
7. To study the various electronic surveying instruments like EDM, Total Station etc.

One-week Survey Camp for topographic/ project survey/Contouring be arranged before or after Term End Exam.

B.Tech. (Civil) 4th Semester (for 2017-18 admitted batch)

TYPICAL LIST OF EXPERIMENTS FOR LABS

4CEU12: BUILDING DRAWING-I (P-3)

Credit: 2

Max. Marks: 75 (IA:50, ETE:25)

- 1- To plan and draw working drawing of a Residential building with following detail.
 - (a) Site plan
 - (b) Foundation plan
 - (c) Plan
 - (d) Two sectional elevations
 - (e) Front elevation
 - (f) Furniture plan
 - (g) Water supply and sanitary plan
 - (h) Electric fitting plan
- 2- To plan and draw a Primary Health Center
- 3- To plan and draw a Primary School
- 4- To plan and draw a Rest House
- 5- To plan and draw a Post Office
- 6- To plan and draw a Bank
- 7- To plan and draw a College Library
- 8- To plan and draw a Cinema Theatre

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TYPICAL LIST OF EXPERIMENTS FOR LABS

4CEU13: CONCRETE TECHNOLOGY LAB (P-2)

Credit: 1

Max. Marks: 75 (IA:50, ETE:25)

1. Test on Cement
 - a. fineness of Cement by sieving through a 90 micron I.S. Sieve.
 - b. Standard Consistency
 - c. Specific Gravity
 - d. Initial & Final Setting Time
 - e. Compressive Strength
 - f. Soundness of cement by Le-chatelier apparatus
2. Test on Aggregates:
 - a. Specific gravity of fine aggregate (sand) by Pycnometer.
 - b. Bulking of fine aggregate
 - c. Specific gravity of Coarse aggregate
 - d. Sieve Analysis of Coarse and Fine Aggregates
3. To design concrete mix of M-20 grade without admixture in accordance with I S recommendations
4. To determine the workability of given concrete mix by slump test, Compaction Factor Test
5. To determine the Compressive Strength and Flexural Strength of Concrete.
6. To design concrete mix of M-40 grade with admixture in accordance with I S recommendations.
7. To determine the optimum dose of super plastisizers by by Flow table test..
8. To determine the Elastic Modulus of Concrete.
9. To determine the Permeability of Concrete.
10. NDT

B.Tech. (Civil) 4th Semester (for 2017-18 admitted batch)

TYPICAL LIST OF EXPERIMENTS FOR LABS

4CEU14: HYDRAULICS AND HYDRAULIC MACHINES LAB (P-2)

Credit: 1

Max. Marks: 75 (IA:50, ETE:25)

1. To determine the minor losses.
2. To determine the friction factor.
3. To determine Cd of Broad crested wier.
4. To verify the momentum equation.
5. To determine the discharge of venturimeter.
6. To determine Manning's & Chezy's coefficient of roughness for the bed of a given flume.
7. To plot characteristics curve of hydraulic jump.
8. To plot characteristics curve of Pelton Wheel.
9. To plot characteristics curve of Centrifugal Pump.