

V SEMESTER, B.Tech.-Civil

Sr.No	Course Code	Subject	L-T-P	Credits
1	CE 301	Design of Structure-I	3-1-0	4
2	CE 302	Geotechnical Engineering-I	3-0-1	4
3	CE 303	Environmental Engineering-I	3-0-1	4
4	CE 304	Concrete Technology-I	3-0-1	4
5	CE 305	Building construction and Drawing-I	3-0-1	4
6	CE 306	Engineering Geology	3-0-1	4
7	CE307	Structural Analysis-II	3-0-0	3
<i>Total Contact Hrs= 21 hrs Lectures+ 1 hrs. Tutorial+ 10 hrs. Lab(single group,it will vary depending upon no of groups)=32 Hrs</i>			TOTAL	27

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COURSE CONTENTS

Third Year (I st Semester)

L T P C

3 1 0 4

Course Code: CE-301

Course Name: Design of Structure-I

Objective: This course discusses methods for designing columns, footings, beams and slabs using limit state method as per Indian Standards.

UNIT –I

Introduction Materials, Constituents of concrete, recommendation of IS 456 – 2000, grades of concrete, elastic theory, design constants; singly reinforced beam.

UNIT –II

Introduction of Limit State Design : Concepts of limit state design – Basic statistical principles – Characteristic loads – Characteristic strength – Partial load and safety factors – representative stress-strain curves for cold worked deformed bars and mild steel bars. Assumptions in limit state design – stress - block parameters – limiting moment of Resistance

UNIT –III

Beams : Limit state analysis and design of singly reinforced, doubly reinforced, T and L beam sections.

UNIT – IV

Shear, Torsion and Bond : Limit state analysis and design of section for shear and torsion – concept of bond, anchorage and development length, I.S. code

provisions. Design examples in simply supported and continuous beams, detailing.

UNIT – V

Short and Long columns – under axial loads ,uniaxial bending and biaxial bending – Braced and un-braced columns – I S Code provisions.

UNIT –VI

Footings : Different types of footings – Design of isolated, square, rectangular and circular footings.

UNIT – VII

Design of Two-way slabs, one way slab, continuous slab Using I S Coefficients .

UNIT –VIII

Limit state design for serviceability for deflection, cracking and codal provision.

TEXT BOOKS:

1. Reinforced concrete design by S.Unnikrishna Pillai & Devdas Menon, Tata Mc.Graw Hill, New Delhi.
2. Fundamentals of reinforced concrete by N.C. Sinha and S.K Roy, S. Chand publishers
3. Reinforced concrete design by N. Krishna Raju and R.N. Pranesh, New age International Publishres, New Delhi
4. Limit State Design by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi

REFERENCES :

1. Fundamentals of Reinforced concrete design by M.L. Gambhir, Printice Hall of India Private Ltd., New Delhi.
2. Reinforced concrete structural elements – behaviour, Analysis and design by P.Purushotham, Tata Mc.Graw-Hill, 1994.
3. Design of concrete structures – Arthus H.Nilson, David Darwin, and Chorles W. Dolar, Tata Mc.Graw-Hill, 3rd Edition, 2005.
4. Reinforced concrete structures, Vol.1, by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi
5. Reinforced concrete structures – I.C. Syal & A.K.Goel, S.Chand Publishers
6. Limit state designed of reinforced concrete – P.C.Varghese, Printice Hall of India, New Delhi

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COURSE CONTENTS

Third Year (I Semester)

L T P C

3 0 1 4

Course Code: CE-302

Course Name: Geotechnical Engineering-I

Objective: *This course discusses soil formation, gradation of soil and different properties of soil.*

1. Origin & formation of Soil :-

Types, Typical Indian Soil, Fundamental of Soil Structure, Clay Mineralogy.

2. Soil as a Three Phase System :-

Weight- Volume Relationship, Measurement of Physical Properties of Soil: Insitu Density, Moisture Content, Specific Gravity, Relative Density.

3. Particle Size Distribution :

By Sieving, Sedimentation Analysis. (3L) dowel bars; Pavement construction and maintenance; Stabilised roads; Drainage.

4. Index Properties of Soil :-

Attarberg's Limits- Determination of Index Properties of Soil by Casagrande's Apparatus, Cone Penetrometer, Soil Indices.

5. Soil Classification :-

As per Unified Classification System, As per IS Code Recommendation, AASHTO Classification, Field Identification of Soil, Consistency of Soil.

6. Soil Moisture :-

Darcy's Law, Capillarity in Soil, Permeability, Determination of Coefficient of Permeability of Soil in Laboratory, Permeability for Stratified Deposits.

7. Effective Stress Principles:-

Definition of Effective Stress, Estimation of Effective Pressure Due to different Conditions

8. Two Dimensional Flow Through Soil :-

Laplace's Equations, Flow nets, Flow Through Earthen Dam, Estimation of Seepage, Uplift due to Seepage, Design of Fillers, Critical Hydraulic Gradient, Quick Sand Condition.

9. Stress Distribution In Soil :-

Bousinesq's & Westergaard's Assumption & Formula for Determination of Stress due to Point Loads, Stress Beneath Line, Strip & Uniformly Loaded Circular - Pressure Bulbs, Newmark's charts- Use For Determination of Stress due to Arbitrarily Loaded Areas, Contact Stress Distribution for various types of Loading & on Different Types of Soils.

References :-

1. Principles of Soil Mechanics & Foundation Engineering by – V.N.S. Murthy (UBS Publishers).
2. Soil Mechanics & Foundation Engineering by – B.C. Punmia (Laxmi Publications).
3. Introduction of Soil Mechanics by- B.M. Das (Galgotia Publications).
4. Soil Mechanics by – T.W. Lambe & R.V. Whitman.
5. SP-36 (Part – I & Part - II).
6. Basic & Applied Soil Mechanics by- Gopal(Ranjan & A.S.R. Rao (Willes Eastern Ltd.)

Laboratory Experiment:

1. Field identification of different type of soil different type of soil as per Indian standards [collection of field samples and identifications without laboratory testing], determination of natural moisture content.

2. Determination of specific gravity of i) Cohesionless ii) cohesive soil
3. Determination of Insitu density by core cutter method.
4. Determination of Insitu density by sand replacement method.
5. Grain size distribution of cohesionless soil by sieving.
6. Grain size distribution of finegrained soil by hydrometer analysis.
7. Determination of Atterberg's limits (liquid limit, plastic limit & shrinkage limit).
8. Determination of co- efficient of permeability by constant head pemeameter (coarse grained soil).
9. Determination of co- efficient of permeability by variable head parameter (fine grained soil).

References:

1. Soil Testing by T.W. Lamb (John willey)
2. 2. SP-36 (Part I- & Part – II)
3. Measurement of Engineering properties of soil by E Saibaba Reddy & K. Rama Sastri. (New age International publication).

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COURSE CONTENTS

Third year (I Semester)

L T P C

3 0 1 4

Course Code: CE-303

Course Name: Environment Engineering-I

Objective: *This course discusses about the water collection system and water treatment process to distribute the water for domestic and industrial purpose.*

1. Water demands: Types of demands for domestic, commercial, industrial, fire, public use and losses, per capita demand, variations in demand, factors affecting demand. Design period. Forecasting population different methods and their suitability.

2. Sources of water: surface water: rivers, streams, lakes and impounded reservoirs, determination of quantity of water in the above sources. Under ground sources Springs, wells and infiltration galleries, measurement of yield of open wells., tube wells, artesian wells and infiltration galleries.

3. Quality of water: Pollution and contamination of water. Sources, classification and prevention of pollution. Water borne diseases. Impurities in water. Water analysis Physical chemical and biological tests, standards for potable water.

4. Collection and conveyance of water: Intakes-river, lake, reservoir and canal. Hydraulic design of pressure pipes. Hydrostatic tests on pipes.

5.Treatment of water: Aeration, Plain sedimentation, sedimentation with coagulation- coagulant feeding devices, optimum dosage of coagulant. Filters and their different types, disinfection, water softening. The functional design of treatment unit. Removal of iron, manganese, colour, odour and taste, Fluoridation, desalination.

6.Distribution: Systems of distribution, layout of distribution system, Pressure in distribution system, Storage and distribution reservoirs. Capacity of reservoirs. Type of reservoirs. Detection and presentation of leakages.

Experiments :

pH, colour , turbidity

Solids – suspended , dissolved , settleable and volatile ,

Dissolved oxygen, BOD , COD

Determination of fluorides and Iron

Hardness , Chlorides

Nitrite – Nitrogen and Ammonical – Nitrogen

Available chlorine in bleaching powder, Residual chlorine in water &

Chlorine demand .

Bacteriological quality of water – presumptive test, confirmative test and Determination of MPN

Jar Test.

References :

Environmental Engineering S.K. Garg -Khanna Pub

Water Supply & Waste Water Disposal –G . M . Fair ,J . C . Geyer ,D . A Okun . –Jhon Wiley & Sons .

Water Supply Engineering Volume I by Kshirasagar.

Manual of Water Supply & treatment - A Government of India Publication.

Water Supply and Sanitary Engineering By G.S.Birdi

Water supply engineering by Babbit and Doland

Water supply sanitary engineering by G.S. Birdi

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COURSE CONTENTS

Third Year (I semester)

L T P C

3 0 1 4

Course Code: CE-304

Course Name: Concrete Technology

Objective: *This course is to familiarize students with the basic constituents of concrete, its properties and methods of testing concrete.*

1. Concrete as a Structural Material, Good Concrete Manufacture of Portland Cement, Chemical Composition of Cement, Hydration of Cement, Heat of Hydration and Strength, Tests on Cement and Cement Paste – fineness, consistency, setting time, soundness, strength.

2. Types of Portland Cement – ordinary, Rapid hardening, low-heat, sulphate resisting, Portland slag, Portland pozzolana, super sulphated cement, white cement

3. Aggregates – Classification, Mechanical and Physical Properties, Deleterious Substances, Alkali-Aggregate Reaction, Sieve Analysis, Grading Curves, Fineness modules, Grading Requirements. Testing of Aggregates – Flakiness, Elongation Tests, Aggregate Crushing Value, Ten Percent Fines Value, Impact Value, Abrasion Value. Quality of Water – Mixing Water, Curing Water, Harmful Contents.

4. Properties of Fresh Concrete – Workability, Factors Affecting Workability, Slump Test Compacting Factor Test, Kelly Ball Test, Flow Table Test, Segregation, Bleeding, Setting Time, Mixing and Vibration of Concrete, Mixers and Vibrators, curing, Methods, Maturity.

5. Strength of Concrete – Water/Cement ratio, Gel/Space ratio, Strength in Tension, Compression, Effect of Age on Strength, Relation between Compressive and Tensile Strength, Fatigue Strength, Stress Strain Relation and Modules of Elasticity, Poisson's Ratio, Shrinkage and Creep, Compression Test on Cubes, Cylinders, Non-Destructive Tests.

6. Admixtures – different types, effects, uses, Retarders and Super plasticizers. Mix Design by I.S. Code method.
Light-weight, Polymer and Fibre-reinforced concrete.

References:

1. Concrete Technology by M.L. Gambhir (Tata McGraw Hill Publishing Co. Ltd.)
2. Concrete Technology by M.S. Shetty (S.Chand)
3. Text book of Concrete Technology by P.D. Kulkarni (Tata McGraw Hill Publishing Co. Ltd.)
4. Concrete Technology by A.R. Santakumar

Laboratory Experiment

Tests on cement – specific gravity, fineness, soundness, normal consistency, setting time, compressive strength on cement mortar cubes.

Tests on fine aggregate – specific gravity, bulking sieve analysis, fineness modulus, moisture content, bulk density, voids and deleterious materials.

Tests on coarse aggregate - specific gravity, sieve analysis, fineness modulus, bulk density and voids. Tests on bricks and tiles (Roofing and Flooring) - Water absorption, breaking loads.

Tests on Concrete & Steel- Fresh Concrete Workability : Slump, Vee-Bee, Compaction factor tests Hardened Concrete: Compressive strength on Cubes, split Tensile Strength, Static modulus of elasticity, Flexure tests , Non destructive testing . Mix Design of Concrete.
Tests on Steel bars–Tension Test- Bend & rebend test –Code provisions.

References:

BIS on testing of cement, fine and coarse aggregates, Bricks and tiles.

Laboratory manual of concrete testing (Part I) – V.V Sastry and M. L. Gambhir, BIS Codes on Concrete, Steel.

Laboratory manual on Concrete Testing (Part II) V.V.Sastry and M.L.Gambhir Highway Materials Testing – S.K. Khanna and C.E.G Justo

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COURSE CONTENTS

Third Year (1st Semester)

L T P C

3 0 1 4

Course Code: CE 305

Course Name: Building Construction and Drawing

Objective: This course discusses the different materials used in building construction, the various structural building components, the methods for detailing various types of buildings with all specifications, building bye laws and regulations.

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.

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.

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.

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.

MASONARY :

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

FOUNDATIONS:

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

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.

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.

Building Byelaws and Regulations:

Introduction – Terminology – Objectives of building byelaws – Floor area ratio (FAR) – Floor space Index (FSI) – Principles underlying building byelaws – classification of bye buildings – Open space requirements – built up area limitations – Height of Buildings – Wall thickness – lighting and ventilation requirement.

Residential Buildings: Minimum standards for various parts of buildings – requirements of different rooms and their grouping – characteristics of various types of residential buildings.

Public Buildings: Planning of Educational institutions, hospitals, dispensaries, Office buildings, banks, industrial buildings, hotels and motels, buildings for recreation.

SIGN CONVENTIONS AND BONDS: Brick, Stone, Plaster, Sand filling, Concrete, Glass, Steel, Cast iron, Copper alloys, Aluminium alloys etc., Lead, Zinc, tin, white lead etc., Earth, Rock, Timber and Marble. English bond & Flemish bond odd & even courses for one, one and half, two and two and half brick walls in thickness at the junction of a corner.

DOORS WINDOWS, VENTILATORS AND ROOFS: Panalled Door – paneled and glazed door, glazed windows – paneled windows – Swing ventilator – Fixed ventilator-Couple roof – Collar roof – Kind Post truss – Queen post truss.

SLOPED AND FLAT ROOF BUILDINGS

Given line diagram with specification to draw, plan, sections section and elevation.

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
4. Building construction: a textbook for engineering students by Rangwala. S.C., K.S. Rangwala, P.S. Rangwala, Charotar Publishing House

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

Laboratory work:

Drawing sheets :

1. Sign conventions and bonds
2. Detailed Residential Building Drawing with plan, elevation and Sectional View
3. Detailed Industrial Building Drawing with plan, elevation and Sectional View
4. Different components of Building

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COURSE CONTENTS

Second year (IST Semester)

L T P C

3 0 1 4

Course Code: CE-306

Course Name: Engineering Geology

Objective *This course will help students to understand the Geographic properties of various materials like rocks and minerals.*

1. Geology and its importance in Civil Engineering.

2. Mineralogy:

Definition, internal and external structure of minerals, study of crystals, Classification and physical properties of minerals.

Classification of rocks -

a) Igneous rocks: Origin, mode of occurrence, forms & texture, classification and engineering importance.

b) Sedimentary rocks: Process of sedimentation, classification and engineering importance.

c) Metamorphic rocks: Agents and types of metamorphism, classification and engineering importance.

Weathering of rocks: Agents and kinds of weathering, soil formation & classification based on origin. .

3. Geological work of rivers:

Origin and stages in the system, erosion, transportation and deposition.

4. Structural geology:

Introduction to structural elements of rocks, dip & strike, definition, description, classification of folds, faults and joints, importance of geological structures in Civil Engineering.

5. Earthquakes and seismic hazards:

Causes and effects, seismic waves and seismographs, Mercalli's intensity scale and Richter's scale of magnitude.

6. Engineering properties of rocks:

Porosity, permeability, compressive strength, tensile strength and abrasive resistance.

Rocks as construction materials: Qualities required for building and ornamental stones, foundations, concrete aggregate, railway ballast, road metal, pavement, flooring and roofing.

7. Geophysical exploration:

Methods of Geophysical Exploration, electrical resistivity method field procedure-sounding and profiling, electrode configuration, interpretation of resistivity data. Geophysical surveys in ground water and other Civil Engg. Projects.

Applied Geology: Surface and subsurface geological and geophysical investigations in major Civil Engg.

Projects. Geological studies of Dams and reservoir sites, Geological studies for selection of tunnels and underground excavations.

Landslides: Types of landslides, causes, effects and prevention of landslides.

Practical Work

Geology Lab

1. Study of crystals with the help of crystal models
2. Identification of Rocks and Minerals [Hand Specimens]
3. Microscopic study of Rocks and minerals

4. Study of Geological maps, interpretation of geological structures

5. Thickness problems, Bore-hole Problems

Reference Books:

1. Engineering and General Geology by Parbin Singh, Fourth edition. Katson publishing house Delhi 1987.

2. Engineering Geology for Civil Engineers – D. Venkat Reddy, Oxford, IBH, 1995.

3. Tyrell: Principles of petrology, 1972, Asia, Bombay.

4. Marland P. Billings: Structural Geology, fourth edition, 1975, Wiley eastern Prentice-Hall, U.S.A. 1972.

5. Todd D.K. Ground Water hydrology. John Wiley & Sons, Second edition, 1980.

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COURSE CONTENTS

Third year (I Semester)

L T P C

3 0 0 3

Course Code: CE-307

Course Name: Structural Analysis-II

Objective: This course will help students analyze indeterminate structures, and identify the various types of actions and deformations occurring in indeterminate structures under different loading conditions.

1. Arches: Introduction. Three hinged arch-analysis and influence line. Two hinged arch and fixed arch --application of unit load method, Castigliano's method and elastic center method, Influence line for arches.
2. Portal frame: Solution by- unit load method, Castigliano's method.
3. Moment distribution method - solution of continuous beam, effect of settlement and rotation of support, frames with or without side sway.
4. Slope Deflection Method – Method and application in continuous beams and Frames.
5. Cables & Suspension bridges with three hinged stiffening girders.
6. Curved beams- analysis
Hooks, Rings and Bow girders.
7. Un-symmetrical bending. Column analogy –method, application
Stiffness and carry over factors for non-prismatic members.

8.Kani's method: application to indeterminate beams and frames.

References:

Theory of structures: by S.P.Timoshenko

Theory of structures: by S.Ramamurthum.

Mechanics of structures: by Thadani

Indeterminate structural analysis: by Kinney

Statically indeterminate structures: by C.K.Wang

Basic structural analysis: by C.S. Reddy

Matrix method of structural analysis: by M.B.Kanchi

Structural analysis – A matrix approach by G.S.Pandit and Gupta

Theory of structures: by Vazirani and Rathwani Vol. II and Vol. III.

Intermediate structural Analysis: by Wang.

Structural Analysis Vol.II: by S.S. Bhavikatti.

