

## SYLLABUS

### Civil Engineering

<b>Class</b>	<b>Diploma</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Semester/Year</b>	<b>3<sup>rd</sup> sem /2<sup>nd</sup> year</b>	<b>2</b>	<b>-</b>	<b>-</b>	<b>2</b>
<b>Subject Name</b>	<b>Construction Materials</b>				
<b>Subject Code</b>	<b>DCE20S301</b>				
<b>Paper</b>	<b>English</b>				
	<b>Hindi</b>				
<b>Max. Marks</b>	<b>100</b>				

#### Course Objectives

Following are the objectives of this course:

1. To learn about various construction materials, and understand their relevant characteristics.
2. To be able to identify suitability of various materials for different construction purposes.
3. To know about natural, artificial, and processed materials available for various purposes of construction activities.

#### Course Outcomes

After competing this course, student will be able to:

- CO1:** Identify relevant construction materials.  
**CO2:** Identify relevant natural construction materials.  
**CO3:** Select relevant artificial construction materials.  
**CO4:** Select relevant special type of construction materials.  
**CO5:** Identify and use of processed construction materials.

<b>Unit</b>	<b>Syllabus</b>	<b>Periods</b>
<b>UNIT-I</b>	Overview of Construction Materials: Scope of construction materials in Building Construction, Transportation Engineering, Environmental Engineering, Irrigation Engineering (applications only). Selection of materials for different civil engineering structures on the basis of strength, durability, Eco friendly and economy. Broad classification of materials – Natural, Artificial, special, finishing and recycled.	<b>12</b>

<b>UNIT-II</b>	Natural Construction Materials: Requirements of good building stone; general characteristics of stone; quarrying and dressing methods and tools for stone. Structure of timber, general properties and uses of good timber, different methods of seasoning for preservation of timber, defects in timber, use of bamboo in construction. Asphalt, bitumen and tar used in construction, properties and uses. Properties of lime, its types and uses. Types of soil and its suitability in construction. Properties of sand and uses. Classification of coarse aggregate according to size.	<b>8</b>
<b>UNIT-III</b>	Artificial Construction Materials: Constituents of brick earth, Conventional / Traditional bricks, Modular and Standard bricks, Special bricks –fly ash bricks, Characteristics of good brick, Field tests on Bricks, Classification of burnt clay bricks and their suitability, Manufacturing process of burnt clay brick, fly ash bricks, Aerated concrete blocks. Flooring tiles – Types, uses. Manufacturing process of Cement - dry and wet (only flow chart), types of cement and its uses, field tests on cement. Pre-cast concrete blocks- hollow, solid, pavement blocks, and their uses. Plywood, particle board, Veneers, laminated board and their uses. Types of glass: soda lime glass, lead glass and borosilicate glass and their uses. Ferrous and non-ferrous metals and their uses.	<b>10</b>
<b>UNIT-IV</b>	Special Construction Materials: Types of material and suitability in construction works of following materials: Water proofing, Termite proofing; Thermal and sound insulating materials. Fibers – Types –Jute, Glass, Plastic Asbestos Fibers, (only uses). Geo-polymer cement: Geo-cement: properties, uses.	<b>10</b>
<b>UNIT-V</b>	Processed Construction Materials: Constituents and uses of POP (Plaster of Paris), POP finishing boards, sizes and uses. Paints- whitewash, cement paint, Distempers, Oil Paints and Varnishes with their uses. (Situations where used). Industrial waste materials- Fly ash, Blast furnace slag, Granite and marble polishing waste and their uses. Agro waste materials - Rice husk, Bagasse, coir fibres and their uses. Special processed construction materials; Geo-synthetic, Ferro Crete, Artificial timber, artificial sand and their uses.	<b>12</b>

**Text Books:**

1. Ghose, D. N., Construction Materials, Tata McGraw Hill, New Delhi.
2. S.K. Sharma, Civil Engineering Construction Materials, Khanna Publishing House, Delhi.
3. Varghese, P.C., Building Materials, PHI learning house, New Delhi.

**Reference Books:**

1. Rangwala, S.C., Engineering Materials, Charator publisher, Ahmedabad.
2. Somayaji, Shan, Civil Engineering Materials, Pearson education, New Delhi.
3. Rajput, R.K, Engineering Materials, S. Chand and Co., New Delhi.
4. Sood H., Laboratory Manual on Testing of Engineering Materials, New Age Publishers, New Delhi.

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### Civil Engineering

<b>Class</b>	<b>Diploma</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
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<b>Subject Name</b>	<b>Basic Surveying</b>				
<b>Subject Code</b>	<b>DCE20S302</b>				
<b>Paper</b>	<b>English</b>				
	<b>Hindi</b>				
<b>Max. Marks</b>	<b>100</b>				

#### Course Objectives

Following are the objectives of this course:

1. To understand types of surveying works required.
2. To know the types of method and equipments to be used for different surveys.
3. To know the use and operational details of various surveying equipments.

#### Course Outcomes

After competing this course, student will be able to:

- CO1:** Select the type of survey required for given situation.  
**CO2:** Compute area of open field using chain, tape and cross staff.  
**CO3:** Conduct traversing in the field using chain and compass.  
**CO4:** Use levelling instruments to determine reduced level for preparation of contour maps.  
**CO5:** Use digital planimeter to calculate the areas.

<b>Unit</b>	<b>Syllabus</b>	<b>Periods</b>
<b>UNIT-I</b>	Overview and Classification of Survey: Survey- Purpose and Use. Types of surveying- Primary and Secondary, Classification: Plane, Geodetic, Cadastral, Hydro- graphic, Photogrammetry and Aerial. Principles of Surveying. Scales: Engineer's scale, Representative Fraction (RF) and diagonal scale.	<b>8</b>

<b>UNIT-II</b>	Chain Surveying: Instruments used in chain survey: Metric Chain, Tapes, Arrow, Ranging rod, Line ranger, Off- set rod, Open cross staff, Optical square. Chain survey Station, Base line, Check line, Tie line, Offset, Tie station. Ranging: Direct and Indirect Ranging. Methods of Chaining, obstacles in chaining. Errors in length: Instrumental error, personal error, error due to natural cause, random error. Principles of triangulation. Types of offsets: Perpendicular and Oblique. Conventional Signs, Recording of measurements in a field book.	<b>10</b>
<b>UNIT-III</b>	Compass Traverse Survey: Compass Traversing- open, closed. Technical Terms: Geographic/ True Magnetic Meridians and Bearings, Whole Circle Bearing system and Reduced Bearing system and examples on conversion of given bearing to another bearing (from one form to another), Fore Bearing and Back Bearing, Calculation of internal and external angles from bearings at a station, Dip of Magnetic needle, Magnetic Declination. Components of Prismatic Compass and their Functions, Methods of using Prismatic Com- pass- Temporary adjustments and observing bearings. Local attraction, Methods of correction of observed bearings - Correction at station and correction to included angles. Methods of plotting a traverse and closing error, Graphical adjustment of closing error.	<b>12</b>
<b>UNIT-IV</b>	Levelling and Contouring: Basic terminologies: Level surfaces, Horizontal and vertical surfaces, Datum, Bench Marks- GTS, Permanent, Arbitrary and Temporary, Reduced Level, Rise, Fall, Line of collimation, Station, Back sight, Fore sight, Intermediate sight, Change point, Height of instruments. Types of levels: Dumpy, Tilting, Auto level, Digital level, Components of Dumpy Level and its fundamental axes, Temporary adjustments of Level. Types of Leveling Staff: Self-reading staff and Target staff. Reduction of level by Line of collimation and Rise and Fall Method. Leveling Types: Simple, Differential, Fly, Profile and Reciprocal Leveling. Contour, contour intervals, horizontal equivalent. Uses of contour maps, Characteristics of contours, Methods of Contouring: Direct and indirect.	<b>12</b>
<b>UNIT-V</b>	Measurement of Area and Volume: Components and use of Digital planimeter. Measurement of area using digital planimeter. Measurement of volume of reservoir from contour map.	<b>10</b>

**Text Books:**

1. Punmia, B.C; Jain, Ashok Kumar; Jain, Arun Kumar, Surveying I, Laxmi Publications, New Delhi.
2. Basak, N. N., Surveying and Levelling, McGraw Hill Education, New Delhi.
3. Kanetkar, T. P.; Kulkarni, S. V., Surveying and levelling volume I, Pune Vidyarthi Gruh Prakashan.

**Reference Books:**

1. Duggal, S. K., Survey I, McGraw Hill Education, New Delhi.
2. Saikia, M D.; Das. B.M.; Das. M.M., Surveying, PHI Learning, New Delhi.
3. Subramanian, R., Fundamentals of Surveying and Levelling, Oxford University Press. New Delhi.
4. Rao, P. Venugopala Akella, Vijayalakshmi, Textbook of Surveying, PHI Learning House, New Delhi.

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<b>Subject Name</b>	<b>Mechanics of Materials</b>				
<b>Subject Code</b>	<b>DCE20S303</b>				
<b>Paper</b>	<b>English</b>				
	<b>Hindi</b>				
<b>Max. Marks</b>	<b>100</b>				

#### Course Objectives

Following are the objectives of this course:

1. To learn properties of area and structural material properties.
2. To understand the concept of stress and strain.
3. To calculate shear force, bending moment for different shapes of structural elements and corresponding stresses.
4. To understand the concept of buckling loads for short and long columns.

#### Course Outcomes

After competing this course, student will be able to:

- CO1:** Articulate practical applications of moment of inertia of symmetrical and unsymmetrical structural sections.
- CO2:** Analyse structural behaviour of materials under various loading conditions.
- CO3:** Interpret shear force and bending moment diagrams for various types of beams and loading conditions.
- CO4:** Determine the bending and shear stresses in beams under different loading conditions.
- CO5:** Analyse the column for various loading and end conditions.

Unit	Syllabus	Periods
<b>UNIT-I</b>	Moment of Inertia: Moment of inertia (M.I.): Definition, M.I. of plane lamina, Radius of gyration, section modulus, Parallel and Perpendicular axes theorems (without derivations), M.I. of rectangle, square, circle, semi-circle, quarter circle and triangle section (without derivations). M.I. of symmetrical and unsymmetrical I-section, Channel section, T-section, Angle section, Hollow sections and built up sections about centroidal axes and any other reference axis. Polar Moment of Inertia of solid circular sections.	<b>8</b>
<b>UNIT-II</b>	Simple Stresses and Strains: Definition of rigid, elastic and plastic bodies, deformation of elastic body under various forces, Definition of stress, strain, elasticity, Hook's law, Elastic limit, Modulus of elasticity. Type of Stresses-Normal, Direct, Bending and Shear and nature of stresses i.e. Tensile and Compressive stresses. Standard stress strain curve for tor steel bar under tension, Yield stress, Proof stress, Ultimate stress, Strain at various critical points, Percentage elongation and Factor of safety. Deformation of body due to axial force, forces applied at intermediate sections, Maximum and minimum stress induced, Composite section under axial loading. Concept of temperature stresses and strain, Stress and strain developed due to temperature variation in homogeneous simple bar (no composite section). Longitudinal and lateral strain, Modulus of Rigidity, Poisson's ratio, Biaxial and triaxial stresses, volumetric strain, change in volume, Bulk modulus (Introduction only). Relation between modulus of elasticity, modulus of rigidity and bulk modulus (without derivation).	<b>12</b>
<b>UNIT-III</b>	Shear Force and Bending Moment: Types of supports, beams and loads. Concept and definition of shear force and bending moment, Relation between load, shear force and bending moment (without derivation). Shear force and bending moment diagram for cantilever and simply supported beams subjected to point loads, uniformly distributed loads and couple (combination of any two types of loading), point of contra flexure.	<b>10</b>
<b>UNIT-IV</b>	Bending and Shear Stresses in beams: Concept and theory of pure bending, assumptions, flexural equation (without derivation), bending stresses and their nature, bending stress distribution diagram. Concept of moment of resistance and simple numerical problems using flexural equation. Shear stress equation (without derivation), relation between maximum and average shear stress for rectangular and circular section, shear stress distribution diagram. Shear stress distribution for square, rectangular, circle, hollow, square, rectangular, circular, angle sections, channel section, I-section, T section. Simple numerical problems based on shear equation.	<b>12</b>
<b>UNIT-V</b>	Columns: Concept of compression member, short and long column, Effective length, Radius of gyration, Slenderness ratio, Types of end condition for columns, Buckling of axially loaded columns. Euler's theory, assumptions made in Euler's theory and its limitations, Application of Euler's equation to calculate buckling load. Rankine's formula and its application to calculate crippling load. Concept of working load/safe load, design load and factor of safety.	<b>10</b>

**Text Books:**

1. Bedi D.S., Strength of Materials, Khanna Publishing House, Delhi, Ed. 2018.
2. Khurmi, R.S., Strength of Materials, S Chand and Co. Ltd. New Delhi.
3. Ramamurtham, S, Strength of Materials, Dhanpat Rai and sons, New Delhi.
4. Punmia B C, Strength of Materials, Laxmi Publications (p) Ltd., New Delhi.

**Reference Books:**

1. Timoshenko, S., Strength of Materials, Vol. I, CBS, New Delhi.
2. Rattan S.S., Strength of Materials, McGraw Hill Education, New Delhi.
3. Bansal R K, Strength of Materials, Laxmi Publications.
4. Subramaniam R, Strength of Materials, Oxford University Press.



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<b>Subject Name</b>	<b>Building Construction</b>				
<b>Subject Code</b>	<b>DCE20S304</b>				
<b>Paper</b>	<b>English</b>				
	<b>Hindi</b>				
<b>Max. Marks</b>	<b>100</b>				

#### Course Objectives

Following are the objectives of this course:

1. To identify different components of building.
2. To understand different types of foundation and their significance.
3. To know different types of masonry and their construction.
4. To highlight the importance of communications in building planning.

#### Course Outcomes

After competing this course, student will be able to:

**CO1:** Identify components of building structures.

**CO2:** Propose suitable type of foundation for building structures.

**CO3:** Select suitable type of masonry for building structures.

**CO4:** Propose relevant means of communications for different types of buildings.

**CO5:** Select relevant material for finishing works.

<b>Unit</b>	<b>Syllabus</b>	<b>Periods</b>
<b>UNIT-I</b>	Overview of Building Components: Classification of Buildings as per National Building Code Group A to I, As per Types of Constructions- Load Bearing Structure, Framed Structure, Composite Structure. Building Components - Functions of Building Components, Substructure – Foundation, Plinth. Superstructure – Walls, Partition wall, Cavity wall, Sill, Lintel, Doors and Windows, Floor, Mezzanine floor, Roof, Columns, Beams, Parapet.	<b>8</b>

<b>UNIT-II</b>	Construction of Substructure: Job Layout: Site Clearance, Layout for Load Bearing Structure and Framed Structure by Center Line and Face Line Method, Precautions. Earthwork: Excavation for Foundation, Timbering and Strutting, Earthwork for embankment, Material for plinth Filling, Tools and plants used for earthwork. Foundation: Functions of foundation, Types of foundation – Shallow Foundation, Stepped Footing, Wall Footing, Column Footing, Isolated and Combined Column Footing, Raft Foundation, Grillage Foundation. Deep Foundation - Pile Foundation, Well foundation and Caissons, Pumping Methods of Dewatering, Deep wells, Well points, Cofferdams (Introduction only).	<b>10</b>
<b>UNIT-III</b>	Construction of Superstructure: Stone Masonry: Terms used in stone masonry-facing, backing, hearting, Through stone, corner stone, cornice. Types of stone masonry: Rubble masonry, Ashlar Masonry and their types. Joints in stone masonry and their purpose. Selection of Stone Masonry, Precautions to be taken in Stone Masonry Construction. Brick masonry: Terms used in brick masonry-header, stretcher, closer, quoins, course, face, back, hearting, bat bond, joints, lap, frog line, level and plumb. Bonds in brick masonry- header bond, stretcher bond, English bond and Flemish bond. Requirements of good brick masonry. Junctions in brick masonry and their purpose and procedure. Precautions to be observed in Brick Masonry Construction. Comparison between stone and Brick Masonry. Tools and plants required for construction of stone and brick masonry. Hollow concrete block masonry and composite masonry. Scaffolding and Shoring: Purpose, Types of Scaffolding, Process of Erection and Dismantling. Purpose and Types of Shoring, Underpinning. Formwork: Definition of Formwork, Requirements of Formwork, Materials used in Formwork, Types of Formwork, Removal of formwork.	<b>12</b>
<b>UNIT-IV</b>	Building Communication and Ventilation: Horizontal Communication: Doors – Components of Doors, Full Paneled Doors, Partly Paneled and Glazed Doors, Flush Doors, Collapsible Doors, Rolling Shutters, Revolving Doors, Glazed Doors. Sizes of Door recommended by BIS. Windows: Component of windows, Types of Windows - Full Paneled, Partly Paneled and Glazed, wooden, Steel, Aluminum windows, Sliding Windows, Louvered Window, Bay window, Corner window, clear-storey window, Gable and Dormer window, Skylight. Sizes of Windows recommended by BIS. Ventilators. Fixtures and fastenings for doors and windows- Material used and functions of Window Sill and Lintels, Shed / Chajja. Vertical Communication: Means of Vertical Communication- Stair Case, Ramps, Lift, Elevators and Escalators. Terms used in staircase-steps, tread, riser, nosing, soffit, waist slab, baluster, balustrade, scotia, hand rails, newel post, landing, headroom, winder. Types of stair- case (On the basis of shape): Straight, dog-legged, open well, Spiral, quarter turn, bifurcated, Three quarter turn and Half turn, (On the basis of Material): Stone, Brick, R.C.C., wooden and Metal.	<b>12</b>
<b>UNIT-V</b>	Building Finishes: Floors and Roofs: Types of Floor Finishes and its suitability- Kota, Marble, Granite, Ceramic Tiles, Vitrified, Chequered Tiles, Paver Blocks, Concrete Floors, wooden Flooring, Skirting and Dado. Process of Laying and Construction, Finishing and Polishing of Floors, Roofing Materials- RCC, Mangalore Tiles, AC Sheets, G.I. sheets, Corrugated G.I. Sheets, Plastic and Fibre Sheets. Types of Roof: Flat roof, Pitched Roof-King Post truss, Queen Post Truss, terms used in roofs. Wall Finishes: Plastering – Necessity of	<b>10</b>

Plastering, Procedure of Plastering, Single Coat Plaster, Double Coat Plaster, Rough finish, Neeru Finishing and Plaster of Paris (POP). Special Plasters- Stucco plaster, sponge finish, pebble finish. Plaster Board and Wall Claddings. Pre- cautions to be taken in plastering, defects in plastering. Pointing – Necessity, Types of pointing and procedure of Pointing. Painting –Necessity, Surface Preparation for painting, Methods of Application.	
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**Text Books:**

1. S. P. Arora and Bindra., Building Construction, Dhanpat Rai Publication, Delhi.
2. Sushil Kumar., Building Construction, Standard Publication.
3. Rangawala, S. C., Building Construction, Charotar Publication, Anand.

**Reference Books:**

1. Sharma S. K., Building Construction, S. Chand and Co. Pvt. Ltd., New Delhi.
2. Janardan Zha , Building Construction, Khanna Publication.
3. Bhavikatti S. S., Building Construction, Vikas Publication House Pvt. Ltd., Delhi.
4. Mantri S., A to Z Building Construction, Satya Prakashan, New Delhi.



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<b>Subject Name</b>	<b>Concrete Technology</b>				
<b>Subject Code</b>	<b>DCE20S305</b>				
<b>Paper</b>	<b>English</b>				
	<b>Hindi</b>				
<b>Max. Marks</b>	<b>100</b>				

#### Course Objectives

Following are the objectives of this course:

1. To know properties of cement, aggregate and water used in concrete.
2. To understand different characteristics of concrete.
3. To learn about role of admixtures in concrete.

#### Course Outcomes

After competing this course, student will be able to:

- CO1:** Use different types of cement and aggregates in concrete  
**CO2:** Prepare concrete of desired compressive strength.  
**CO3:** Prepare concrete of required specification.  
**CO4:** Maintain quality of concrete under different conditions.  
**CO5:** Apply relevant admixtures for concreting.

<b>Unit</b>	<b>Syllabus</b>	<b>Periods</b>
<b>UNIT-I</b>	Cement, Aggregates and Water: Physical properties of OPC and PPC: fineness, standard consistency, setting time, soundness, compressive strength. Different grades of OPC and relevant BIS codes. Testing of cement: Laboratory tests- fineness, standard consistency, setting time, soundness, compressive strength. Storage of cement and effect of storage on properties of cement. BIS Specifications and field applications of different types of cements: Rapid hardening, Low heat, Portland pozzolana, sulphate resisting, Blast furnace slag, High Alumina and White cement. Aggregates: Requirements of good aggregate, Classification according to size and shape. Fine aggregates: Properties, size, specific gravity, bulk density, water absorption and bulking, fineness modulus	<b>12</b>

	and grading zone of sand, silt content and their specification as per IS 383. Concept of crushed Sand. Coarse aggregates: Properties, size, shape, surface texture, water absorption, soundness, specific gravity and bulk density, fineness modulus of coarse aggregate, grading of coarse aggregates, crushing value, impact value and abrasion value of coarse aggregates with specifications. Water: Quality of water, impurities in mixing water and permissible limits for solids as per IS: 456.	
<b>UNIT-II</b>	Concrete: Concrete: Different grades of concrete, provisions of IS 456. Duff Abraham water cement (w/c) ratio law, significance of w/c ratio, selection of w/c ratio for different grades, maximum w/c ratio for different grades of concrete for different exposure conditions as per IS 456. Properties of fresh concrete: Workability: Factors affecting workability of concrete. Determination of workability of concrete by slump cone, compaction factor, Vee-Bee Consistometer. Value of workability requirement for different types of concrete works. Segregation, bleeding and preventive measures. Properties of Hardened concrete: Strength, Durability, Impermeability.	<b>10</b>
<b>UNIT-III</b>	Concrete Mix Design and Testing of Concrete: Concrete mix design: Objectives, methods of mix design, study of mix design as per IS 10262 (only procedural steps). Testing of concrete, determination of compressive strength of concrete cubes at different ages, interpretation and co-relation of test results. Non-destructive testing of concrete: Rebound hammer test, working principle of rebound hammer and factor affecting the rebound index, Ultrasonic pulse velocity test as per IS13311 (part 1 and 2), Importance of NDT tests.	<b>8</b>
<b>UNIT-IV</b>	Quality Control of Concrete: Concreting Operations: Batching, Mixing, Transportation, Placing, Compaction, Curing and Finishing of concrete. Forms for concreting: Different types of form works for beams, slabs, columns, materials used for form work, requirement of good form work. Stripping time for removal of form works per IS 456. Waterproofing: Importance and need of waterproofing, methods of waterproofing and materials used for waterproofing. Joints in concrete construction: Types of joints, methods for joining old and new concrete, materials used for filling joints.	<b>10</b>
<b>UNIT-V</b>	Chemical Admixture, Special Concrete and Extreme Weather concreting: Admixtures in concrete: Purpose, properties and application for different types of admixture such as accelerating admixtures, retarding admixtures, water reducing admixtures, air entraining admixtures and super plasticizers. Special Concrete: Properties, advantages and limitation of following types of Special concrete: Ready mix Concrete, Fiber Reinforced Concrete, High performance Concrete Self-compacting concrete and light weight concrete. Cold weather concreting: effect of cold weather on concrete, precautions to be taken while concreting in cold weather condition. Hot weather concreting: effect of hot weather on concrete, precautions to be taken while concreting in hot weather condition.	<b>12</b>

**Text Books:**

1. Gambhir, M.L., Concrete Technology, Tata McGraw Hill Publishing Co. Ltd., Delhi.
2. Shetty, M.S., Concrete Technology, S. Chand and Co. Pvt. Ltd., Ram Nagar, Delhi.
3. Santhakumar, A. R., Concrete Technology, Oxford University Press, New Delhi.

**Reference Books:**

1. Neville, A. M. and Brooks, J.J., Concrete Technology, Pearson Education Pvt. Ltd.
2. Neville, A. M., Concrete Technology, Pearson Education Pvt. Ltd., New Delhi.
3. Sood, H., Kulkarni P. D., Mittal L. N., Laboratory Manual in Concrete Technology, CBS Publishers, New Delhi.



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<b>Semester/Year</b>	<b>3<sup>rd</sup> sem /2<sup>nd</sup> year</b>	-	-	<b>2</b>	<b>1</b>
<b>Subject Name</b>	<b>Construction Materials Lab</b>				
<b>Subject Code</b>	<b>DCE20S307</b>				
<b>Paper</b>	<b>English</b>				
	<b>Hindi</b>				
<b>Max. Marks</b>	<b>50</b>				

**List of experiments to be performed:**

1. Identify various sizes of available coarse aggregates from sample of 10 kg in laboratory and prepare report (60, 40, 20, 10 mm).
2. Identify the available construction materials in the laboratory on the basis of their sources.
3. Identify the grain distribution pattern in given sample of teak wood in the laboratory and draw the various patterns. (along and perpendicular to the grains).
4. Prepare the lime putty by mixing lime (1 kg) with water in appropriate proportion and pre- pare report on slaking of lime.
5. Identify various layers and types of soil in foundation pit by visiting at least 3 construction sites in different locations of city and prepare report consisting photographs and samples. Part I.
6. Identify various layers and types of soil in foundation pit by visiting at least 3 construction sites in different locations of city and prepare report consisting photographs and samples. Part II.
7. Select first class, second class and third-class bricks from the stake of bricks and prepare report on the basis of its properties.
8. Measure dimensions of 10 bricks and find average dimension and weight. Perform field tests- dropping, striking and scratching by nail and correlate the results obtained.
9. Identify different types of flooring tiles such as vitrified tiles, ceramic tiles, glazed tiles, mosaic tiles, anti- skid tiles, chequered tiles, paving blocks and prepare report about the specifications.
10. Apply the relevant termite chemical on given damaged sample of timber.
11. Identify the type of glasses from the given samples.
12. Apply two or more coats of selected paint on the prepared base of a given wall surface for the area of 1m x 1m using suitable brush/rollers adopting safe practices.
13. Apply two or more coats of selected paint on the prepared base of a given wall surface for the area of 1m x 1m using suitable brush/rollers adopting safe practices. Part II
14. Prepare the cement mortar of proportion 1:3 or 1:6 using artificial sand as a special processed construction material. Prepare mortar using cement and Fly ash or Granite/marble polishing waste in the proportion 1:6 or 1:3.



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<b>Semester/Year</b>	<b>3<sup>rd</sup> sem /2<sup>nd</sup> year</b>		-	-	<b>2</b>	<b>1</b>
<b>Subject Name</b>	<b>Basic Surveying Lab</b>					
<b>Subject Code</b>	<b>DCE20S308</b>					
<b>Paper</b>	<b>English</b>					
	<b>Hindi</b>					
<b>Max. Marks</b>	<b>50</b>					

#### List of experiments to be performed:

1. Measure distance between two survey stations using chain, tape and ranging rods when two stations are inter visible.
2. Undertake reciprocal ranging and measure the distance between two stations.
3. Determine area of open field using chain and cross staff survey.
4. Measure Fore Bearing and Back Bearing of survey lines of open traverse using Prismatic Compass.
5. Measure Fore Bearing and back bearing of a closed traverse of 5 or 6 sides and correct the bearings and included angles for the local attraction.
6. Undertake Survey Project with chain and compass for closed traverse for minimum 5 sides around a building.
7. Plot the traverse on A1 size imperial drawing sheet for data collected in Survey Project mentioned at practical **No.6**.
8. Undertake simple leveling using dumpy level/ Auto level and leveling staff.
9. Undertake differential leveling and determine Reduced Levels by Height of instrument method and Rise and fall method using dumpy level/Auto Level and leveling staff.
10. Undertake fly leveling with double check using dumpy level/ Auto level and leveling staff.
11. Undertake Survey Project with Leveling instrument for Profile leveling and cross-sectioning for a road length of 500 m with cross-section at 30 m interval.
12. Plot the L-section with minimum 3 cross-sections on A1 size imperial sheet for data collected in Survey Project mentioned at practical **No.11**.
13. Undertake Survey Project for plotting contour map using block contouring method for a block of 150m x 150m with grid of 10m x 10m.
14. Plot the contours on A1 size imperial drawing sheet for data collected in Survey Project mentioned at practical **No.13**.
15. Measure area of irregular figure using Digital planimeter.



## SYLLABUS

### Civil Engineering

<b>Class</b>	<b>Diploma</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Semester/Year</b>	<b>3<sup>rd</sup> sem /2<sup>nd</sup> year</b>	-	-	<b>2</b>	<b>1</b>
<b>Subject Name</b>	<b>Mechanics of Materials Lab</b>				
<b>Subject Code</b>	<b>DCE20S309</b>				
<b>Paper</b>	<b>English</b>				
	<b>Hindi</b>				
<b>Max. Marks</b>	<b>50</b>				

#### List of experiments to be performed:

1. Study and understand the use and components of Universal Testing Machine (UTM).
2. Perform Tension test on mild steel as per IS: 432 (1).
3. Perform tension test on Tor steel as per IS: 1608, IS: 1139.
4. Conduct compression test on sample test piece using Compression Testing Machine.
5. Conduct Izod Impact test on three metals. e.g. mild steel/ brass/aluminum/ copper /cast iron etc as per IS: 1598.
6. Conduct Charpy Impact test on three metals. e.g. mild steel/ brass/aluminum/ copper /cast iron etc as per IS: 1757.
7. Determine Water Absorption on bricks per IS: 3495 (part II), IS: 1077 or tile IS: 1237.
8. Determine Compressive strength of dry and wet bricks as per IS: 3495(part I), IS: 1077.
9. Conduct Abrasion Test on flooring tiles (any one) e.g. Mosaic tiles, Ceramic Tiles as per IS: 13630 (part7), Cement Tile as per IS: 1237.
10. Perform Single Shear and double shear test on any two metals e.g. Mild steel/ brass/aluminum/copper / cast iron etc as per IS:5242.
11. Conduct Compression test on timber section along the grain and across the grain as per IS: 2408.
12. Plot Shear force and Bending Moment diagrams for cantilever, simply supported beams.
13. Plot Shear force and Bending Moment diagrams for overhanging beams for different types of loads including moment loading.
14. Conduct Flexural test on timber beam on rectangular section in both orientation as per IS:1708, IS:2408.
15. Conduct Flexure test on floor tiles IS:1237, IS:13630 or roofing tiles as per IS:654, IS:2690.



## SYLLABUS

### Civil Engineering

<b>Class</b>	<b>Diploma</b>		<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Semester/Year</b>	<b>3<sup>rd</sup> sem /2<sup>nd</sup> year</b>		-	-	<b>2</b>	<b>1</b>
<b>Subject Name</b>	<b>Concrete Technology Lab</b>					
<b>Subject Code</b>	<b>DCE20S310</b>					
<b>Paper</b>	<b>English</b>					
	<b>Hindi</b>					
<b>Max. Marks</b>	<b>50</b>					

#### List of experiments to be performed:

1. Determine fineness of cement by Blaine's air permeability apparatus or by sieving.
2. Determine specific gravity, standard consistency, initial and final setting times of cement.
3. Determine compressive strength of cement.
4. Determine silt content in sand.
5. Determine bulking of sand.
6. Determine bulk density of fine and coarse aggregates.
7. Determine water absorption of fine and coarse aggregates.
8. Determine Fineness modulus of fine aggregate by sieve analysis.
9. Determine impact value of aggregate.
10. Determine crushing value of aggregate.
11. Determine abrasion value of aggregate.
12. Determine elongation and flakiness index of coarse aggregates.
13. Determine workability of concrete by slump cone test.
14. Determine workability of concrete by compaction factor test.
15. To prepare concrete mix of a particular grade and determine compressive strength of concrete for 7 and 28 days.
16. Demonstration of NDT equipments.

## **SEMESTER - IV**

## SYLLABUS

### Civil Engineering

<b>Class</b>	<b>Diploma</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Semester/Year</b>	<b>4<sup>th</sup> sem /2<sup>nd</sup> year</b>	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>Subject Name</b>	<b>Hydraulics</b>				
<b>Subject Code</b>	<b>DCE20S401</b>				
<b>Paper</b>	<b>English</b>				
	<b>Hindi</b>				
<b>Max. Marks</b>	<b>100</b>				

#### Course Objectives

Following are the objectives of this course:

1. To understand parameters associated with fluid flow and hydrostatic pressure.
2. To know head loss and water hammer in fluid flowing through pipes.
3. To learn different types of pumps and their uses.

#### Course Outcomes

After competing this course, student will be able to:

- CO1:** Measure pressure and determine total hydrostatic pressure for different conditions.  
**CO2:** Understand various parameters associated with fluid flow  
**CO3:** Determine head loss of fluid flow through pipes.  
**CO4:** Find the fluid flow parameters in open channels.  
**CO5:** Select relevant hydraulic pumps for different applications.

<b>Unit</b>	<b>Syllabus</b>	<b>Periods</b>
<b>UNIT-I</b>	Pressure measurement and Hydrostatic pressure: Technical terms used in Hydraulics –fluid, fluid mechanics, hydraulics, hydrostatics and hydrodynamics - ideal and real fluid, application of hydraulics. Physical properties of fluid – density-specific volume, specific gravity, surface tension, capillarity, viscosity-Newton’s law of viscosity. Various types of pressure – Atmospheric Pressure, Gauge Pressure, Absolute Pressure, Vacuum Pressure. Concept of Pressure head and its unit, Pascal’s law of fluid pressure and its uses. Measurement of differential Pressure by different methods. Variation of pressure with depth, Pressure diagram, hydrostatic pressure and center of pressure on immersed surfaces and on tank walls. Determination of total pressure and center of	<b>12</b>

	pressure on sides and bottom of water tanks, sides and bottom of tanks containing two liquids, vertical surface in contact with liquid on either side.	
<b>UNIT-II</b>	Fluid Flow Parameters: Types of flow – Gravity and pressure flow, Laminar, Turbulent, Uniform, Non-uniform, Steady, Unsteady flow. Reynolds number. Discharge and its unit, continuity equation of flow. Energy of flowing liquid: potential, kinetic and pressure energy. Bernoulli's theorem: statement, assumptions, equation.	<b>10</b>
<b>UNIT-III</b>	Flow through pipes: Major head loss in pipe: Frictional loss and its computation by Darcy's Weisbach equation, Use of Moody's Diagram and Nomograms. Minor losses in pipe: loss at entrance, exit, sudden contraction, sudden enlargement and fittings. Flow through pipes in series, pipes in parallel and Dupuit's equation for equivalent pipe. Hydraulic gradient line and total energy line. Water hammer in pipes: Causes and Remedial measures. Discharge measuring device for pipe flow: Venturi meter - construction and working. Discharge measurement using Orifice, Hydraulic Coefficients of Orifice.	<b>12</b>
<b>UNIT-IV</b>	Flow through Open Channel: Geometrical properties of channel section: Wetted area, wetted perimeter, hydraulic radius for rectangular and trapezoidal channel section. Determination of discharge by Chezy's equation and Manning's equation. Conditions for most economical rectangular and trapezoidal channel section. Discharge measuring devices: Triangular and rectangular Notches. Velocity measurement devices: current meter, floats and Pitot's tube. Specific energy diagram, Froudes' Number.	<b>10</b>
<b>UNIT-V</b>	Hydraulic Pumps: Concept of pump, Types of pump - centrifugal, reciprocating, submersible. Centrifugal pump: components and working, Reciprocating pump: single acting and double acting, components and working. Suction head, delivery head, static head, Manometric head. Power of centrifugal pump. Selection and choice of pump.	<b>8</b>

**Text Books:**

1. Modi, P. N. and Seth, S.M., Hydraulics and Fluid Mechanics, Standard book house, Delhi.
2. S.S. Rattan, Fluid Mechanics & Hydraulic Machines, Khanna Book Publishing Co., New Delhi
3. Ramamrutham, and Narayan, R., Hydraulics, Fluid Mechanics and Fluid Machines, Dhanpat Rai Publishing Company, New Delhi.

**Reference Books:**

1. Khurmi R S, Hydraulics, Fluid Mechanics, Hydraulic machines, S. Chand Publishers.
2. Rajput, R K, Fluid Mechanics, S Chand, New Delhi.
3. Ojha, C S P, Berndtsson, R, and Chandramoulli P. N., Fluid Mechanics and Machinery, Oxford University Press, New Delhi.

## SYLLABUS

### Civil Engineering

<b>Class</b>	<b>Diploma</b>		<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Semester/Year</b>	<b>4<sup>th</sup> sem /2<sup>nd</sup> year</b>		<b>3</b>	<b>1</b>	<b>-</b>	<b>4</b>
<b>Subject Name</b>	<b>Theory of Structure</b>					
<b>Subject Code</b>	<b>DCE20S402</b>					
<b>Paper</b>	<b>English</b>					
	<b>Hindi</b>					
<b>Max. Marks</b>	<b>100</b>					
<b>Course Objectives</b>						
Following are the objectives of this course:						
1. To learn concept of eccentric loading and stresses in vertical members like column, chimneys, dam.						
2. To analyze beams using various methods like slope deflection, three moment, and moment distribution.						
3. To understand different methods of finding axial forces in trusses.						
<b>Course Outcomes</b>						
After competing this course, student will be able to:						
<b>CO1:</b> Analyze stresses induced in vertical member subjected to direct and bending loads.						
<b>CO2:</b> Analyze slope and Deflection in fixed and continuous beams.						
<b>CO3:</b> Analyze continuous beam under different loading conditions using the principles of Three Moments.						
<b>CO4:</b> Analyze continuous beam using Moment Distribution Method under different loading conditions.						
<b>CO5:</b> Evaluate axial forces in the members of simple truss.						
<b>Unit</b>	<b>Syllabus</b>					<b>Periods</b>
<b>UNIT-I</b>	Direct and Bending Stresses in vertical members: Introduction to axial and eccentric loads, eccentricity about one principal axis only, nature of stresses, Maximum and minimum stresses, resultant stresses and distribution diagram. Condition for no tension or zero stress at extreme fiber, Limit of eccentricity, core of section for rectangular and circular cross sections, Middle third rule. Chimneys of circular cross section subjected to wind pressure, Maximum and minimum stresses, resultant stresses and distribution diagram at base. Analysis of dams subjected to horizontal water pressure, conditions of stability, Maximum and minimum stresses, resultant stresses and distribution diagram at base.					<b>12</b>

<b>UNIT-II</b>	Slope and Deflection: Concept of slope and deflection, stiffness of beams, Relation among bending moment, slope, deflection and radius of curvature, (no derivation). Double integration method to find slope and deflection of cantilever and simply supported beams subjected to concentrated load and uniformly distributed load on entire span. Macaulay's method for slope and deflection, application to cantilever and simply supported beam subjected to concentrated and uniformly distributed load on entire span.	<b>10</b>
<b>UNIT-III</b>	Fixed and Continuous Beam: Concept of fixity, effect of fixity, advantages and disadvantages of fixed beam over simply supported beam. Principle of superposition, Fixed end moments from first principle for beam subjected to point load, UDL over entire span. Application of standard formulae in finding end moments, end reactions and drawing S.F. and B.M. diagrams for a fixed beam. Definition, effect of continuity, nature of moments induced due to continuity, concept of deflected shape, practical examples. Clapeyron's theorem of three moment (no derivation), Application of Clapeyron's theorem maximum up to three spans and two unknown support moment only, Support at same level spans having same and uniform moment of inertia subjected to concentrated loads and uniformly distributed loads over entire span. Drawing SF diagrams showing point of contra flexure, shear and BM diagrams showing net BM and point of contra flexure for continuous beams.	<b>12</b>
<b>UNIT-IV</b>	Moment distribution method: Introduction to moment distribution method, sign convention, Carry over factor, stiffness factor, distribution factor. Application of moment distribution method to various types of continuous beams subjected to concentrated loads and uniformly distributed load over entire span having same or different moment of inertia, supports at same level, up to three spans and two unknown support moments only. Introduction to portal frames – Symmetrical and unsymmetrical portal frames with the concept of Bays and stories.	<b>10</b>
<b>UNIT-V</b>	Simple trusses: Types of trusses (Simple, Fink, compound fink, French truss, Pratt truss, Howe truss, North light truss, King post and Queen post truss). Calculate support reactions for trusses subjected to point loads at joints. Calculate forces in members of truss using Method of joints and Method of sections.	<b>8</b>

**Text Books:**

1. Ramamrutham.S, Theory of structures, Dhanpat rai & Sons.
2. Khurmi, R. S, Theory of Structures S. Chand and Co., New Delhi.
3. Bhavikatti, S S, Structural Analysis Vol-1, Vikas Publishing House Pvt Ltd. New Delhi.

**Reference Books:**

1. Junnarkar, S. B, Mechanics of structures, Volume-I and II Charotar Publishing House, Anand.
2. Pandit, G.S. and Gupta, S.P., Theory of Structures, Tata McGraw Hill, New Delhi.
3. Agor R, Structural Analysis, Khanna Publishing House, Delhi.

## SYLLABUS

### Civil Engineering

<b>Class</b>	<b>Diploma</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Semester/Year</b>	<b>4<sup>th</sup> sem /2<sup>nd</sup> year</b>	<b>3</b>	<b>1</b>	<b>-</b>	<b>4</b>
<b>Subject Name</b>	<b>Building Planning and Drawing</b>				
<b>Subject Code</b>	<b>DCE20S403</b>				
<b>Paper</b>	<b>English</b>				
	<b>Hindi</b>				
<b>Max. Marks</b>	<b>100</b>				

#### Course Objectives

Following are the objectives of this course:

1. To learn basic principles of building planning and drawing.
2. To know graphical representation of various components of buildings.
3. To draw complete plan and elevation of a building.
4. To learn basics of perspective drawings and Computer Aided Drawings.

#### Course Outcomes

After competing this course, student will be able to:

- CO1:** Interpret the symbols, signs and conventions from the given drawing.  
**CO2:** Prepare line plans of residential and public buildings using principles of planning.  
**CO3:** Prepare submission and working drawing for the given requirement of Load Bearing Structure.  
**CO4:** Prepare submission and working drawing using CAD for the given requirement of Framed Structure.  
**CO5:** Draw two-point perspective drawing for given small objects.

<b>Unit</b>	<b>Syllabus</b>	<b>Periods</b>
<b>UNIT-I</b>	Conventions and Symbols: Conventions as per IS 962, symbols for different materials such as earthwork, brickwork, stonework, concrete, woodwork and glass. Graphical symbols for doors and windows, Abbreviations, symbols for sanitary and electrical installations. Types of lines-visible lines, centre line, hidden line, section line, dimension line, extension line, pointers, arrow head or dots. Appropriate size of lettering and numerals for titles, sub-titles, notes and dimensions. Types of scale- Monumental, Intimate, criteria for Proper Selection of scale for various types of drawing. Sizes of various standard papers/sheets.	<b>10</b>

	Reading and interpreting readymade Architectural building drawing (To be procured from Architect, Planning Consultants, Planning Engineer).	
<b>UNIT-II</b>	Planning of Building: Principles of planning for Residential and Public building- Aspect, Prospect, Orientation, Grouping, Privacy, Elegance, Flexibility, Circulation, Furniture requirements, Sanitation, Economy. Space requirement and norms for minimum dimension of different units in the residential and public buildings as per IS 962. Rules and bye-laws of sanctioning authorities for construction work. Plot area, built up area, super built up area, plinth area, carpet area, floor area and FAR (Floor Area Ratio). Line plans for residential building of minimum three rooms including water closet (WC), bath and staircase as per principles of planning. Line plans for public building-school building, primary health center, restaurant, bank, post office, hostel, Function Hall and Library.	<b>12</b>
<b>UNIT-III</b>	Drawing of Load Bearing Structure: Drawing of Single storey Load Bearing residential building (2 BHK) with staircase. Data drawing –plan, elevation, section, site plan, schedule of openings, construction notes with specifications, area statement, Planning and design of staircase- Rise and Tread for residential and public building. Working drawing – developed plan, elevation, section passing through staircase or WC and bath. Foundation plan of Load bearing structure.	<b>10</b>
<b>UNIT-IV</b>	Drawing of Framed Structure: Drawing of Two storeyed Framed Structure (G+1), residential building (2 BHK) with staircase. Data drawing – developed plan, elevation, section, site plan, schedule of openings, construction notes with specifications, area statement. Planning and design of staircase- Rise and Tread for residential and public building. Working drawing of Framed Structure – developed plan, elevation, section passing through staircase or WC and bath. Foundation plan of Framed Structure. Details of RCC footing, Column, Beam, Chajjas, Lintel, Staircase and slab. Drawing with CAD- Draw commands, modify commands, layer commands.	<b>12</b>
<b>UNIT-V</b>	Perspective Drawing: Definition, Types of perspective, terms used in perspective drawing, principles used in perspective drawing, Two Point Perspective of small objects only such as steps, monuments, pedestals.	<b>8</b>

**Text Books:**

1. Shah. M.G. Kale, CM, Patki, S.Y., Building Drawing, McGraw Hill publishing company Ltd. New Delhi.
2. Malik and Mayo, Civil Engineering Drawing, Computech Publication Ltd New Asian Publishers, New Delhi.
3. M. G. Shah and C. M. Kale, Principles of Perspective Drawing, Mcgraw Hill publishing company Ltd. New Delhi.

**Reference Books:**

1. Swamy, Kumara; Rao, N, Kameshwara, A, Building Planning and Drawing, Charotar Publication, Anand.
2. Bhavikatti, S. S., Building Construction, Vikas Publication House Pvt. Ltd., New Delhi.
3. Mantri, Sandip, A to Z Building Construction, Satya Prakashan, New Delhi.
4. Singh, Ajit, Working with Auto CAD 2000, Mcgraw Hill Publishing company Ltd. New Delhi.
5. Sane, Y.S., Planning and design of Building, Allied Publishers, New Delhi.

## SYLLABUS

### Civil Engineering

<b>Class</b>	<b>Diploma</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Semester/Year</b>	<b>4<sup>th</sup> sem /2<sup>nd</sup> year</b>	<b>2</b>	<b>-</b>	<b>-</b>	<b>2</b>
<b>Subject Name</b>	<b>Water Resource Engineering</b>				
<b>Subject Code</b>	<b>DCE20S404</b>				
<b>Paper</b>	<b>English</b>				
	<b>Hindi</b>				
<b>Max. Marks</b>	<b>100</b>				

#### Course Objectives

Following are the objectives of this course:

1. To learn estimation of hydrological parameters.
2. To understand water demand of crops and provisions to meet the same.
3. To know planning of reservoirs and dams.
4. To design irrigation projects, canals and other diversion works.

#### Course Outcomes

After competing this course, student will be able to:

**CO1:** Estimate hydrological parameters.

**CO2:** Estimate crop water requirements of a command area and capacity of canals.

**CO3:** Execute Minor and Micro Irrigation Schemes.

**CO4:** Select the relevant Cross Drainage works for the specific site conditions.

**CO5:** Design, construct and maintain simple irrigation regulatory structures.

<b>Unit</b>	<b>Syllabus</b>	<b>Periods</b>
<b>UNIT-I</b>	Introduction to Hydrology: Hydrology: Definition and Hydrological cycle. Rain Gauge: Symons rain gauge, automatic rain gauge, Methods of calculating average rainfall: Arithmetic mean, Isohyetal, and Thiessen polygon method. Runoff, Factors affecting Run off, Computation of run-off. Maximum Flood Discharge measurement: Rational and empirical methods, Simple numerical problems. Yield and Dependable yield of a catchment, determination of dependable yield.	<b>10</b>

<b>UNIT-II</b>	Crop water requirement and Reservoir Planning: Irrigation and its classification. Crop Water requirement: Cropping seasons, Crop period, base period, Duty, Delta, CCA, GCA, intensity of irrigation, factors affecting duty, Problems on water requirement and capacity of canal. Methods of application of irrigation water and its assessment. Surveys for irrigation project, data collection for irrigation project. Area capacity curve. Silting of reservoir, Rate of silting, factors affecting silting and control measures. Control levels in reservoir, Simple numerical problems on Fixing Control levels.	<b>12</b>
<b>UNIT-III</b>	Dams and Spillways: Dams and its classification: Earthen dams and Gravity dams (masonry and concrete). Earthen Dams – Components with function, typical cross section, seepage through embankment and foundation and its control. Methods of construction of earthen dam, types of failure of earthen dam and preventive measures. Gravity Dams – Forces acting on dam, Theoretical and practical profile, typical cross section, drainage gallery, joints in gravity dam, concept of high dam and low dam. Spillways-Definition, function, location, types and components, Energy dissipaters.	<b>10</b>
<b>UNIT-IV</b>	Minor and Micro Irrigation: Bandhara irrigation: Layout, components, construction and working, solid and open bandhara. Percolation Tanks – Need, selection of site. Lift irrigation Scheme-Components and their functions, Lay out. Drip and Sprinkler Irrigation- Need, components and Layout. Well irrigation: types and yield of wells, advantages and disadvantages of well irrigation.	<b>8</b>
<b>UNIT-V</b>	Diversion Head Works & Canals: Weirs – components, parts, types, K.T. weir – components and construction. Diversion head works – Layout, components and their function. Barrages – components and their functions. Difference between weir and Barrage. Canals – Classification according to alignment and position in the canal network, Cross section of canal in embankment and cutting, partial embankment and cutting, balancing depth, Design of most economical canal section. Canal lining - Purpose, material used and its properties, advantages. Cross Drainage works- Aqueduct, siphon aqueduct, super passage, and level crossing. Canal regulators- Head regulator, Cross regulator, Escape, fall and Outlets.	<b>12</b>

**Text Books:**

1. Punmia, B.C., Pande, B, Lal, Irrigation and Water Power Engineering, Laxmi Publications.
2. Subramanayan, Engineering Hydrology, McGraw Hill Publication.
3. Mutreja K N, Applied Hydrology, McGraw Hill Publication.
4. Sharma, R.K. and Sharma, T.K., Irrigation Engineering, S. Chand Publication.

**Reference Books:**

1. Basak, N.N., Irrigation Engineering, McGraw Hill Education.
2. Dahigaonkar, J.G., Irrigation Engineering, Asian Book Pvt. Ltd., New Delhi.
3. Garg, S K, Irrigation and Hydraulic Structures, Khanna Publishers, Delhi.

## SYLLABUS

### Civil Engineering

<b>Class</b>	<b>Diploma</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Semester/Year</b>	<b>4<sup>th</sup> sem /2<sup>nd</sup> year</b>	<b>2</b>	<b>-</b>	<b>-</b>	<b>2</b>
<b>Subject Name</b>	<b>Transportation Engineering</b>				
<b>Subject Code</b>	<b>DCE20S405</b>				
<b>Paper</b>	<b>English</b>				
	<b>Hindi</b>				
<b>Max. Marks</b>	<b>100</b>				

#### Course Objectives

Following are the objectives of this course:

1. To identify the types of roads as per IRC recommendations.
2. To understand the geometrical design features of different highways.
3. To perform different tests on road materials.
4. To identify the components of railway tracks.

#### Course Outcomes

After competing this course, student will be able to:

- CO1:** Identify the types of roads as per IRC recommendations.  
**CO2:** Implement the geometrical design features of different highways.  
**CO3:** Perform different tests on road materials.  
**CO4:** Identify the components of railway tracks.  
**CO5:** Identify the defects in railway tracks.

<b>Unit</b>	<b>Syllabus</b>	<b>Periods</b>
<b>UNIT-I</b>	Overview of Highway Engineering: Role of transportation in the development of nation, Scope and Importance of roads in India and its' Characteristics. Different modes of transportation – land way, waterway, airway. Merits and demerits of roadway and railway; General classification of roads. Selection and factors affecting road alignment.	<b>8</b>

<b>UNIT-II</b>	Geometric Design of Highway: Camber: Definition, purpose, types as per IRC – recommendations. Kerbs: Road margin, road formation, right of way. Design speed and various factors affecting design speed as per IRC recommendations. Gradient: Definition, types as per IRC – Recommendations. Sight distance (SSD): Definition, types IRC – recommendations, simple numerical. Curves: Necessity, types: Horizontal, vertical curves. Extra widening of roads: numerical examples. Super elevation: Definition, formula for calculating minimum and maximum Super elevation and method of providing super-elevation. Standards cross-sections of national highway in embankment and cutting.	<b>12</b>
<b>UNIT-III</b>	Construction of Road Pavements: Types of road materials and their Tests – Test on aggregates-Flakiness and Elongation Index tests, Angularity Number test, test on Bitumen- penetration, Ductility, Flash and Fire point test and Softening point test. Pavement – Definition, Types, Structural Components of pavement and their functions. Construction of WBM road. Merits and demerits of WBM & WMM road. Construction of Flexible pavement / Bituminous Road, Types of Bitumen and its properties, Emulsion, Cutback, Tar, Terms used in BR-prime coat, tack coat, seal coat, Merits and Demerits of BR. Cement concrete road - methods of construction, Alternate and Continuous Bay Method, Construction joints, filler and sealers, merits and demerits of concrete roads. Types of joints.	<b>10</b>
<b>UNIT-IV</b>	Basics of Railway Engineering: Classification of Indian Railways, zones of Indian Railways, Permanent way: Ideal requirement, Components; Rail Gauge, types, factors affecting selection of a gauge. Rail, Rail Joints - requirements, types. Creep of rail: causes and prevention. Sleepers - functions and Requirement, types - concrete sleepers and their density Ballast - function and types, suitability. Rail fixtures and fastenings – fish plate, spikes, bolts, keys, bearing plates, chairs-types of anchors and anti-creepers.	<b>10</b>
<b>UNIT-V</b>	Track geometrics, Construction and Maintenance: Alignment- Factors governing rail alignment. Track Cross sections – standard cross section of single and double line in cutting and embankment. Important terms-permanent land, formation width, side drains, Railway Track Geometrics: Gradient, curves-types and factors affecting, grade compensation, super elevation, limits of Super elevation on curves, cant deficiency, negative cant, coning of wheel, tilting of rail. Branching of Tracks, Points and crossings, Turn out- types, components, functions and inspection. Track junctions: crossovers, scissor cross over, diamond crossing, track triangle. Station -Purpose, requirement of railway station, important technical terms, types of rail- way station, factors affecting site selection for railway station. Station yard: Classification- Passenger, goods, locomotive and marshalling yards. Function & drawbacks of marshalling yards. Track Maintenance- Necessity, Classification, Tools required for track maintenance with their functions, organisation of track maintenance, Duties of permanent way inspector, gang mate and key man.	<b>12</b>

**Text Books:**

1. L.R. Kadiyali, Transportation Engineering, Khanna Book Publishing Co., Delhi (ISBN: 978-93-82609-858) Edition 2018.
2. Khanna S.K., Justo, C E G and Veeraragavan, A., Highway Engineering, Nem Chand and Brothers, Roorkee.
3. Arora, N. L., Transportation Engineering, Khanna Publishers, Delhi.

**Reference Books:**

1. Saxena S C and Arora S P, A Textbook of Railway Engineering, Dhanpat Rai Publication.
2. Birdi, Ahuja, Road, Railways, Bridge and Tunnel Engineering, Standard Book House, New Delhi.
3. Sharma, S.K., Principles, Practice and Design of Highway Engineering, S. Chand Publication, New Delhi.
4. Duggal, Ajay K. and Puri, V. P., Laboratory Manual in Highway Engineering, New Age International (P) Limited Publishers, New Delhi.
5. Subramanian, K.P., Highway, Railway, Airport and Harbour Engineering, Scitech Publications, Hyderabad.



## SYLLABUS

### Civil Engineering

<b>Class</b>	<b>Diploma</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Semester/Year</b>	<b>4<sup>th</sup> sem /2<sup>nd</sup> year</b>	-	-	<b>2</b>	<b>1</b>
<b>Subject Name</b>	<b>Hydraulics Lab</b>				
<b>Subject Code</b>	<b>DCE20S407</b>				
<b>Paper</b>	<b>English</b>				
	<b>Hindi</b>				
<b>Max. Marks</b>	<b>50</b>				

#### List of experiments to be performed:

1. Use piezometer to measure pressure at a given point.
2. Use Bourdon's Gauge to measure pressure at a given point.
3. Use U tube differential manometer to measure pressure difference between two given points.
4. Find the resultant pressure and its position for given situation of liquid in a tank.
5. Use Reynolds's apparatus to determine type of flow.
6. Use Bernoulli's apparatus to apply Bernoulli's theorem to get total energy line for a flow in a closed conduit of varying cross sections.
7. Use Friction factor Apparatus to determine friction factor for a given pipe.
8. Determine minor losses in pipe fittings due to sudden contraction and sudden enlargement.
9. Determine minor losses in pipe fitting due to Bend and Elbow.
10. Calibrate Venturimeter to find out the discharge in a pipe.
11. Calibrate the Orifice to find out the discharge through a tank.
12. Use Current meter to measure the velocity of flow of water in open channel.
13. Use Pitot tube to measure the velocity of flow of water in open channel.
14. Use triangular notch to measure the discharge through open channel.
15. Use Rectangular notch to measure the discharge through open channel.
16. Determine the efficiency of centrifugal pump.



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### Civil Engineering

<b>Class</b>	<b>Diploma</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Semester/Year</b>	<b>4<sup>th</sup> sem /2<sup>nd</sup> year</b>	-	-	<b>4</b>	<b>2</b>
<b>Subject Name</b>	<b>Building Planning and Drawing Lab</b>				
<b>Subject Code</b>	<b>DCE20S408</b>				
<b>Paper</b>	<b>English</b>				
	<b>Hindi</b>				
<b>Max. Marks</b>	<b>50</b>				

#### List of experiments/Drawings to be completed:

##### A. Sketch Book:

1. Draw various types of lines, graphical symbols for materials, doors and windows, symbols for sanitary, water supply and electrical installations and write abbreviations as per IS 962.
2. Write summary of observations of all technical details from the given drawing (One/Two BHK) obtained from the professional architect or civil engineer (Group activity in four students).
3. a) Measure the units of existing building (Load Bearing / Frame structure).  
b) Draw line plan of measured existing building at serial no 3a to the suitable scale.
4. Draw line plan to suitable scale (Minimum 1BHK, staircase, WC and Bathroom).  
a) Residential Bungalows ( Minimum three plans)  
b) Apartment (Minimum two plans)
5. Draw line plans to suitable scale for any Five Public Buildings from the following (School Building, Primary Health Centre, Bank, Post Office, Hostel, Restaurant, Community Hall and Library).
6. Draw the following plans for a Framed Structure (One/Two BHK) from given line plan.  
a. Developed plan, Elevation.  
b. Section for above developed plan.  
c. Site plan for above drawings including area statement, schedule of opening and construction notes.

##### B. Full Imperial Size Sheet (A1)

1. Draw submission drawing to the scale 1:100 of a single storey load bearing residential building (2BHK) with flat Roof and staircase showing:  
a. Developed plan and elevation.  
b. Section passing through Stair or W.C. and Bath.  
c. Foundation plan and schedule of openings.  
d. Site plan (1:200), area statement, construction notes.
2. Draw submission drawing, to the scale of 1:100, of (G+1) Framed Structure Residential Building (2BHK) with Flat Roof and staircase showing:  
a. Developed plan  
b. Elevation.  
c. Section passing through Staircase, WC and Bath.

- d. Site plan (1:200) and area statement.
  - e. Schedule of openings and Construction Notes.
3. Draw the above mentioned drawing at serial number (B-2) using CAD software and enclose the print out.
- a. Developed plan
  - b. Elevation
  - c. Section passing through Staircase, W.C. and Bath.
  - d. Foundation plan
  - e. Site plan (1:200), area statement, Schedule of openings and construction notes.
4. Draw working drawing for above mentioned drawing at serial number (B-2) showing:
- a. Foundation plan to the scale 1:50.
  - b. Detailed enlarged section of RCC column and footing with plinth filling.
  - c. Detailed enlarged section of RCC Beam, Lintel and Chajjas.
  - d. Detailed enlarged section of RCC staircase and slab.
5. Draw two point perspective drawing of small objects - steps, monuments, pedestals (any one) scale 1:50.
- a. Draw plan, elevation, eye level, picture plane and vanishing points.
  - b. Draw perspective view.

**SYLLABUS**
**Civil Engineering**

<b>Class</b>	<b>Diploma</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Semester/Year</b>	<b>4<sup>th</sup> sem /2<sup>nd</sup> year</b>	-	-	<b>2</b>	<b>1</b>
<b>Subject Name</b>	<b>Water Resource Engineering Lab</b>				
<b>Subject Code</b>	<b>DCE20S409</b>				
<b>Paper</b>	<b>English</b>				
	<b>Hindi</b>				
<b>Max. Marks</b>	<b>50</b>				

**List of experiments to be performed:**

1. Calculate average rainfall for the given area using arithmetic mean method.
2. Calculate average rainfall for the given area using isohyetal, Thiessen polygon method.
3. Compute the yield of the Catchment area demarcated in Sr.No.2.
4. Delineation of contributory area for the given outlet from the given toposheet.
5. Estimate crop water requirement for the given data.
6. Estimate capacity of the canal for the given data.
7. Calculate reservoir capacity from the given data.
8. Calculate control levels for the given data for a given reservoir.
9. Draw a labeled sketch of the given masonry/earthen dam section.
10. Draw the theoretical and practical profile of the given gravity dam section.
11. Prepare a presentation on the technical details of any one micro or minor irrigation scheme.
12. Prepare a model of any irrigation structure using suitable material.
13. Prepare a maintenance report for any major/minor irrigation project site in the vicinity of your area, based on field visit.
14. Prepare summary of the technical details of any existing water resource project in the vicinity of your area.
15. Draw a labeled sketch of the given diversion head works and Cross Drainage works.
16. Design a canal section for the given conditions with estimation of the quantity of material required for lining.



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### Civil Engineering

<b>Class</b>	<b>Diploma</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Semester/Year</b>	<b>4<sup>th</sup> sem /2<sup>nd</sup> year</b>	-	-	<b>2</b>	<b>1</b>
<b>Subject Name</b>	<b>Transportation Engineering Lab</b>				
<b>Subject Code</b>	<b>DCE20S410</b>				
<b>Paper</b>	<b>English</b>				
	<b>Hindi</b>				
<b>Max. Marks</b>	<b>50</b>				

#### List of experiments to be performed:

1. Draw the sketches showing standard cross-sections of Expressways, Freeways, NH/SH, MDR/ODR.
2. Flakiness and Elongation Index of aggregates.
3. Angularity Number of aggregates.
4. Aggregate impact test.
5. Los Angeles Abrasion test.
6. Aggregate crushing test.
7. Softening point test of bitumen.
8. Penetration test of bitumen.
9. Flash and Fire Point test of bitumen.
10. Ductility test of Bitumen.
11. Visit the constructed road for visual inspection to identify defects and suggest remedial measures.
12. Prepare the photographic report containing details for experiment No. 11.
13. Visit the hill road constructed site to understand its components.
14. Prepare the photographic report containing details for experiment No. 13.
15. Visit the road of any one type (flexible or rigid) to know the drainage condition.
16. Prepare the photographic report suggesting possible repairs and maintenance for experiment No. 15.
17. Visit to railway track for visual inspection of fixtures, fasteners and yards.
18. Prepare the photographic report containing details for experiment No. 17.

