

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN CIVIL ENGINEERING	
Course Code: PC301	Course Title: Construction Technology
Semester: III	Credits: 03
Periods Per Week: 4 (L: 3, T: 1, P: 0)	

COURSE OBJECTIVE:

1. To gain knowledge on different materials in advanced construction
2. To know different methods in concreting.
3. To know the relevance of advanced construction methods for particular site condition.
4. To identify the requisite hoisting and conveying machinery for the given situation

COURSE CONTENT

1. **Advanced Construction Materials (08 hrs)**
 - 1.1 Fibres: Use and properties of steel, polypropylene, carbon and glass fibres.
 - 1.2 Plastics: Use and properties of PVC, RPVC, HDPE, FRP, GRP.
 - 1.3 Miscellaneous Materials: Properties and uses of acoustics materials, wall claddings, plaster boards, micro-silica, waterproofing materials, adhesives.
 - 1.4 Use of waste products and industrial by products in bricks, blocks, concrete and mortar.
2. **Advanced Technology in Constructions (08 hrs)**
 - 2.1 Construction of bridges and flyovers: Equipments and machineries required for foundation and super structure.
 - 2.2 Construction of multi-storeyed Building: Equipments and machinery required for construction of multi-storeyed building such as use of lifts, belt conveyers, pumping of concrete.
 - 2.3 Prefabricated construction: Methods of prefabrication, Plant fabrication and site fabrication, all prefabricated building elements such as wall panels, slab

panels, beams, columns, door and window frames etc. Equipments and machineries used for placing and jointing of prefabricated elements.

2.4 Strengthening of embankments by soil reinforcing techniques using geosynthetics

3. Hoisting and Conveying Equipments (06 hrs)

3.1 Hoisting Equipments: Principles and working of Derrick-Pole, Gin Pole, Crane, Power driven scotch derrick crane, Hand operated crane, Locomotive crane, Tower crane, Lattice Girder, Winches, Elevators, ladders. Crawler cranes, Truck mounted cranes, Gantry cranes, Mast cranes.

3.2 Conveying Equipments: Working of belt conveyers, types of belts and conveying mechanism. Capacity and use of dumpers, tractors and trucks.

4. Drilling and Blasting (08 hrs)

4.1 Drilling

4.1.1 Types, Drilling requirements

4.1.2 Selecting the drilling pattern for blasting

4.1.3 Effect of air pressure on drilling operation

4.1.4 Betonies/mud slurry in drilling

4.1.5 Factors affecting the selection of drilling method and equipment.

4.2 Blasting

4.2.1 Explosives for blasting: Dynamite, Blasting caps Prime line, Safety fuse ,Stemming, Blast hole, Prime detonators

4.2.2 Process of using explosive

4.2.3 Types of blasting, Precautions

4.2.4 Storage of explosives

4.2.5 Features of magazine building

5. Miscellaneous Machineries and Equipments (08 hrs)

5.1 Excavation Equipments: Use, working and output of following machinery – bull dozers, scrapers, graders, Clam Shell, trenching equipment, Tunnel boring machine, Wheel mounted belt loaders, power shovels, JCB, and drag lines.

5.2 Compacting Equipments: Output of different types of rollers such as plain rollers, ship footed rollers, vibratory, pneumatic rollers rammers.

5.3 Miscellaneous Equipments: Working and selection of equipments: Pile driving equipments, Pile hammers, Hot mix bitumen plant, bitumen paver, grouting equipment, guniting equipments, floor polishing and cutting machine selection of drilling pattern for blasting, Bentonite/mud slurry in drilling, Explosives for blasting, Dynamite, process of using explosives.

RECOMMENDED BOOKS

1. Sharma S C and Deodhar S V, Construction Engineering and Management, Khanna Book Publishing, New Delhi
2. Chudly, R., Construction Technology Vol. I to II, ELBS-Longman Group.
3. Peurifoy, R. L., Construction Planning Equipment and Methods, McGraw Hill Co. Ltd. New York.
4. Smith, R. C., Materials of C
5. onstruction, McGraw Hill Co. Ltd.
6. Satyanarayana, R Saxena, S. C., Construction Planning and Equipment, Standard Publication, New Delhi.
7. Rangawala,S. C., Construction of Structures and Management of works, Charotar Publication, Anand.
8. Ghose,D. N., Materials of Construction, McGraw Hill Publishing Co, New Delhi.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	08	20
2	08	22
3	06	18
4	08	20
5	08	20
Total	38	100

COURSE OUTCOME

After completing this course, student will be able to:

1. Use relevant materials in advanced construction of structures.
2. Use relevant method of concreting and equipment according to type of construction.
3. Apply advanced construction methods for given site condition.
4. Select suitable hoisting and conveying equipment for a given situation.
5. Identify advanced equipment required for a particular site condition.

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN CIVIL ENGINEERING	
Course Code: PC 302	Course Title: Concrete Technology
Semester: III	Credits: 3
Periods Per Week: (L: 3, T: 0, P:0)	

COURSE OBJECTIVES:

Diploma holders in Civil Engineering are supposed to supervise concreting operations involving proportioning, mixing, transporting, placing, compacting, finishing and curing of concrete. To perform above functions, it is essential to impart knowledge and skills regarding ingredients of concrete and their properties; properties of concrete in plastic and hardened stage, water cement ratio and workability; proportioning for ordinary concrete; concreting operations and joints in concrete.

COURSE CONTENT

- 1. Introduction (02 hrs)**
 1. Definition of concrete.
 2. Uses of concrete in comparison to other building materials.

- 2. Ingredients of Concrete (06 hrs)**
 1. **Cement:** physical properties of cement; different types of cement as per IS Codes
 2. **Aggregates:** Classification of aggregates according to size and shape
 3. **Characteristics of aggregates:** Particle size and shape, surface texture, specific gravity of aggregate; bulk density, water absorption, surface moisture, bulking of sand, deleterious materials, soundness
 4. **Grading of aggregates:** Coarse aggregate, fine aggregate; All-in- aggregate; fineness modulus; interpretation of grading charts
 5. **Water:** Quality requirements as per IS:456-2000

- 3. Water Cement Ratio (02 hrs)**
 1. Hydration of cement

2. Principle of water-cement ratio
3. Duff Abram's Water-cement ratio law: Limitations of water-cement ratio law and its effects on strength of concrete
- 4. Workability (05 hrs)**
 1. Workability factors affecting workability
 2. Measurement of workability: slump test, compacting factor and Vee Bee consistometer
 3. Recommended slumps for placement in various conditions as per IS:456-2000/SP-23
- 5. Properties of Concrete (08 hrs)**
 1. Properties in plastic state: Workability, Segregation, Bleeding and Harshness
 2. Properties in hardened state: Strength, Durability, Impermeability, Dimensional changes
- 6. Proportioning for Normal Concrete (04 hrs)**
 - 6.1** Objectives of mix design, introduction to various grades as per IS:456- 2000; proportioning for nominal mix design as prescribed by IS 456-2000
 - 6.2 Adjustment on site for: Bulking of fine aggregate, water absorption of aggregate, workability
 - 6.3 Difference between nominal and controlled concrete
 - 6.4 Introduction to IS-10262-2009-Code for controlled mix design
- 7. Introduction to Admixtures (03 hrs)**
 - 7.1 (chemicals and minerals) for improving performance of concrete
- 8. Special Concretes (06 hrs)**
 - 8.1 Concreting under special conditions, difficulties and precautions before, during and after concreting
 - 8.1.1 Cold weather concreting
 - 8.1.2 Under water concreting
 - 8.1.3 Hot weather concreting
 - 8.2 Ready mix concrete

- 8.3 Fibre reinforced concrete
- 8.4 Polymer Concrete
- 8.5 Fly ash concrete
- 8.6 Silica fume concrete

9. Concreting Operations (12 hrs)

- 9.1 Storing of Cement:
 - 9.1.1 Storing of cement in a warehouse
 - 9.1.2 Storing of cement at site
 - 9.1.3 Effect of storage on strength of cement
 - 9.1.4 Determination of warehouse capacity for storage of Cement
- 9.2 Storing of Aggregate: Storing of aggregate at site
- 9.3 Batching (to be shown during site visit)
 - 9.3.1 Batching of Cement
 - 9.3.2 Batching of aggregate by:
 - 9.3.2.1 Volume,using gauge box (farma) selection of proper gauge box
 - 9.3.2.2 Weight spring balances and batching machines
 - 9.3.3 Measurement of water
- 9.4 Mixing:
 - 9.4.1 Hand mixing
 - 9.4.2 Machine mixing - types of mixers, capacities of mixers, choosing appropriate size of mixers, operation of mixers
 - 9.4.3 Maintenance and care of machines
- 9.5 Transportation of concrete: Transportation of concrete using: wheel barrows, transit mixers, chutes, belt conveyors, pumps, tower crane and hoists etc.
- 9.6 Placement of concrete:Checking of form work, shuttering and precautions to be taken during placement
- 9.7 Compaction:

- 9.7.1 Hand compaction
- 9.7.2 Machine compaction-types of vibrators, internal screed vibrators and form vibrators
- 9.7.3 Selection of suitable vibrators for different situations
- 9.8 Finishing concrete slabs - screeding, floating and trowelling
- 9.9 Curing:
 - 9.9.1 Objectives of curing, methods of curing like ponding, membrane curing, steam curing, chemical curing
 - 9.9.2 Duration for curing and removal of form work
- 9.10 Jointing: Location of construction joints, treatment of construction joints, expansion joints in buildings - their importance and location
- 9.11 Defects in concrete: Identification of and methods of repair

RECOMMENDED BOOKS

1. Kulkarni, PD; Ghosh, RK and Phull, YR; "Text Book of Concrete Technology"; Oxford and IBH Publishing Co. New Delhi
2. Krishnamurthy, KT; Rao, A Kasundra and Khandekar, AA; "Concrete Technology"; Dhanpat Rai and Sons, Delhi,
3. Gupta BL and Gupta Amit; "Text Book of Concrete Technology"; Standard Publishers Distributors, Delhi.
4. Varshney, RS;"Concrete Technology";, Oxford and IBH Publishing, New Delhi
5. Neville, AM; "Properties of Concrete", Pitman (ELBS Edition available), London
6. Orchard; "Concrete Technology"; Vol I, II, and III
7. Handoo, BL; Puri, LD and Mahajan Sanjay "Concrete Technology"; Satya Prakashan, New Delhi,
8. Sood, Hemant, Mittal LN and Kulkarni PD; "Laboratory Manual on Concrete Technology", CBS Publishers, New Delhi, 2002
9. Vazirani, VN; and Chandola, SP; "Concrete Technology"; Khanna Publishers, Delhi,
10. Gambhir, ML; "Concrete Technology";, MacMillan India Ltd., New Delhi
11. Siddique, R., "Special Structural Concretes", , Galgotia Publishers Pvt. Ltd. Delhi

12. Birinder Singh, "Concrete Technology", Kaption Publications, Ludhiana,
13. Module on 'Special Concretes by Dr Hemant Sood , NITTTR Chandigarh
14. Concrete Technology by P Dayaratman
15. Video programme on different experiments in 'Concrete Technology' developed by NITTTR, Chandigarh.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	02	04
2	06	12
3	02	04
4	05	10
5	08	18
6	04	08
7	03	07
8	06	12
9	12	25

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN CIVIL ENGINEERING	
Course Code: PC 306	Course Title: Concrete Technology
Semester: III	Credits: 1
Periods Per Week: (L: 0, T: 0, P:2)	

PRACTICAL EXERCISES:

1. To determine flakiness and elongation index of coarse aggregates
2. To determine silt in fine aggregate
3. Determination of specific gravity and water absorption of aggregates
4. Determination of bulk density and voids of aggregates
5. To determine surface moisture in fine aggregate by displacement method
6. Determination of particle size distribution of fine, coarse and all in aggregate by sieve analysis (grading of aggregate)
7. To determine necessary adjustment for bulking of fine aggregate
8. To determine workability by slump test:
9. To verify the effect of water, fine aggregate/coarse aggregate ratio and aggregate/Cement ratio on slump
10. Compaction factor test for workability
11. Tests for compressive strength of concrete cubes for different grades of concrete

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN CIVIL ENGINEERING	
Course Code:	Course Title: Structural Mechanics
Semester: 3 rd	Credits: 3
Periods per week: (L:3, T:0, P:)	

COURSE OBJECTIVE

This is a basic engineering subject. The purpose of the subject is to impart basic knowledge and skill regarding properties of materials, concept of stresses and strains, bending moment and shear force diagrams, second moment of area, bending and shear stresses, slope and deflection and analysis of trusses. The above knowledge will be useful for designing simple structural components. This subject is very important to develop basic concepts and principles related to strength of materials. This subject will also enable the students to continue their further education.

COURSE CONTENT

1. STRESSES AND STRAINS

1.1 Properties of Materials: Classification of materials, elastic materials, plastic materials, ductile materials, brittle materials.

1.2 Introduction to tensile test, compressive test, impact test, fatigue test, torsion test on metals.

1.3 Simple Stresses and Strains: Concept of stress, normal and shear stresses, Concept of strain and deformation, longitudinal and transverse strain, Poisson's ratio, volumetric strain.

1.4 Hooke's law, moduli of elasticity and rigidity, Bulk modulus of elasticity, relationship between the elastic constants. Stresses and strains in bars subjected to tension and compression. Extension of uniform bar under its own weight, stress produced in compound bars (two or three) due to axial load.

1.5 Stress-strain diagram for mild steel and HYSD steel, mechanical properties, factor of safety. Temperature stresses and strains.

2. SHEAR FORCE AND BENDING MOMENT

2.1 Shear Force and Bending Moment: Concept of a beam and supports (Hinges, Roller and Fixed), types of beams: Simply supported, cantilever, propped, over hang, cantilever and continuous beams (only concept).

2.2 Types of loads (dead load, live load, snow load, wind load seismic load as per IS Codes etc) and types of loading (point, uniformly distributed and uniformly varying loads)

2.3 Concept of bending moment and shear force, sign conventions .Bending Moment and shear force diagrams for cantilever, simply supported and overhanging beams subjected to concentrated, uniformly distributed load. Relationship between load, Shear force and Bending moment, Point of maximum bending moment, and Point of contra flexure.

2.4 Moment of Inertia: Concept of moment of inertia and second moment of area and radius of gyration, theorems of parallel and perpendicular axis, second moment of area of common geometrical sections: rectangle, triangle, circle (without derivations). Second moment of area for L, T and I sections, Section modulus.

3. BENDING AND SHEAR STRESSES

3.1 Bending Stresses in Beams: and Shear Stresses: Concept of pure/simple bending Assumptions made in the theory of simple bending, derivation and application of bending equation to circular cross-section, I section, T&L sections only.

3.2 Moment of resistance Calculations of bending stresses in simply supported beam Combined Direct and Bending Stresses: Concentric and eccentric loads single axis eccentricity only. Effect of eccentric load on the section stresses due to eccentric loads, Numerical in the case of short columns.

3.3 Simple problems on stability of masonry dams and retaining walls. Shear Stresses in Beams: Concept of shear stresses in beams, shear stress distribution in rectangular, circular I, T, L sections (Formula to be stated, no derivation)

4. COLUMNS

4.1 Columns: Theory of columns, Eulers and Rankine Formula (No derivation)

4.2 Slope and Deflection of Beams, Necessity for Slope and Deflection: Moment area theorem (no derivation, numerical problems)

5. TRUSSES

5.1 Truss: Introduction to Analysis of Trusses, Concept of a perfect, redundant and deficient frames .

5.2 Assumptions and analysis of trusses by :Method of joints ,Method of sections ,Graphical method

Recommended Books

1. Ramamrutham, S., "Strength of Materials", Dhanpat Rai and Sons., New Delhi
2. Ram Chandra, "Applied Mechanics and Strength of Materials", Standard Publishers. Delhi:
3. Punmia, BC., "Strength of Materials", Standard Publishers, Delhi,
4. Prasad VS " Structural mechanics Galgotia publications Pvt Ltd, Delhi
5. Sadhu Singh "Strengths of Materials" Standard Publishers, New Delhi
6. Singh Birinder "Structural Mechanics" Kaption Publishers, Ludhiana
7. Singh Harbhajan, " Structural Mechanics" ., Abhishek Publishers, Chandigarh

UNIT WISE TIME AND MARKS DISTRIBUTION

UNIT	TIME (HOURS)	MARKS(%age)
1	08	15
2	08	40
3	08	20
4	08	15
5	08	10
TOTAL	40	100

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN CIVIL ENGINEERING	
Course Code: PC307	Course Title: Structural Mechanics lab
Semester: 3 rd	Credits: 1
Periods per week: 2(L: T:0, P:2)	

STRUCTURAL MECHANICS LAB

- 1.** Determination of yield stress, ultimate stress, percentage elongation and plot the stress strain diagram and compute the value of young's modulus on mild steel.
- 2.** Testing of HYSD Steel.
- 3.** Determination of Young's modulus of elasticity for steel wire with sear's apparatus.
- 4.** Determination of modulus of rupture of a concrete beam.
- 5.** Determination of maximum deflection and young's modulus of elasticity in simply supported beam with load at middle third point.
- 6.** Verification of forces in a framed structure

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN CIVIL ENGINEERING	
Course Code: PC304	Course Title: Basic Surveying
Semester: III	Credits: 3
Periods Per Week: (L: 3, T: 0, P: 0)	

COURSE OBJECTIVES:

- To develop the concept of basic principles of surveying including the uses of chain and plane table survey.
- To demonstrate bearing, declination, dip, traversing etc
- To impart idea about leveling and sectioning of surfaces

COURSE CONTENT

1. Introduction:

(03 hrs)

- 1.1. Concept of surveying
- 1.2. Principles of surveying
- 1.3. Purpose of surveying
- 1.4. Plane surveying and geodetic surveying
- 1.5. Classification of surveys based on instruments
- 1.6. Reconnaissance survey
- 1.7. Units of measurements - linear and angular measurements

2. Chain surveying:

(06 hrs)

- 2.1 Purpose of Chain Surveying
- 2.2 Instrument used in Chain Surveying
- 2.3 Different types of chain and tape
- 2.4 Technical Terms related with chain survey
- 2.5 Ranging - different methods
- 2.6 Chaining and taking offsets, setting out right angles.
- 2.7 Calculate the area of the plot by cross staff survey and triangulation (simple problems)
- 2.8 Obstacles in chaining and methods to overcome obstacles

2.9 Conventional signs

3. Compass surveying:

(07 hrs)

- 3.1 Introduction, Triangulation Survey & Traversing
- 3.2 Components of Prismatic Compass and its Functions
- 3.3 Method to use Prismatic Compass: Technical Terms
- 3.4 Whole Circle Bearing System and Reduced Bearing
- 3.5 System & examples on conversion of given bearing to another bearing (from one form to another)
- 3.6 Method of finding included angles from bearings & examples
- 3.7 Local attraction and Closing error with relevant examples
- 3.8 Errors in compass survey and elimination of errors

4. LEVELLING & CONTOURING (15 hrs)

- 4.1 Purpose of levelling, concept of a level surface, horizontal surface, vertical surface, datum, reduced level and benchmarks
- 4.2 Identification of various parts of Auto level/dumpy: advantages and disadvantages and use of auto level/dumpy level.
- 4.3 Concepts of line of collimation, axis of the bubble tube, axis of the telescope and vertical axis
- 4.4 Levelling staff: single piece, folding, invar precision staff, telescopic
- 4.5 Concept of back sight, foresight, intermediate sight, change point, to determine reduce levels
- 4.6 Level book and reduction of levels by
 - a. Height of collimation method and
 - b. Rise and fall method
- 4.7 Arithmetic checks, problem on reduction of levels
- 4.8 Basic concept of contouring, contour interval, Characteristics of contour, Methods of locating contours

- 4.9 Interpolation & extrapolation of contour, Contour gradient, Use of contour maps
- 4.10 Locating the proposed route for a road on a contour map
- 4.11 Computations of Areas/Volumes of regular figures and irregular figures. Simpson's rule: prismatic formula and graphical method use of planimeter for computation of areas, numerical problems

5. Plane Table Surveying

(6 hrs)

- 5.1 Purpose of Plane table survey
- 5.2 Equipment used in Plane table
- 5.3 Setting up the plane table
- 5.4 Methods of Plane Table Surveying
 - 5.4.1 Radiation
 - 5.4.2 Intersection
 - 5.4.3 Traversing,
 - 5.4.4 Resection.
- 5.5 Sources of errors in plane tabling.
- 5.6 Problem on above topics.

RECOMMENDED BOOKS

1. Surveying – N.N.Basak – Tata McGraw Hill
2. Surveying Vol-I – S.K.Duggal -McGraw Hill Edn (India) Pvt Ltd
3. Surveying and Levelling Vol -1 -Kulkarni and Kanetkar
4. Surveying and Levelling Vol. – 1 – B.C. Punmia
5. Surveying and Levelling -Vol -1 -R.Agor- Khanna Publishers
6. Kocher, CL; "A Textbook of Surveying"; Ludhiana, Katson Publishing House

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	3	10
2	6	15
3	7	20
4	15	35
5	6	20
Total	37	100

COURSE OUTCOME

After completion of the course the student is able to:

- Select the type of survey required for given situation.
- Compute area of open fields using chain, tape and cross staff.
- Conduct traversing in the field using chain and compass
- Explain the principles and procedures of Compass Surveying and acquaint with checking for local attraction to compute included angles from given bearings
- Calculate the included angles for plotting the closed traverse for the given data and adjust the closing error by using Bowditch rule

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN CIVIL ENGINEERING	
Course Code: PC308	Course Title: Basic Surveying Lab
Semester: III	Credits: 1
Periods Per Week: (L: 0, T: 0, P: 2)	

COURSE OBJECTIVES:

While framing the curriculum for the subject of surveying, stress has been given to the development of the skill in each type of survey like chain surveying, compass surveying levelling, that the Civil Engineering diploma holder will normally be called upon to perform and plane table surveying,

LIST OF PRACTICALS

- I. Chain surveying:
 - i) a) Ranging a line
 - b) Chaining a line and recording in the field book
 - c) Taking offsets - perpendicular and oblique (with a tape only)
 - d) Setting out right angle with a tape
 - ii) Chaining of a line involving reciprocal ranging
 - iii) Chaining a line involving obstacles to ranging
 - iv) Chain Survey of a small area.
- II. Compass Surveying: i) a) Study of prismatic compass b) Setting the compass and taking observations c) Measuring angles between the lines meeting at a point
- III. Levelling:
 - i) a) Study of dumpy level and levelling staff
 - b) Temporary adjustments of various levels

- c) Taking staff readings on different stations from the single setting and finding differences of level between them
- ii) To find out difference of level between two distant points by shifting the instrument
- iii) Longitudinal and cross sectioning of a road/railway/canal
- iv) Setting a gradient by dumpy and auto-level
- v) Preparing a contour plan by direct and indirect methods

IV. Plane Table Surveying:

- i) a) Study of the plane table survey equipment
- b) Setting the plane table
- c) Marking the North direction
- d) Plotting a few points by radiation method
- ii) a) Orientation by - Trough compass - Back sighting
- b) Plotting few points by intersection, radiation and resection method
- iii) Concept of Two point and Three point problems

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN CIVIL ENGINEERING	
Course Code: PC 305	Course Title: Building Construction
Semester: 3 rd	Credits:3
Periods Per Week: 3 (L:3, T:0, P:0)	

COURSE OBJECTIVE:

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.
5. To implement safe building construction practices.

COURSE CONTENT:

1. Introduction: (04 Hours)

- 1.1. Definition of a building
- 1.2. Classification of Buildings
 - 1.2.1. As per National Building Code Group A to I,
 - 1.2.2. As per Types of Constructions- Load Bearing Structure, Framed Structure, Composite Structure.
- 1.3. Different parts of a building
 - 1.3.1. Functions of Building Components,
 - 1.3.2. Substructure: Foundation, Plinth.
 - 1.3.3. Superstructure: Walls, Partition wall, Cavity wall, Sill, Lintel, Doors and Windows, Floor, Roof, Columns, Beams, Parapet.

2. Substructure (07 Hours)

- 2.1. Layout: Site Clearance, Layout/setting out for surface excavation,
- 2.2. Earthwork: Excavation for Foundation, Timbering and Shuttering, Plinth Filling, Tools and plants used for earthwork.
- 2.3. Foundation: Concept of foundation and its purpose, Functions of foundation, Types of foundation: Shallow and deep
 - 2.3.1. Shallow Foundation: Stepped Footing, Wall Footing, Column Footing, Raft Foundation, Grillage Foundation.
 - 2.3.2. Deep Foundation: Pile Foundation, Well foundation and Caissons, Pumping Methods of Dewatering

3. Superstructure (10 Hours)

- 3.1. Brick masonry: Definition of terms used in brick masonry- header, stretcher, queen closer, king closer, frog and quoin, course, bond, facing, backing, hearting, jambs, reveals, soffits.
 - 3.1.1. Bonds in brick masonry: header bond, stretcher bond, English bond and Flemish bond.
 - 3.1.2. Requirements of good brick masonry. Junctions in brick masonry and their purpose and procedure.
- 3.2. Stone Masonry: Terms used in stone masonry: facing, backing, hearting, through stone, corner stone, cornice.
 - 3.2.1. Types of stone masonry: Rubble masonry, Ashlar Masonry and their types. Joints in stone masonry and their purpose. Selection of Stone Masonry
 - 3.2.2. Comparison between stone and Brick Masonry. Tools and plants required for construction of stone and brick masonry. Hollow concrete block masonry and composite masonry- Stone facing with brick backing, brick facing with concrete backing.
- 3.3. Scaffolding and Shoring: Purpose, Types of Scaffolding, Platform used for multi-storey buildings Process of Erection and Dismantling. Purpose and Types of Shoring, Underpinning.
- 3.4. Formwork: Definition of Formwork, Requirements of Formwork, Materials used in Formwork, Types of Formwork, Removal of formwork.

4. Building Communication

(10 Hours)

- 4.1. Horizontal Communication:
 - 4.1.1. Doors : Location, technical terms, Components of Doors, types and suitability, sizes of door recommended by BIS.
 - 4.1.2. Windows: Location, technical terms, Components of windows, types and suitability, Sizes of Windows recommended by BIS. Factors affecting selection of size, shape, location and no. of windows. Ventilators.
 - 4.1.3. Fixtures and fastenings for doors and windows- Material used and functions of Window Sill and Lintels, Shed / Chajja.
- 4.2. Vertical Communication:
 - 4.2.1. Means of Vertical Communication- Stair Case, Ramps, Lift, Elevators and Escalators. Terms used in staircase
 - 4.2.2. Types of staircase: Straight, dog-legged, open well, Spiral, quarter turn, bifurcated,

5. Building Finishes

(07 Hours)

- 5.1. Floors: 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,
- 5.2. Roofs: Roofing Materials- RCC, Mangalore Tiles, AC Sheets, G.I. sheets, Corrugated G.I. Sheets, Plastic and Fibre Sheets.
- 5.3. Wall Finishes:

- 5.3.1. Plastering – Necessity of 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.
- 5.3.2. Pointing – Necessity, Types of pointing and procedure of Pointing.
- 5.3.3. Painting –Necessity, Surface Preparation for painting, Methods of Application.

COURSE OUTCOME:

After the completion of the course the student will be able to:

1. Execute safe practices in building construction activities
2. Propose suitable type of foundation for building structures.
3. Select suitable type of masonry for building structures.
4. Execute various types of masonry.
5. Propose relevant means of communications for different types of buildings.
6. Select relevant material for finishing works.
7. Select appropriate formwork.

RECOMMENDED BOOKS:

1. Building Construction S. P. Arora and Bindra Dhanpat Rai Publication, Delhi Edition 2013.
2. Building Construction S. C. Rangawala Charotar Publication, Dist-Anand
3. Building Construction B. C. Punmia and A.K.Jain Firewall Media, 2005
4. Building Construction S.K. Sharma S. Chand and Co. Pvt. Ltd., New Delhi
5. Building Construction Dr.Janardan Zha Khanna Publication, New Delhi 2007,
6. Building Construction S. S. Bhavikatti Vikas Publication House Pvt. Ltd., New Delhi
7. A to Z Building Construction Sandip Mantri Satya Prakashan; New Delhi (2015)
8. Building construction illustrated Francis D.K. Ching Wiley India, USA, 2014

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit	Time Allotted(Hrs)	Marks Allotted (%)
1	04	10
2	07	25
3	10	25
4	10	20
5	07	20
Total	38	100

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN CIVIL ENGINEERING	
Course Code: PC 309	Course Title: Building Construction Lab
Semester: 3 rd	Credits: 1
Periods Per Week: 2 (L:0, T:0, P:2)	

COURSE OBJECTIVE:

This course will facilitate the development of basic construction skill which a diploma holder must possess. The students should be able to supervise and execute the construction activities of substructures and superstructure of buildings.

LIST OF PRACTICALS:

1. To visit the institute building to study different components of building, types of Structures, etc.
2. Demonstration of tools and plants used in building construction.
3. To set out foundation plan on ground for load bearing structure.
4. To construct brick bonds in one, one and half and two brick thick walls for L, T and cross junction.
5. To visit building construction site to understand construction of substructure.
6. To visit building construction site to understand construction of super structure, plastering and painting work.
7. Group activity of model making like scaffolding, formwork, centering.
8. Observing the models, specimen of different types of foundations.
9. Observing the models, specimen of different types of doors, windows and stairs.

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN CIVIL ENGINEERING	
Course Code: ES310	Course Title: Building Drawing and CAD
Semester: III	Credits: 3
Periods Per Week: (L: 0, T: 0, P: 6)	

COURSE OBJECTIVES:

Following are the objectives of this course:

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

COURSE CONTENT:

Drawing No.1: (2sheets)

Details of spread footing foundations, load bearing and non-load bearing wall for given thickness of walls with the help of given data or rule of the thumb, showing offsets, position of DPC. The details of the concrete and brick plinth protection have to be shown in the drawing.

Drawing No.2: (one sheet)

Plans of "T" and Corner junction of walls of 1 Brick, 1-1/2 Brick and 2 brick thick in English bond.

Drawing No.3: (2sheets)

Detailed drawing of basement, single wooden floor, double wooden floor.

Drawing No.4 (3sheets)

Elevation, sectional plan and sectional side elevation of flush door, glazed door, paneled door and window, Aluminum door and window with wire gauge shutter. Sketches of various joints of different members.

Drawing No.5 (one sheet)

Draw at least one sheet using CAD software.

Drawing No.6: (2 sheet)

Drawing plan, elevation of a small building by measurement and foundation detail and sectional elevation.

DrawingNo.7(a)

(4sheets)

Drawing detailed plan, elevation and section of a two room residential building from a given line plan, showing details of foundations, roof and parapet.

DrawingNo.7(b)

Draw detailed plan, elevation and section of:

- (i) Single flight R.C.C. staircase
- (ii) Dog legged wooden staircase

Drawing No.8

(one sheet)

Drawings of following floors

Cement concrete floors on ground and at first floor

- i) Conglomerate (Concrete Flooring)
- ii) Bonded cement concrete flooring
- iii) Terrazo flooring
- iv) Ceramic/vitrified tile flooring

DrawingNo.9

Draw at least one sheet using CAD software.

NOTE:

- a) All drawings should be as per BIS code and specifications in SI Units.
- b) Intensive practice of reading and interpreting building drawings should be given.
- c) Some practice should be done to prepare drawings on AutoCAD.

COURSE OUTCOMES

After completing this course, student will be able to:

1. Interpret the symbols, signs and conventions from the given drawing.
2. Prepare line plans of residential and public buildings using principles of planning.
3. Prepare submission and working drawing for the given requirement of Load Bearing Structure.
4. Prepare submission and working drawing using CAD for the given requirement of Framed Structure.
5. Draw two-point perspective drawing for given small object

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	06	10
2	03	10
3	06	10
4	09	20
5	03	-
6	06	20
7	11	20
8	03	10
9	03	-
Total	50	100

RECOMMENDED BOOKS

1. Civil Engineering Drawing by RS Malik, Asia Publishing House
2. Civil Engineering Drawing by V.B. Sikka. Katson Publishing, Ludhiana
3. Civil Engineering Drawing by NS Kumar; IPH, New Delhi
4. Principles of Building Drawing by MG Shahand CM Kale, MacMillan, Delhi
5. Building Construction by Moorthy NRK
6. National Building Code