

**Diploma (Civil)**  
**Semester-III**

L-2 T-1 P-2 C-4

**SUBJECT: BUILDING DESIGN & DRAWING (CVE-180)**

**Course Objective :**

1. To develop an appreciation for understanding the essence of Building Design and Drawing, and its importance in Civil Engineering.
2. To apply basic skills acquired in Civil Engineering in the design of building components as part of Building Design and Drawing.
3. To develop capabilities for design of structural plans for the benefit of the community.
4. To develop capabilities for generating various types of building plans using AutoCAD.

**Course Outcomes :** Upon successful completion of the course, the student will be able to-

**CO1:** Understand the conventions as per IS:962-1989 for various types of lines used in engineering drawings.

**CO2:** Understand the rules and bye-laws of local governing authorities for construction work.

**CO3:** Create line plans for residential and public buildings.

**CO4:** Create drawings of steel trusses and lean-to roofs. layout plans for water supply lines with accessories. layout of sanitary lines, including the positioning of inspection chambers, septic tanks, and sanitary fittings.

**CO5:** Create two-point perspective views of small objects like pedestals, step blocks, and small single-storied buildings with flat roofs.

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	3	2	-	3	-	-	-	-	-	-	-	2	2	-	2	-	1	1	2
CO 2	2	3	-	3	-	-	-	-	-	-	-	2	1	-	1	-	1	1	2
CO 3	2	3	-	3	-	-	-	-	-	-	-	2	2	-	1	-	-	1	2
CO 4	1	2	-	3	-	-	-	-	-	-	-	3	1	-	3	-	-	1	2
CO 5	2	3	-	2	-	-	-	-	-	-	-	2	2	-	3	-	1	2	2

High-3 Medium-2 Low-1

**UNIT- I CONVENTIONS:** Conventions as per IS:962-1989, Types of Lines – Visible line, Center line, Hidden line, Section line, Dimension line, Extension line, Pointers, Arrow heads or dots. Dimensioning systems. Symbols – Graphical symbols for door and window, symbols for sanitary and electrical installations. Symbols for different materials. building components. Reading of ammonia prints of residential buildings. **6 hours**

**Unit- II PLANNING OF BUILDING:** Principles of planning of Residential and Public building. Space requirements and norms for minimum dimension of Residential and Public building. Rules and bye-laws of local governing authorities for construction work. Drawing of line plans for Residential and Public building **8 hours**

**Unit- III BUILDING DRAWING:** Development of plan from line plan of a residential building, Elevation, Section, Site plan, Location Plan, Foundation plan, Area statement and other details. Submission Drawing and Working Drawing. **6 hours**

**Unit- IV DETAILED DRAWING:** Drawing of staircase, drawing of steel truss& lean to roof, drawing of layout plan of water supply line with accessories. Layout plan of sanitary line - position of inspection chamber, septic tank, sanitary fittings. Position of wash basin, sink etc. **8 hours**

**Unit- V PERSPECTIVE DRAWING:** Definition, Necessity, Types of perspective, Principles of Perspective Drawing, Terms used in perspective drawing, Two-point perspective view of a small object like pedestal, step block, small single storied building with flat roof etc. **8 hours**

**Drawing using AutoCAD:** - Setting up a drawing starting from scratch, Using and creating a template file, opening an existing drawing, Screen layout, Screen icons, Command line, status bar, Dialogue boxes, Drawing Commands, Lines, Ray, Construction Line, Multiline and polylines, Rectangles, Arc, Circle and Ellipse, Polygon, Spline.

Co-ordinate input methods (directive, absolute, relative and polar), Starting a New Drawing/Opening an existing drawing, Drawing Commands, Hatching Command Text (multi-line & single line) and Formatting Text Styles, View Commands & Drawing Settings and Aids, Dimension Command Formatting Dimension Style and Multi-leader Style, Saving and Plotting

**Total: 36 Hours**

**Reference Books:**

1. Shah. M. G. Kale, CM, Patki, S.Y.; Building Drawing; McGraw Hill Publication company Ltd. New Delhi 2002, ISBN: 9780074638767.
2. Malik and Mayo; Civil Engineering Drawing; Computech Publication Ltd. New Asian Publishers, 2009, New Delhi, ISBN: 978-8173180026.
3. M. G. Shah and C. M. Kale; Principles of Perspective Drawing; McGraw Hill Publication company Ltd. New Delhi 2002.
4. Swamy, Kumara; Rao, N, Kamehwara, A.; Building Planning and Drawing; Charotar Publication, ANAND; ISBN: 978-93-85039-12-6 (Ed.2015).
5. Sane, Y. S.; Planning and design of Building; Allied Publishers, New Delhi, ASIN: B0007JVH92.

**LIST OF EXPERIMENTS**

1. Draw various types of lines, lettering and symbols of materials, doors and windows etc. Used in construction on Full Imperial size drawing sheet.
2. Drawing the lines plans of following buildings on Full Imperial size graph paper.
3. Residential Building (Min. three rooms)
4. Public Building – School building, Primary health center / Hospital building, Bank, Post Office, Hostel building etc. (At least four)
5. Measured Drawing of an existing residential Building (Load bearing/Framed structure Type), showing Plan, Elevation, Sections, Construction notes, Schedule of openings, Site Plan, Area statement etc.
6. Submission Drawing of two storied residential building (Framed structure type) showing Plans, Elevation, Sections, Foundation Plan, construction notes, Schedule of openings, Site Plan, Area statement etc.
7. Working drawing of above drawing sheet preferably one plan, section through stair case to scale 1:50

**CVE 452: Theory of Concrete**

**Course Objectives**

- Understand the fundamentals of concrete, including its classification, properties, and ingredients.
- Comprehend the properties of fresh and hardened concrete, including workability, strength, and durability.
- Learn about formwork design for different concrete structures.
- Develop skills in concrete mix design and understand factors influencing the choice of mix.
- Gain knowledge of concrete production, quality control, and special concretes for specific applications.

**Course Outcomes (COs)**

1. Understand the functional role of ingredients use in concrete.
2. Apply the fundamental knowledge of fresh and hardened properties in development of sustainable concrete.
3. Discuss the various techniques use in field for batching, mixing, placing, compacting and curing of concrete
4. Design and develop a performance based mix which can fulfill the requirements of ready mix concrete plant
5. Create an awareness about the formwork and special types of concretes with their tailored properties.

CO/PO/ PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3	PS O4	PS O5	PS O6	PS O7
CO1	2	2	-	-	-	3	3	-	-	-	-	-	-	1	-	3	-	2	-
CO2	2	2	-	-	-	3	3	-	-	-	-	-	-	1	-	3	-	2	-
CO3	2	-	-	-	2	3	3	-	-	-	-	-	-	-	2	2	-	3	-
CO4	2	-	-	-	-	3	3	-	-	-	-	3	-	-	2	2	-	3	-
CO5	2	2	-	-	-	3	3	-	-	-	-	3	-	-	2	3	-	3	-

High-3 Medium-2 Low-1

**UNIT I: INTRODUCTION TO CONCRETE**

**12 Hours**

Classification, properties, grades, advantage & disadvantages of concrete, ingredients of concrete, types of cement, aggregates, water, admixtures, inspection & testing of materials as per Indian standard specifications

**UNIT II: PROPERTIES OF FRESH & HARDENED CONCRETE**

**12 Hours**

Introduction, workability, testing of concrete, factors affecting, rheology of concrete, compressive & tensile strength, stress and strain characteristics, shrinkage and temperature effects. Creep of concrete, permeability, durability, thermal properties & micro-cracking of concrete.

**UNIT III: FORM WORK FOR CONCRETE STRUCTURE**

**12 Hours**

Requirement, their types and guidelines for the design, typical form work and shuttering/centering for column, beams, slabs, walls, arches and stair cases, slip and moving of formwork.

Design of concrete mix :Various classical methods of concrete mix design, I.S. Code method, basic considerations and factors influencing the choice of mix design, acceptance criteria for concrete, concrete mixes with surkhi and other pozzolanic materials, design of plastic concrete mix, computer aided design of concrete mix

**UNIT IV: PRODUCTION AND QUALITY CONTROL OF CONCRETE**

**12 Hours**

Production of crushed stone aggregate, batching equipment's for production and concreting, curing at different temperatures, concreting underwater, hot & cold weather condition, statistical quality control, field control,

nondestructive testing, repair technology for concrete structures, inspection & testing of concrete.  
Concrete in aggressive environment: Sulphate attack, chloride attack, acid attack, effect of seas water

#### **UNIT V: SPECIAL CONCRETES**

**12 Hours**

Light weight concrete, ready mix concrete, vacuum concrete, ferrocement, fiber reinforced concrete, polymer concrete composites, shotcrete, Guniting, rubble concrete, resin concrete, prestressed concrete, heat resistant concrete, mass concrete, temperature control of mass concrete.

**Total: 60 Hours**

#### **Reference(s)**

1. Varshneyr; concrete technology; oxfores&ibh publishing co.
2. Gambhir ml; concrete technology – tmh
3. Sinhasn; reinforced concrete technology; tmh
4. New building materials published by b.m.t.p.c., new delhi
5. Hand books on materials & technology - published by bmtpc&hudco
6. Mohan rai&m.p. Jai singh; advances in building materials & construction
7. Jackson n; civil engineering materials.
8. Properties of concrete - a.m. Neville - pearson education

#### **List of e-Learning Resources:**

1. <https://nptel.ac.in/>
2. <https://www.coursera.org/>

## Diploma Civil Engineering Semester-V

L-2 T-1 P-2 C-4

### CVE-460: Estimating & Costing-I

#### Course Objectives

The course should enable the students to:

- Summarize the basic principle and standard methods for working out quantities of different civil engineering works.
- Demonstrate the detailed estimate of buildings.
- Workout rate analysis of the various items of work.
- Understand the material requirements as per specified norms and standards.
- Learn practical knowledge of standard specifications of items of buildings construction.

#### Course Outcomes (COs)

After completion of course, students will be able to:-

CO 1: Understand the basics requirements and types of estimating & costing.

CO 2: Evaluate the quantity by long wall short wall and center line method.

CO 3: Analyze bar bending schedule for reinforcement works.

CO 4: Understand the rate analysis of civil works.

CO 5: Evaluate the quantities of roads and canals.

#### Articulation Matrix

CO/PO/PSO	P O1	P O2	P O3	P O4	P O5	P O6	P O7	P O8	P O9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO1	3	1	1	2	2	2	-	-	1	-	-	1	2	2	2	3	-	-	-
CO2	3	1	1	2	2	2	-	-	1	-	-	1	2	2	2	3	-	-	-
CO3	3	1	1	2	2	2	-	-	1	-	-	1	2	2	2	3	-	-	-
CO4	3	1	1	2	2	2	-	-	1	-	-	1	2	2	2	3	-	-	-
CO5	3	1	1	2	2	2	-	-	1	-	-	1	2	2	2	3	-	-	-

High-3 Medium-2 Low-1

#### COURSE CONTENT:

##### Unit –I Overview of Estimating & Costing

**8 Hours**

Meaning of the terms estimating, costing, Purpose of estimating and costing, Data required for estimate, General items of work in building – Standard units' principles of working out quantities, Factors to be considered during preparation of estimate, Specification, Quantity availability of material, Location of site.

##### Unit –II Types of Estimates

**8 Hours**

Types of estimate - Approximate and Detailed, for detailed and abstract estimates, approximate method of estimating, detailed estimates of buildings, revised estimate, Supplementary estimate, Maintenance & Repair estimate, Load bearing Structure –Long Wall short wall and Center line method, Uses of detailed estimate.

**Unit –III Mode of Measurements:****8 Hours**

General Rules for fixing units of Measurements for different, Desired accuracy in taking measurements, rules for deductions, Procedure for taking out quantities as per IS 1200 and latest PWD hand book, Framed Structure building. – By using thumb rules and by preparing Reinforcement bar bending and bar requirement schedules.

**Unit –IV Rate Analysis****8 Hours**

Meaning of term Rate analysis –Factors affecting rate analysis, working out data for various items of work over head, Contingent charges, Materials and labour component, Market rate and labour rate, Transportation of materials,

**Unit- V Earthworks****8 Hours**

Earthwork for roads and canals, various methods of calculation of quantity of earth work, Estimate of rigid and flexible pavement Road of 1km length, Use of software for estimation.

**Practical**

1. Estimation of building (long wall and short wall method).
2. Estimation of building (center line method).
3. Analysis of rate for concrete work.
4. Analysis of rate for brick work.
5. Analysis of rate for plaster work.
6. Estimate quantity of reinforcement.
7. Preparation for approximate estimate for road project.
8. Estimating cost of building on plinth area method.

**Total: 60 Hours****Text Books:**

1. B. N. Dutta, “Estimating and Costing”, UBS publishers, 2000.
2. G. S. Birdie., “Estimating and Costing”, DhanpatRai publications, 1988.
3. M. Chakraborti, Estimating & costing, Specification and Valuation in Civil Engineering
4. S.C. Rangwala, Estimating & costing, Charotar , Publication Anand,
5. B.S. Patil, Civil Engineering Estimating, Contracts and accounts Vol.I

**List of e-Learning Resources:**

1. <https://nptel.ac.in/>
2. <https://www.coursera.org/>

**Diploma Civil Engineering**  
**Semester-V**

L-2 T-1 P-2 C-6

**CVE470: Highway Engineering**

**Course Objectives**

- To establish an understanding of the fundamental concepts of mechanics of deformable solids including static equilibrium, geometry of deformation, and material constitutive behavior.
- To provide students with exposure to the systematic methods for solving engineering problems in solid mechanics.
- To build the necessary theoretical background for further structural analysis and design courses.

**Course Outcomes (COs) At the completion of syllabus students will be able to-**

1. Understand the functions of different components of a Highway and importance of traffic engineering in highway planning and design.
2. Apply the principles of road design and traffic engineering to create safe and efficient roads.
3. Apply various techniques to investigate and analyze traffic data, collect and analyze traffic data, including traffic volume, speed, and parking patterns, using a variety of techniques such as survey methods and statistical analysis.
4. Analyze the design elements of highways, including horizontal cross-sectional elements, camber, kerbs, and super elevation, to design a safe and efficient road.
5. Evaluate the different types of road construction materials, including their advantages and disadvantages, to determine the most appropriate material for a specific road project.

**Articulation Matrix**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	-	-	1	-	-	-	-	-	-	-
CO2	3	1	1	1	1	-	-	-	-	-	-	-
CO3	2	3	2	1	-	-	-	-	-	-	-	-
CO4	3	1	1	1	1	-	-	-	-	-	-	-
CO5	3	1	1	1	-	1	-	-	-	-	-	-

1High-3 Medium-2 Low-1

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	3	1	-	-	-	-	-
CO2	3	1	2	1	-	1	2
CO3	2	-	3	-	-	1	3
CO4	3	-	-	-	-	-	-
CO5	-	-	1	3	-	1	-

High-3 Medium-2 Low-1

**Unit - I Unit I: Road Engineering**

Importance of roads in India, Classification of roads according to Nagpur plan, Third road development plan Traffic and tonnage, Classification of urban roads Road yojanas like Pradhan Mantri Gram Sadak Yojana and Mukhya Mantri Sadak Yojana, Investigation for Road Project: Reconnaissance survey, Preliminary survey and Location survey for a road project, Detailed survey for cross drainage, Fixing the alignment of road, Drawings required for road project, Survey for availability of construction material

**Unit-11 Geometric Design of Highways**

Horizontal cross-sectional elements, Camber, Kerbs, road margin, road formation, right of way, Design speed, Gradient, Sight distances-SSD, ISD and OSD, Curves, Extra-Widening of roads on curves, Super Elevation.

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### **Unit III Road Construction Materials**

Types of road materials:- Bitumen and its test, road aggregate and its test, soil test, types of pavement, Hill Roads Parts and functions of hill road components-Types of curves, Hill road formation, Land slides - causes and prevention, Structures - drainage structures

### **Unit - IV Highway Construction & Design**

Construction of earthen road, soil stabilized roads, water bound macadam roads, bituminous roads, and cement concrete pavements, Joints in cement concrete pavements, Road side development: Arboriculture, street lighting., Design of Highway Pavements Design of flexible G.I. method and CBR method.

### **Unit – V Traffic Engineering**

Traffic Engineering Road user characteristics, vehicular characteristics, traffic flow characteristics, speed, traffic volume studies, parking studies - definition, purpose, types, survey methods. Accident studies - purpose, types, causes, collision diagram, condition diagram, preventive measures. Traffic control devices like pavement marking, signs, signals. Traffic management, various types of intersection and their design concept.

**Total: 90 Hours**

### **PRACTICAL**

1. Aggregate Crushing Value Test.
2. Determination of Aggregate Impact Value.
3. Determination of Los Angeles Abrasion Value.
4. Determination of Abrasion Value of Aggregates by the use of Deval Machine.
5. Determination of California Bearing Ratio Value.
6. Determination of Penetration Value of Bitumen.
7. Determination of Viscosity of Bituminous Material.
8. Determination of Softening Point of Bituminous Material.
9. Determination of Flash Point and Fire Point of Bituminous Material.
10. Determination of Bitumen Content by Centrifuge Extractor.
11. Determination of Stripping Value of Road

### **Reference(s)**

1. Highway Engineering Khanna & Justo Khanna Pub.
2. Traffic Engineering L.R. Kadiyali
3. Transportation Engineering N.L.Arora,S.P.Luthara I.P.H. New Delhi
4. Transportation Engineering Vazarani & Chandola Khanna Pub.
5. Road, Railway, Bridges Biridi & Ahuja. S.B.H.New Delhi
6. Transportation Engineering Kamala T.M.H. New Delhi
7. DATA book of P.W. D.

### **List of e-Learning Resources:**

1. <https://nptel.ac.in/>
2. <https://www.coursera.org/>



**CVE480: Structural Design-I (RCC)**

**Course Objectives**

- To analyze and design the structural members.
- To understand the various designing methods for designing RCC structures.
- To understand the design and drawing of beams, column, slab, foundation, staircase etc.
- To design the shear reinforcement.
- To understand the basic fundamentals of design.

**Course Outcomes (COs)**

1. Illustrate the concepts of Reinforced Cement Concrete, compare various design methodologies, identify grades of concrete and steel. (Understand)
2. Design of singly and doubly reinforced beams. (Apply)
3. Differentiate between one way and two-way slabs, Design one way, one way continuous and two-way slabs. (Apply)
4. Design of column and column footings economically and suitably recommend the appropriate type according to site conditions. (Apply)
5. Design of Staircase. (Apply)

**Articulation Matrix**

CO/PO/PSO	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3	PS O4	PS O5	PS O6	PS O7
CO1	2	2	3	-	3	1	2	2	-	-	-	-	2	-	3	3	-	-	-
CO2	3	2	3	-	3	2	2	2	-	1	-	-	2	-	1	3	-	-	-
CO3	3	2	3	-	3	2	2	2	-	1	-	-	2	-	1	3	-	-	-
CO4	3	2	3	-	3	2	2	2	-	1	-	-	2	-	1	3	-	-	-
CO5	3	2	3	-	3	2	2	2	-	1	-	-	2	-	1	3	-	-	-

High-3 Medium-2 Low-1

**UNIT I: Introduction**

**10 Hours**

Properties of concrete and steel, LSM, WSM, Loads and combinations, characteristic loads & strength, partial safety factor balance, under and over reinforced sections, stress block parameters, depth of neutral axis, code requirements, Idealized stress-strain curves, Assumptions, Stress-Strain relationship for concrete and steel.

**UNIT II: Design of Beams**

**12 Hours**

**Singly Reinforced Beam:** Moment of resistance of singly reinforce beam, area of steel of singly reinforced beam, design of singly reinforced beam, shear bond and development length.

**Doubly Reinforced Beam:** Moment of resistance of doubly reinforce beam, area of steel of doubly reinforced beam, design of doubly reinforced beam.

**T & L Beam (Flanged Section):** Analysis & Design of T & L beams.

**UNIT III: Design of Slabs**

**08 Hours**

Slab types, one-way slab design & drawing, Two-way slab design & drawing.

**UNIT IV: Columns & Footings**

**10 Hours**

**Column:** Classification of columns, effective length of columns, slenderness ratio, eccentric column, load analysis on column, design of axially loaded columns.

**Footing:** Concept of column footing, types of footing, criteria for designing of footing, rectangular, square, isolated column footing design, details of reinforcement in footing.

**UNIT V: Staircases**

**08 Hours**

Types of staircases, general arrangement of staircase, design of straight flight, doglegged, open well staircase, details of reinforcement in staircase.

## **PRACTICAL**

1. AutoCAD Drawings of singly reinforced beam
2. AutoCAD Drawings of doubly reinforced beam
3. AutoCAD Drawings of beam with bent up bars.
4. AutoCAD Drawings of one-way slab.
5. AutoCAD Drawings of Two-way slab.
6. AutoCAD Drawings of column.
7. AutoCAD Drawings of footing.
8. AutoCAD Drawings of staircase.

**Total: 90 Hours**

## **Reference(s)**

1. Plain & Reinforced Concrete Vol. I & II – O.P. Jain & Jay Krishna.
2. Limit State Design by P.C. Varghese; Prentice Hall of India, New Delhi.
3. Design of Reinforced Concrete Elements by Purushottam; Tata McGraw Hill, New Delhi.
4. Reinforced Cement Concrete by Gupta & Mallick, Oxford and IBH.
5. Reinforced Cement Concrete by P. Dayaratnam, Oxford and IBH.
6. Plain & reinforced concrete – Ramammutham

## **List of e-Learning Resources:**

1. <https://nptel.ac.in/courses/105105105/>
2. <https://nptel.ac.in/downloads/105105104/>