UNIVERSITY POLYTECHNIC
BIRLA INSTITUTE OF TECHNOLOGY MESRA – 835215 (RANCHI)
DEPARTMENT OF CIVIL ENGINEERING

4TH SEMESTER

UNIVERSITY POLYTECHNIC
BIRLA INSTITUTE OF TECHNOLOGY MESRA – 835215 (RANCHI)
DEPARTMENT OF CIVIL ENGINEERING

SYLLABUS (CBCS) - 2026

COURSE: DCV 401 STRUCTURAL ANALYSIS

PROGRAMME: DIPLOMA IN CIVIL ENGINEERING							
COURSE CODE: DCV 401			COURSE TITLE: STRUCTURAL ANALYSIS				
COMPULSORY: PROGRAM CORE							
TEACHING SCHEME AND CREDITS					EXAMINATION SCHEME		
L	T	P	HOURS/WEEK	CREDIT	PE	FINAL	TOTAL
3	-	-	3	3	50	50	100

COURSE OBJECTIVES: This course enables the students:

1	To explain the fundamentals of structural analysis, equilibrium, and stability of structures.
2	To analyze shear force, bending moment, slope, and deflection in beams.
3	To apply methods for the analysis of fixed and continuous beams.
4	To evaluate statically indeterminate structures using classical analysis methods.
5	To analyze force distribution in simple trusses.

COURSE OUTCOMES: After the completion of this course, students will be able to:

CO1	Explain the concepts of structural systems, equilibrium, determinacy, stability, and the behaviour of determinate structures.
CO2	Analyze shear force, bending moment, slope, and deflection in beams using standard analytical methods.
CO3	Apply moment area theorem, double integration method, and three-moment theorem for the analysis of determinate and indeterminate beams.
CO4	Evaluate statically indeterminate beams and simple portal frames using the moment distribution method.
CO5	Analyze support reactions and member forces in simple trusses using the method of joints and method of sections.

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	**Introduction to Structural Analysis** 1.1 Basics of Structures: Definition of structure, structural elements, types of structures. 1.2 Idealization and Equilibrium: Idealized structural models, equations of static equilibrium, and the principle of superposition. 1.3 Determinacy and Stability: Concept of statically determinate, indeterminate, and stable structures. 1.4 Analysis of Determinate Structures- Beams: SF/BM diagrams of beams under concentrated and uniformly distributed load (UDL) and their combination with or without having internal hinges.

	Course Outcome: CO1, CO2	Teaching Hours: 6 hrs
2	**Slope and Deflection Analysis** 2.1 Need for Slope and Deflection Analysis: Importance of determining beam slope and deflection in design. 2.2 Basic Beam Deflection Theory: Relation among bending moment, slope, deflection, and radius of curvature (no derivation). 2.3 Moment Area Theorems: Determination of slopes and defections using moment area theorems 2.4 Double Integration Method: Determination of slope and deflection using double integration method. 2.5 Applications to Standard Beams: Application of the moment area theorem and double integration method to cantilever and simply supported beams under point load and UDL. Course Outcome: CO2, CO3	Teaching Hours: 10 hrs
3	**Analysis of Fixed and Continuous Beam** 3.1 Fixed Beams: Concept of fixed beams and determination of fixing moments by the moment area theorem. SF and BM diagrams with supports at the same level under point load and UDL using the moment area theorem. 3.2 Deflection of Fixed Beam: Slope and deflection at selected points using the moment area theorem. 3.3 Continuous Beams: Introduction, Clapeyron's theorem of three moments (no derivation), 3.4 Analysis of Continuous Beams: Application of Clapeyron's theorem of three moments for continuous beams of two spans with simply supported and fixed ends. SF and BM diagram for such cases. Course Outcome: CO2, CO3	Teaching Hours: 10 hrs
4	**Moment Distribution Method** 4.1 Introduction to Moment Distribution: Concept and need of iterative analysis method. 4.2 Basic Parameters: Stiffness factor, carry-over factor, and distribution factor. 4.3 Sign Convention and Procedure: Standard conventions and stepwise moment balancing process. 4.4 Continuous Beam Analysis: Application of moment distribution method to continuous beams up to three spans with supports at the same level and constant moment of inertia, subjected to concentrated loads and UDL. 4.5 Portal Frame Analysis: Application of moment distribution method to analysis of single storey single bay symmetrical portal frame without side sway, SF and BM diagrams. Course Outcome: CO4	Teaching Hours: 8 hrs

5	**Analysis of Simple Trusses** 5.1 Types of trusses (Simple, Fink, compound fink, French truss, pratt truss, Howe truss, North light truss, King post and Queen post truss), determinacy and stability. 5.2 Calculate support reactions for trusses subjected to point loads at joints 5.3 Calculate forces in members of truss using Method of joints and Method of sections. Course Outcome: CO5 Teaching Hours: 6 hrs

TEXT BOOK:

Sl. No.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Basic Structural Analysis	Reddy, C.S. – The McGraw Hill Publications.	978-0070702769
2.	Structural Analysis	Devdas Menon – Narosa Publications.	978-8173197505

REFERENCE BOOKS:

Sl. No.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Structural Analysis	Hibbeler, R.C. – Pearson Publications	978-0134610672
2.	Theory of Structures	Timoshekno S. P. & Young.	978-0070648685

E-REFERENCES:

https://nptel.ac.in/courses/105101085
https://onlinecourses.nptel.ac.in/e-learning/preview/noc22_ce29

Mapping of Course Outcomes onto Program Outcomes & Program Specific Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	1	1	1	0	1	2	1	0
CO2	3	3	2	1	0	0	1	3	2	0
CO3	3	3	3	1	0	0	1	3	2	0
CO4	3	3	3	2	0	0	2	3	2	0
CO5	3	3	3	1	0	0	1	3	2	0

Grading: No correlation – 0, Low correlation - 1, Moderate correlation – 2, High Correlation - 3

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DEPARTMENT OF CIVIL ENGINEERING

SYLLABUS (CBCS) - 2026

COURSE: DCV 403 GEOTECHNICAL ENGINEERING

PROGRAMME: DIPLOMA IN CIVIL ENGINEERING							
COURSE CODE: DCV 403			COURSE TITLE: GEOTECHNICAL ENGINEERING				
COMPULSORY: PROGRAM CORE							
TEACHING SCHEME AND CREDITS					EXAMINATION SCHEME		
L	T	P	HOURS/WEEK	CREDIT	PE	FINAL	TOTAL
3	-	-	3	3	50	50	100

COURSE OBJECTIVES: This course enables the students to

1.	Recall and explain the foundational geological processes, rock classifications, and structural components of the Earth-system.
2.	Analyze and classify physical phase relationships, index properties, and engineering behaviors of diverse soil profiles.
3.	Apply Principles of effective stress, permeability, and fluid-flow mechanics to evaluate subsurface hydraulic stability and seepage behavior.
4.	Evaluate and Simulate soil densification through compaction and consolidation, and determine baseline shear strength parameters.
5.	Formulate and compute lateral earth pressures, slope stability factors, and bearing capacities for shallow and deep foundations.
6.	Design and propose standard site exploration programs alongside sustainable, eco-friendly soil stabilization and ground improvement blueprints using industrial waste materials.

COURSE OUTCOMES: After the completion of this course, students will be able to:

CO1	Solve well-defined technical engineering problems related to soil phase configurations, mineral properties, and hydraulic permeability under varying groundwater conditions.
CO2	Analyze the mechanical response of soils under structural stress by determining effective stress profiles, shear strength characteristics, and compaction behaviour.
CO3	Evaluate settlement timelines, lateral earth pressures, and structural slope stability factors using standard codal and analytical methodologies.
CO4	Determine the ultimate and allowable bearing capacity of shallow and deep foundations based on subsurface field exploration data and laboratory parameters.
CO5	Formulate integrated site investigation operations and synthesize eco-friendly soil stabilization programs using locally available industrial waste and sustainable materials.

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COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	**Elements of Engineering Geology and Soil Genesis** 1.1 Earth System & Fundamentals: Shape, size, and interior of the solid earth; Rock cycles and rock-water interaction. 1.2 Rocks & Indian Geology: Genetic classification and engineering uses of Igneous, Sedimentary, and Metamorphic rocks. Overview of major rock types and mineral wealth of India. 1.3 Soil Genesis and Clay Minerals: Weathering processes; Soil formation and classification. Identification and engineering properties of regional and special soils, Introduction to Clay Minerals: Basic Structural Units, Inter-particle Bonds, Structure of Water Molecules and their Interaction, basics of common clay minerals, Course Outcome: CO1, CO5 Teaching Hours: 5hrs
2	**Nature and Phase Relationships of Soil** 2.1 Soil Formation: Soil types and the effects of soil structure on basic properties. 2.2 Phase Relationships: Three-phase diagram (solids, water, air); Definitions of physical properties and functional relationships. Laboratory and field determination of physical properties. 2.3 Index Properties of Soil: Grain size distribution (Sieve and Hydrometer analysis); Atterberg limits and consistency indices. 2.4 Soil Classification: Field identification of soils. Principles of soil classification; Comparison of AASHTO, Unified (USCS), and Indian Standard (IS) systems; Plasticity charts. Course Outcome: CO1, CO2 Teaching Hours: 6 hrs
3	**Effective Stress, Permeability, and Seepage** 3.1 Effective Stress Theory: Principle and physical meaning; Total and effective stress diagrams; Quick sand condition and capillarity. 3.2 Groundwater: Occurrence of groundwater, water table definition. Types of Aquifers, storage and yield. 3.3 Permeability: Darcy's Law; Seepage velocities; Laboratory and field determination of coefficient of permeability. 3.4 Seepage Analysis: Concepts of flow lines and equipotential lines. Course Outcome: CO1, CO2 Teaching Hours: 6 hrs
4	**Compaction and Consolidation** 4.1 Compaction: Basic phenomenon and difference between Compaction and Consolidation, Laboratory Proctor Tests, factors affecting compaction; Field compaction. 4.2 Consolidation: Define consolidation of soil. Describe Terzaghi's soil-spring analogy model to explain the process of consolidation and different stages of consolidation

	(Initial, primary and secondary consolidation). Laboratory consolidation test. Components for settlement computation. 4.3 Shear Strength: Concept of shear strength, cohesion, and internal friction. Mohr-Coulomb failure theory, Measurement of shear strength, Unconfined strength test; Direct shear tests; Vane shear test and Triaxial tests. 4.4 Earth Pressure: Concept of Earth Pressure, active earth pressure, passive earth pressure, earth pressure at rest, and coefficients of earth pressure. 4.5 Stability of Slopes: Types of Slopes, Failure Modes, Forces at Play, Factor of Safety, Stability of Infinite Slopes. Course Outcome: CO2, CO3, CO5 Teaching Hours: 12 hrs
5	**Site Investigation and Foundation** 5.1 Foundation: Define foundation, Different types of foundation - Shallow and Deep foundation (Types and selection criterion). 5.2 Bearing Capacity of Shallow Foundation: Define terms- bearing capacity, ultimate bearing capacity, safe bearing capacity and allowable bearing pressure. Terzaghi's analysis and assumptions, the effect of the water table on bearing capacity. Field determination of bearing capacity: - Plate load test, standard penetration test. 5.3 Pile Foundation: Function of Piles, classification of piles, field installation of piles, load carrying capacity of piles (Static analysis) 5.4 Soil exploration: Objectives of site investigation. Discuss the different stages of site investigation. Criteria for deciding the depth, location and number of test pits or bore holes. Discuss the different methods of soil exploration - Open excavation methods, different types of boring (Auger boring, wash boring, rotary drilling, percussion drilling, core drilling) and geo-physical methods. Definition, necessity and brief introduction to the methods and mechanisms of soil stabilization. Course Outcome: CO3, CO4, CO5 Teaching Hours: 11 hrs

TEXT BOOK:

Sl. No.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Basic and Applied Soil Mechanics	Gopal Ranjan and A.S.R. Rao (New Age International), 3rd Edition, 2016	978-8122440393
	Geotechnical Engineering	D. Moitra (Khanna Publishers), 1st Edition, 2013	978-8173719905
2.	Geotechnical Engineering	Shashi K. Gulhati and Manoj Datta (Tata McGraw-Hill), 1st Edition, 2005	978-0070588295
3.	Soil Mechanics and Foundation Engineering	Dr. P.N. Modi (Standard Book House), 5th Edition, 2019	978-8189401306

4.	Soil Mechanics and Foundations	B.C. Punmia, Ashok Kumar Jain, and Arun Kumar Jain (Laxmi), 17th Edition, 2017	978-8170087915

REFERENCE BOOKS:

Sl. No.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Geotechnical Engineering: Principles and Practices of Soil Mechanics and Foundation Engineering	V.N.S. Murthy (CRC Press), 1st Edition, 2002	978-0824708733
2.	Soil Mechanics	T. William Lambe and Robert V. Whitman (Wiley), 1st Edition, 1969	978-0471511922
3.	Principles of Geotechnical Engineering	Braja M. Das and Khaled Sobhan (Cengage Learning), 10th Edition, 2021	978-0357420478
4.	Principles and Practice of Ground Improvement	Jie Han (John Wiley & Sons), 1st Edition, 2015	978-1118259917

E-REFERENCES:

https://nptel.ac.in/courses/105105168
https://nptel.ac.in/courses/105101201
https://www.igs.org.in/digital-library
https://www.ndl.gov.in/he_search?key=geotechnical%20engineering

Mapping of Course Outcomes onto Program Outcomes & Program Specific Outcomes:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	1	2	0	0	1	3	2	0
CO2	3	3	2	3	0	1	2	3	2	1
CO3	2	3	3	2	2	1	2	3	3	1
CO4	3	3	3	2	2	2	2	3	3	2
CO5	2	2	3	3	3	2	3	3	2	3

Grading: No Correlation – 0, Low Correlation – 1, Moderate Correlation- 2, High Correlation – 3

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DEPARTMENT OF CIVIL ENGINEERING

SYLLABUS (CBCS) - 2026

COURSE: DCV 405 CONCRETE TECHNOLOGY

PROGRAMME: DIPLOMA IN CIVIL ENGINEERING							
COURSE CODE: DCV 405			COURSE TITLE: CONCRETE TECHNOLOGY				
COMPULSORY: PROGRAM CORE							
TEACHING SCHEME AND CREDITS					EXAMINATION SCHEME		
L	T	P	HOURS/WEEK	CREDIT	PE	FINAL	TOTAL
3	-	-	3	3	50	50	100

COURSE OBJECTIVES: This course enables the students:

1.	To explain the properties and characteristics of cement, aggregates, and water used in concrete.
2.	To analyze the behaviour of fresh and hardened concrete under different conditions.
3.	To design concrete mixes based on standard procedures and specifications.
4.	To apply concreting operations, quality control measures, and testing methods in concrete construction.
5.	To assess the role of admixtures, special concretes, and concreting under extreme weather conditions.

COURSE OUTCOMES: After the completion of this course, students will be able to:

CO1	Explain the properties, types, and tests of cement, aggregates, and water used in concrete.
CO2	Analyze the properties of fresh and hardened concrete, including workability, strength, shrinkage, creep, and durability.
CO3	Design concrete mixes using standard methods such as IS 10262 and evaluate their performance.
CO4	Apply knowledge of concreting operations, curing, formwork, and quality control techniques, including non-destructive testing.
CO5	Assess the role of admixtures, special concretes, and environmental conditions in concrete performance.

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	**Cement, Aggregate and Water** 1.1 Cement: Types and Properties: Introduction, OPC and PPC, grades of OPC, physical and chemical properties. 1.2 Tests and Storage of Cement: Field tests, fineness, consistency, setting time, soundness, strength, and storage of cement and its effects on its properties. 1.3 Special Types of Cement: BIS specifications and applications of rapid hardening, low heat, sulphate resisting, slag, high alumina, and white cement.

	1.4 Aggregates and Fine Aggregates: Requirements and classification of aggregates; Fine aggregates: properties, specific gravity, bulk density, water absorption, bulking, sieve analysis, grading, deleterious materials, and emerging trends in fine aggregates. 1.5 Coarse Aggregate and Water: Properties, specific gravity, bulk density, flakiness index, elongation index, crushing, impact, abrasion, water absorption, soundness, sieve analysis, grading, and storage. Quality of mixing water, impurities, and permissible limits as per IS 456:2000. Course Outcome: CO1 Teaching Hours: 8 hrs
2	**Concrete and Its Properties** 2.1 Grades of Concrete and Water-Cement Ratio: Concrete grades as per IS 456, significance of water-cement ratio, and Abram's law, 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. 2.2 Fresh Concrete Properties: Factors affecting workability and methods of testing using the slump cone, compaction factor, and Vee-Bee test, Workability Requirement for different types of Concrete Works. 2.3 Defects in Fresh Concrete: Segregation, bleeding, honeycombing, and preventive measures. 2.4 Hardened Concrete Properties: Compressive, split tensile, bond strength, modulus of rupture, modulus of elasticity, and Poisson's ratio; Factors affecting strength. 2.5 Shrinkage, Creep and Durability: Shrinkage, creep, and durability of concrete. Course Outcome: CO1, CO2 Teaching Hours: 8 hrs
3	**Concrete Mix Design** 3.1 Concept of Mix Design: Need and objectives of concrete mix proportioning. 3.2 Factors Affecting Mix Proportions: Factors to be considered while specifying a concrete mix. 3.3 Methods of Mix Design: Overview of standard methods with emphasis on the IS method. 3.4 Mix Design as per IS 10262:2019: Stepwise procedure for proportioning concrete mix. 3.5 Sampling and Acceptance Criteria: Sampling of fresh concrete and acceptance criteria for strength. Course Outcome: CO1, CO2, CO3 Teaching Hours: 8 hrs
4	**Manufacture and Quality Control of Concrete** 4.1 Concreting Operations: Batching, mixing, transportation, placing, compaction, and finishing of concrete. 4.2 Curing of Concrete: Importance, methods, and duration of curing. 4.3 Formwork for Concrete: Types of formworks for beams, slabs, and columns with desirable requirements. Stripping time of formwork as per IS 456 provisions.

	4.4 Quality Control and Supervision: Need for supervision, common construction errors, and pre-concreting checklist. 4.5 Non-destructive testing of concrete: Rebound hammer test, working principle of rebound hammer and factors affecting the rebound index, Ultrasonic pulse velocity test as per IS13311 (part 1 and 2), Importance of NDT tests. Course Outcome: CO2, CO4 Teaching Hours: 8 hrs
5	**Admixtures, Special Concrete and Weather Concreting** 5.1 Mineral Admixtures: Fly ash, GGBS, silica fume – composition, properties, usage, and advantages. 5.2 Chemical Admixtures: Purpose, properties, and uses of accelerating, retarding, water-reducing, air-entraining admixtures, and superplasticisers. 5.3 Special Concretes: Ready mix concrete, fiber reinforced concrete, high-performance concrete, self-compacting concrete, and lightweight concrete. 5.4 Cold Weather Concreting: Effects of low temperature on concrete and necessary precautions. 5.5 Hot Weather Concreting: Effects of hot weather on concrete and measures during concreting. Course Outcome: CO1, CO2, CO5 Teaching Hours: 8 hrs

TEXT BOOK:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Properties of Concrete	Neville, A.M., (2011), Pearson Education Ltd., England	978-0273755807
2.	Concrete Technology (Theory and Practice)	Shetty, M.S. (1982), S. Chand and company, New Delhi.	978-8121903486
3.	Concrete Technology	Gambhir, M.L. (2004), Tata McGraw-Hill Education, New Delhi	978-0070583740

REFERENCE BOOKS:

Sl. No.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Concrete Technology	Neville, A.M. and Brooks J.J. (2010), Prentice Hall, England.	978-0273732198
2.	Concrete Manual, Gambhir, M.L. (1992),	Dhanpat Rai& Sons, New Delhi.	-

3.	IS: 10262-2019	Indian Standard Concrete Mix Proportioning-Guidelines, BIS, New Delhi.	-
4.	SP 23 (1982)	Handbook on Concrete Mixes, BIS, New Delhi.	-

E-REFERENCES:

https://nptel.ac.in/courses/105102012
https://nptel.ac.in/courses/105106176

Mapping of Course Outcomes onto Program Outcomes & Program Specific Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	3	2	2	1	0	1	2	1	1
CO2	3	3	2	2	1	0	1	2	1	1
CO3	3	3	3	2	1	1	1	3	2	1
CO4	3	2	2	3	2	2	1	3	2	2
CO5	3	2	2	2	3	0	2	2	1	3

Grading: No correlation – 0, Low correlation - 1, Moderate correlation – 2, High Correlation – 3

Sajal Sarkar Shawik Das

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DEPARTMENT OF CIVIL ENGINEERING

SYLLABUS (CBCS) - 2026

COURSE: DPE 461 BUILDING CONSTRUCTION

PROGRAMME: DIPLOMA IN CIVIL ENGINEERING							
COURSE CODE: DPE 461			COURSE TITLE: BUILDING CONSTRUCTION				
COMPULSORY: PROGRAM ELECTIVE (PE - I)							
TEACHING SCHEME AND CREDITS					EXAMINATION SCHEME		
L	T	P	HOURS/WEEK	CREDIT	PE	FINAL	TOTAL
3	-	-	3	3	50	50	100

PREREQUISITE: DCV 305 Building Materials

COURSE OBJECTIVE: This paper, Building Construction, enables the students to

1	Explain the components, classification, and functional requirements of buildings used in construction.
2	Describe substructure construction practices, including foundations, earthwork, and dewatering methods.
3	Identify different types of masonry, scaffolding, formwork, and superstructure construction techniques used in building works.
4	Analyze the principles of building communication systems such as staircases, ramps, lifts, doors, windows, and ventilation.
5	Select suitable materials and construction methods for building finishes, flooring, roofing, plastering, and painting works.

COURSE OUTCOME: After the completion of this course, students will be able to

CO1	Classify and explain the various components of buildings and different types of construction systems used in civil engineering works.
CO2	Analyze site conditions and select suitable foundation systems and substructure construction methods for building works.
CO3	Compare and select appropriate masonry systems, scaffolding, and formwork techniques based on construction requirements and durability considerations.
CO4	Explain and choose suitable building communication and ventilation systems, ensuring accessibility, functionality, and safety.

CO5	Select appropriate materials and construction techniques for flooring, roofing, plastering, painting, and other finishing works in buildings.

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	**Overview of Building Components** 1.1 Classification of buildings as per NBC (Groups A to I) 1.2 Classification based on type of construction: load-bearing, framed, and composite structures 1.3 Substructure components: foundation and plinth 1.4 Superstructure components: walls, partitions, cavity walls, sill, lintel 1.5 Other components: doors, windows, floors, mezzanine floor, roof, columns, beams, parapet Course Outcome: CO1, CO2, CO4 Teaching hours:7 hrs
2	**Construction of Substructure** 2.1 Job layout: site clearance and layout using center line and face line methods 2.2 Earthwork: excavation, timbering and strutting, embankments 2.3 Materials for plinth filling; tools and equipment used in earthwork 2.4 Foundations: functions and types (shallow foundations: stepped, wall, column, isolated, combined, raft, grillage) 2.5 Deep foundations (pile, well, caisson) and dewatering methods (pumping, deep wells, well points, cofferdams – introduction) Course Outcome: CO1, CO2, CO3 Teaching hours:9 hrs
3	**Construction of Superstructure** 3.1 Stone masonry: terminology, types (rubble, ashlar), joints, selection, precautions 3.2 Brick masonry: terminology, types of bonds (header, stretcher, English, Flemish), requirements 3.3 Brick masonry practices: junctions, precautions, comparison with stone masonry, tools and equipment 3.4 Introduction to hollow concrete block masonry and composite masonry 3.5 Scaffolding, shoring, underpinning, and formwork: purpose, types, materials, erection, and removal Course Outcome: CO2, CO3, CO5 Teaching hours:9 hrs
4	**Building Communication and Ventilation** 4.1 Doors: components, types, standard sizes (BIS) 4.2 Windows: components, types, skylights, standard sizes (BIS) 4.3 Ventilators, fixtures and fastenings; materials and functions of sill, lintel, chajja

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	4.4 Vertical communication: staircases, ramps, lifts, elevators, escalators; staircase terminology 4.5 Types of staircases based on shape and materials Course Outcome: CO1, CO4, CO5 Teaching hours:7 hrs
5	**Building Finishes** 5.1 Floor finishes: types (Kota, marble, granite, tiles, concrete, wooden) and suitability 5.2 Skirting, dado, laying, finishing, and polishing of floors 5.3 Roofing materials and types: RCC, tiles, sheets; flat and pitched roofs (king post, queen post truss) 5.4 Plastering: necessity, methods, finishes (POP, stucco, sponge, pebble), defects, and precautions 5.5 Pointing and painting: necessity, types, surface preparation, and methods Course Outcome: CO3, CO4, CO5 Teaching hours:8hrs

REFERENCE BOOKS:

Sl. No.	Title	Author, Publisher, Edition, and Year of Publication	ISBN
1	Building Construction	S. P. Arora and Bindra, Dhanpat Rai Publication, Delhi.	978-8189928903
2	Building Construction	Sushil Kumar, Standard Publication.	978-8180141189
3	Building Construction	Punmia B. C., and Jain A. K., Firewall Media.	978-8131804286
4	Building Construction	B. C. Punmia, Ashok Kumar Jain & Arun Kumar Jain, Laxmi Publications, New Delhi	978-8131804286
5	Building Materials and Construction	S. K. Duggal, New Age International Publishers, New Delhi, 4th Edition	978-8122430623

E-REFERENCES:

https://onlinecourses.swayam2.ac.in
https://theconstructor.org/building/
https://www.engineeringcivil.com/category/building-construction
https://www.aboutcivil.org/building-construction.html
https://byjus.com/civil-engineering/building-construction/

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DEPARTMENT OF CIVIL ENGINEERING

Mapping of Course Outcomes onto Program Outcomes & Program Specific Outcomes:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	1	1	1	0	0	2	1	1
CO2	3	3	3	2	2	1	0	3	1	2
CO3	3	2	3	2	2	1	0	3	2	2
CO4	3	2	3	2	2	1	0	3	2	3
CO5	2	2	2	1	3	1	1	2	1	3

Grading: No Correlation: 0, Low Correlation: 1, Moderate Correlation: 2, High Correlation: 3

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DEPARTMENT OF CIVIL ENGINEERING

SYLLABUS (CBCS) - 2026

COURSE: DPE 463 ADVANCED SURVEYING

PROGRAMME: DIPLOMA IN CIVIL ENGINEERING							
COURSE CODE: DPE 463			COURSE TITLE: ADVANCED SURVEYING				
COMPULSORY: PROGRAM ELECTIVE (PE - I)							
TEACHING SCHEME AND CREDITS					EXAMINATION SCHEME		
L	T	P	HOURS/WEEK	CREDIT	PE	FINAL	TOTAL
3	-	-	3	3	50	50	100

PREREQUISITE: DBS103 Applied Physics-I, DBS105 Mathematics-I, DBS 201 Applied Physics-II, DBS 203 Mathematics-II, DCV307 Basic Surveying.

COURSE OBJECTIVES: This course enables the students to;

1.	Define the fundamental principles of geodetic surveying and identify celestial coordinate systems.
2.	Explain the distribution of accidental errors and the principles of UAV (Drone) photogrammetry.
3.	Use the Principle of Least Squares for survey adjustments and calculate position coordinates using GPS data.
4.	Examine the intervisibility of stations and analyze the effects of the Earth's curvature on field observations.
5.	Assess the accuracy of drone-generated orthomosaics and Digital Elevation Models (DEM) using Ground Control Points.
6	Formulate comprehensive survey plans integrating a GIS framework for urban infrastructure and disaster management.

COURSE OUTCOMES: After the completion of this course, students will be able to;

CO1	Interpret geodetic survey frameworks and apply triangulation principles to establish high-precision horizontal control networks.
CO2	Apply the theory of errors, weightage analysis, and the Principle of Least Squares to compute the most probable values in survey networks.
CO3	Execute astronomical observations and utilize Global Positioning System (GPS) data to determine precise geographic positions, time systems, and azimuths.
CO4	Generate accurate 3D maps, orthomosaics, and Digital Elevation Models (DEM) using UAV (drone) photogrammetry and image processing tools.

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CO5	Formulate geospatial solutions by integrating Remote Sensing and GIS frameworks to address engineering challenges in infrastructure and disaster management.

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	**Geodetic Surveying and Triangulation** 1.1 Foundations: Definition and scope of Geodetic surveying; fundamental differences between Plane and Geodetic surveys. 1.2 Triangulation Framework: Principles of triangulation; classification and orders of triangulation (Primary, Secondary, Tertiary). 1.3 Field Operations: Reconnaissance survey; criteria for selection of stations; requirements for towers and signals. 1.4 Station Geometry and Base Line Analysis: Intervisibility and heights of stations; effects of the Earth's curvature and atmospheric refraction. Methods of baseline measurement; equipment used, and essential corrections. Course Outcome: CO1, CO2 Teaching Hours: 8 hrs
2	**Theory of Errors and Survey Adjustments** 2.1 Error Fundamentals & Distribution: Analysis of accidental errors and their behaviour using the Probability Curve (Normal Distribution). 2.2 Statistical Metrics: Definitions and calculations for Probable Error, mean error, and standard deviation. 2.3 Weightage Analysis: Application of the Laws of Weights to determine the relative reliability of different sets of observations. 2.4 Adjustment Principles: Implementation of the Principle of Least Squares through the formulation and solution of Normal Equations. Course Outcome: CO2 Teaching Hours: 6 hrs
3	**Astronomical Surveying** 3.1 Basic Definitions: Celestial sphere, Zenith, Nadir, Azimuth, celestial horizon, visible horizon, celestial poles, polar axis, equator, ecliptic, equinoctial point, Solstices, Meridians, celestial Hour Angle, and declination. 3.2 Coordinate Systems and Time Systems: Horizon system and Equatorial system of coordinates. Sidereal time, Solar time, and Standard time calculations. 3.4 Determination of Position: Basics of determining Latitude, Longitude, and Azimuth of a survey line through celestial observations. Course Outcome: CO3 Teaching Hours: 6 hrs
4	**Photogrammetry & UAV (Drone) Surveying**

	4.1 Photogrammetric Principles: Terrestrial vs. Aerial photogrammetry, scale of vertical photographs, and relief displacement. 4.2 Drone Surveying (UAV): Introduction to UAV types (Fixed-wing vs. Multi-rotor), flight planning, and overlap (forward/side) requirements. 4.3 Image Processing: Standard practices for generating Orthomosaics, Digital Elevation Models (DEM), and Point Clouds. 4.4 Data Accuracy: Importance of Ground Control Points (GCPs) in drone mapping and basic image enhancement techniques. Course Outcome: CO4, CO2 Teaching Hours: 8 hrs
5	**Global Positioning System (GPS) and Remote Sensing** 5.1 GIS Framework: Components of GIS and core GIS operations; Map Projection methods. Coordinate Systems: Understanding Geographic and Projected coordinate systems. 5.2 Remote Sensing Principles: Definition, Electromagnetic Spectrum, energy interactions with atmosphere and earth surface features, spectral reflectance of vegetation, soil and water, classification of sensors, Active and Passive. 5.3 Civil Engineering Applications: Environmental: Impact of mining activities and natural resource mapping. Water Resources: Hydrologic modelling and watershed management. Urban & Infrastructure: Urban growth monitoring and transportation planning. Safety: Disaster management and mitigation strategies. Course Outcomes: CO3, CO5 Teaching Hours: 10 hrs

TEXT BOOK:

Sl. No.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Surveying Vol. II (Advanced Surveying)	B.C. Punmia, Ashok K. Jain & Arun K. Jain; Laxmi Publications (P) Ltd.; 16th Edition, 2016	9788170088837
2.	Advanced Surveying: Total Station, GPS, GIS & Remote Sensing	Satheesh Gopi, R. Sathikumar & N. Madhu; Pearson India; 2nd Edition, 2017	9789352860722
3.	Surveying and Levelling Part-2	T.P. Kanetkar and S.V. Kulkarni; Pune Vidyarthi Griha Prakashan; 24th Edition, 2019	9788185825009
4.	Remote Sensing and GIS	Basudeb Bhatta; Oxford University Press; 3rd Edition, 2020	9780199496648

REFERENCE BOOKS:

Sl. No.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Higher Surveying	A.M. Chandra; New Age International Publishers; 2nd Edition, 2002	9788122416281
2.	Elementary Surveying: An Introduction to Geomatics	Paul R. Wolf and Charles D. Ghilani; Pearson; 14th Edition (International), 2015	9780133758887

E-REFERENCES:

https://onlinecourses.nptel.ac.in/e-learning/preview/noc20_ce16
https://onlinecourses.nptel.ac.in/e-learning/preview/noc25_ce13
https://www.isro.gov.in/CARTOSAT_1.html
https://www.researchgate.net/publication/233904109_Automatic_digital_terrain_model_generation_using_Cartosat-1_stereo_images

Mapping of Course Outcomes onto Program Outcomes & Program Specific Outcomes:

COs	PO1	PO2	P3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	1	2	1	1	2	3	2	1
CO2	3	3	2	1	0	1	2	2	3	1
CO3	3	2	1	3	1	1	2	3	2	2
CO4	2	3	2	3	2	2	3	3	3	2
CO5	2	2	3	3	3	2	3	3	2	3

Grading: No Correlation – 0, Low Correlation – 1, Moderate Correlation- 2, High Correlation – 3

UNIVERSITY POLYTECHNIC
BIRLA INSTITUTE OF TECHNOLOGY MESRA – 835215 (RANCHI)
DEPARTMENT OF CIVIL ENGINEERING

SYLLABUS (CBCS) - 2026

COURSE: DPE 465 BUILDING SERVICES AND MAINTENANCE

PROGRAMME: DIPLOMA IN CIVIL ENGINEERING							
COURSE CODE: DPE 465			COURSE TITLE: BUILDING SERVICES AND MAINTENANCE				
COMPULSORY: PROGRAM ELECTIVE (PE - II)							
TEACHING SCHEME AND CREDITS					EXAMINATION SCHEME		
L	T	P	HOURS/WEEK	CREDIT	PE	FINAL	TOTAL
3	-	-	3	3	50	50	100

PREREQUISITE: DBS103 Applied Physics-I, DBS105 Mathematics-I, DCV 406 Civil Engineering Drawing

COURSE OBJECTIVES: This course enables the students:

1	To describe the procedure for classifying various types of building services
2	To explain the principles of vertical transportation systems.
3	To enumerate the fire safety requirements for multi-storeyed buildings.
4	To design a suitable plumbing system for a given type of building.
5	To evaluate building environmental systems for functional and comfortable indoor conditions.

COURSE OUTCOMES: After the completion of this course, students will be able to:

CO1	Explain the concepts, classification, and functional requirements of various building services and management systems.
CO2	Apply the principles of vertical transportation systems, including lifts, escalators, and ramps, in buildings.
CO3	Analyze fire hazards, fire protection systems, and fire safety provisions in buildings as per NBC guidelines.
CO4	Design suitable plumbing and drainage systems for buildings using standard plumbing practices and codes.
CO5	Evaluate lighting, ventilation, acoustics, and solar water heating systems for improving building functionality and comfort.

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	**Overview of Building Services** 1.1 Introduction to Building Services: Definition, necessity, and functional requirements of building services in modern buildings.

	1.2 Classification of Buildings: Classification of buildings as per the National Building Code and their service requirements. 1.3 Types of Building Services: Introduction to HVAC, lifts, escalators, fire safety, plumbing, lighting, acoustics, and electrical services. 1.4 Building Management Systems (BMS): Concept, functions, and role of BMS in smart buildings. 1.5 Role of Building Service Engineer: Responsibilities and importance of service engineers in planning and maintenance of buildings. Course Outcome: CO1, CO5 Teaching hours: 8 hrs
2	**Modes of vertical communication** 2.1 Vertical Communication in Buildings: Objectives and modes of vertical movements in buildings. 2.2 Lifts: Types, components, applications, and design provisions for basic size calculation of space enclosure to accommodate lift services. 2.3 Escalators: Types, components, applications, and design provisions for basic size calculation of space enclosure to accommodate escalator services. 2.4 Ramps: Necessity, design consideration, gradient calculation, layout planning, and accessibility features for elderly and physically challenged persons. 2.5 Safety Measures in Vertical Transportation: Safety requirements and operational precautions for lifts, escalators, and ramps. Course Outcome: CO1, CO2 Teaching hours: 8 hrs
3	**Fire Safety and Protection** 3.1 Fire Hazards in Buildings: Causes of fire in buildings and fire protection requirements for multi-storeyed buildings. 3.2 Fire Detection and Extinguishing Systems: Working principles and applications of fire detection and firefighting systems. 3.3 Fire Safety Provisions: National Building Code requirements for fire safety in multi-storeyed buildings. 3.4 Fire-Resistant Construction: Fire-resistant materials, fire-resistant construction methods, and their properties. 3.5 Fire Safety Inspection and Evacuation: Procedures for fire safety inspection and evacuation planning in buildings. Course Outcome: CO1, CO3 Teaching hours: 8 hrs

4	**Plumbing Services** 4.1 Introduction to Plumbing: Importance of plumbing systems, terminology and fixtures: terms used in plumbing, different types of plumbing fixtures, shapes/sizes, capacities, situation and usage, Traps, Interceptors. 4.2 Water Supply Systems: Storage, distribution, and hot and cold-water supply systems in buildings. 4.3 Drainage Systems: One-pipe and two-pipe drainage systems, venting, grey water, and reclaimed water concepts. 4.4 Plumbing Materials and Fittings: Types of pipes, joints, fittings, hangers, supports, valves, and their suitability. 4.5 Plumbing Standards and Approvals: Authority Having Jurisdiction (AHJ) approvals and plumbing code provisions. Course Outcome: CO1, CO4 Teaching hours: 8 hrs
5	**Lighting, Ventilation and Acoustics** 5.1 Solar Water Heating System: Concept, components, types, installation, and maintenance of solar water heating systems. 5.2 Lighting in Buildings: Concept and types of lighting, factors influencing the brightness of a room, factors affecting the selection of artificial lighting, installation of light, types of light control, lamp types, and lamp selection as per room size. 5.3 Ventilation: Concept, necessity, and types of ventilation systems in buildings. 5.4 Building Acoustics: Objectives of acoustics and sound control methods. 5.5 Acoustic Materials and Sound Insulation: Porous absorbers, cavity resonators, and materials used for sound insulation in buildings. Course Outcome: CO1, CO5 Teaching hours: 8 hrs

TEXT BOOK:

Sl. No.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	The A to Z of Practical Building Construction and its Management	Mantri and Sandeep, Satya Prakashan, New Delhi.	978-9351922629
2.	Plumbing Design and Practice	Deolalikar,S. G., McGraw-Hill.	978-0074620694

3.	Principles of Fire Safety Engineering: Understanding Fire and Fire Protection	Akhil Kumar Das, PHI Learning Pvt. Ltd, New Delhi.	978-8120350380
4.	Solar panel installation guide & user manual	Shraman N L, The Memory Guru of India.	-
5.	National Building Code Part1, 4, 8, 9.	BIS., Bureau of Indian Standard, New Delhi	-
6.	IS 12183(Part 1):1987 Code of practice for plumbing in multistoried buildings.	BIS., Bureau of Indian Standard, New Delhi	-
7.	2008 Uniform plumbing code – India (UPC-I).	BIS., Bureau of Indian Standard	-

REFERENCE BOOKS:

Sl. No.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Practical handbook on building maintenance	Gupta M K, Civil works, Nabhi Publications.	978-8172748036
2.	Building Services	Patil, S. M., Seema Publication, Mumbai.	-

E-REFERENCES:

https: /nptel.ac.in/domains/discipline/124?course=124_1
https: /nptel.ac.in/courses/124105004
https: /nptel.ac.in/courses/105102176

Mapping of Course Outcomes onto Program Outcomes & Program Specific Outcomes:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	1	1	1	1	1	0	2	1	1
CO2	3	2	2	1	2	1	1	2	2	1
CO3	3	3	2	1	3	2	1	2	2	2
CO4	3	3	3	1	3	2	1	3	3	2
CO5	3	2	2	1	3	1	2	2	1	3

Grading: No correlation – 0, Low correlation - 1, Moderate correlation – 2, High Correlation – 3

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DEPARTMENT OF CIVIL ENGINEERING

SYLLABUS (CBCS) – 2026

COURSE: DPE 467 BUILDING BYE-LAWS AND PLANNING

PROGRAMME: DIPLOMA IN CIVIL ENGINEERING							
COURSE CODE: DPE 467			COURSE TITLE: BUILDING BYE-LAWS AND PLANNING				
OPTIONAL: PROGRAME ELECTIVE (PEII)							
TEACHING SCHEME AND CREDITS					EXAMINATION SCHEME		
L	T	P	HOURS/WEEK	CREDIT	PE	FINAL	TOTAL
3	-	-	3	3	50	50	100

PREREQUISITE: DCV 406 Civil Engineering Drawing

COURSE OBJECTIVES: This course enables the students

1.	Remember fundamental legal definitions, building classifications, and the history of the National Building Code (NBC).
2.	Understanding the principles of land-use zoning and the socio-environmental impact of building regulations.
3.	Apply NBC standards for room dimensions and fire safety to develop functional building layouts.
4.	Analyze site constraints to calculate permissible Floor Area Ratio (FAR) and Ground Coverage.
5.	Evaluate building plans for compliance with barrier-free design and professional ethical standards.
6.	Create professional-grade digital submission drawings and accurate Area Statement tables for municipal sanction.

COURSE OUTCOMES: After the completion of this course, students will be able to:

CO1	Interpret legal terminology, zoning regulations, and the National Building Code (NBC) to determine plot development potential.
CO2	Apply site planning principles and mandatory space standards to design efficient residential and public building layouts.
CO3	Integrate fire safety, natural ventilation, and essential utility services into building designs per statutory requirements.
CO4	Assess the legality of structures regarding accessibility, parking norms, and the digital approval workflow.
CO5	Produce professional submission drawings, manage regularization processes, and adhere to professional ethics and liabilities in engineering practice.

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COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	**Legal Framework and Building Governance** 1.1 Objectives and Scope: Understanding why bye-laws exist (safety, health, and aesthetic harmony). 1.2 National Building Code (NBC): History, latest amendments, and its role as a guiding document for state bye-laws. 1.3 Legal Definitions: Comprehensive study of Plinth area, carpet area, built-up area, and setbacks. 1.4 Development Controls: Understanding Floor Area Ratio (FAR/FSI) and its impact on urban density. 1.5 Administrative Hierarchy: Role of local Municipal Authorities and Development Authorities in building sanctioning. Course Outcomes: CO1, CO5 Teaching Hours: 8 hrs
2	**Strategic Site Planning and Zoning** 2.1 Site Selection: Factors influencing selection, including topography, soil, and connectivity. 2.2 Land Use Zoning: Classification of residential, commercial, industrial, and green zones. 2.3 Plot Requirements: Minimum plot sizes and frontage requirements for different building types. 2.4 Set-back Regulations: Determination of front, rear, and side margins for light and ventilation. 2.5 Road Widths: Relationship between road width, building height, and permissible coverage. Course Outcomes: CO1, CO2 Teaching Hours: 8 hrs
3	**Planning Standards and Occupancy Safety** 3.1 Principles of Planning: Application of Orientation (Sun/Wind), Prospect, Privacy, Grouping, and Circulation. 3.2 Habitable Space Standards: Minimum area and height requirements for habitable rooms, kitchens, and toilets. 3.3 Public Building Planning: Specific considerations for schools, dispensaries, and small community halls. 3.4 Fire Safety Mandates: Exit requirements, travel distance to exits, and fire-resistant materials. 3.5 Building Classification: Categorization of buildings based on occupancy and hazard potential.

	Course Outcomes: CO2, CO3 Teaching Hours: 8 hrs
4	**Integrated Building Services and Accessibility** 4.1 Sanitation Bye-laws: Rules for water supply, septic tank locations, and drainage systems. 4.2 Climate Control: Window-to-floor area ratios for natural lighting and ventilation. 4.3 Universal Design: Barrier-free design requirements, including ramps and wide doorways for accessibility. 4.4 Sustainable Infrastructure: Compulsory mandates for Rainwater Harvesting (RWH) and solar passive design. 4.5 Urban Logistics: Calculation of Equivalent Car Space (ECS) and parking layout requirements. Course Outcomes: CO3, CO4 Teaching Hours: 8 hrs
5	**Professional Practice and Submission Project** 5.1 The Permit Process: Step-by-step documentation for building permits and Occupancy Certificates. 5.2 Digital Governance: Introduction to Online Building Plan Approval Systems (OBPAS) and Auto-DCR. 5.3 Regularization and Ethics: Handling unauthorized construction and professional liability of the engineer. 5.4 Submission Set Preparation: Drafting Site plans, Floor plans, Elevations, and Sections at standard scales. 5.5 Area Statement Table: Preparation of the formal technical table for legal verification. Course Outcomes: CO4, CO5 Teaching Hours: 8 hrs

TEXT BOOK:

Sl. No.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Building Science and Planning	S.V. Deodhar; Khanna Publishers, 5th Edition, 2019	978-81-7409-199-4
2.	Building Planning and Drawing	N. Kumara Swamy and A. Kameswara Rao; Charotar Publishing House, 9th Edition, 2022	978-9385039386
3.	Building Drawing with an Integrated Approach to the Built Environment	M.G. Shah, C.M. Kale, and S.Y. Patki; Tata McGraw Hill, 5th Edition, 2017	978-0074638767

REFERENCE BOOKS:

Sl. No.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	National Building Code of India 2016 (Volume 1 & 2)	Bureau of Indian Standards (BIS), 2016	---
2.	A Visual Dictionary of Architecture	Francis D.K. Ching; John Wiley & Sons, 2nd Edition, 2011	978-0470648858
3.	Estimating and Costing in Civil Engineering	B.N. Dutta; CBS Publishers & Distributors, 28th Revised Edition, 2020	978-8174840431

E-REFERENCES:

1. NPTEL Course: Housing Policy & Planning by Prof. Uttam Kumar Roy, IIT Roorkee.
   Link: https://onlinecourses.nptel.ac.in/e-learning/preview/noc21_ar16

Mapping of Course Outcomes onto Program Outcomes & Program Specific Outcomes:

COs	PO1	PO2	P3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	1	0	0	2	1	2	2	3	2
CO2	3	2	3	1	2	2	1	3	3	2
CO3	2	2	3	2	3	2	2	2	2	3
CO4	2	3	2	3	2	3	3	2	3	3
CO5	1	2	3	3	1	3	3	3	3	3

Grading: No Correlation – 0, Low Correlation – 1, Moderate Correlation- 2, High Correlation – 3

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DEPARTMENT OF CIVIL ENGINEERING

SYLLABUS (CBCS) – 2026

COURSE: DOE 461 RENEWABLE ENERGY AND ENVIRONMENT

PROGRAMME: DIPLOMA IN CIVIL ENGINEERING							
COURSE CODE: DOE 461			COURSE TITLE: RENEWABLE ENERGY AND ENVIRONMENT				
OPTIONAL: OPEN ELECTIVE - I							
TEACHING SCHEME AND CREDITS					EXAMINATION SCHEME		
L	T	P	HOURS/WEEK	CREDIT	PE	FINAL	TOTAL
3	-	-	3	3	50	50	100

PREREQUISITE: DBS101 Engineering Chemistry, DBS103 Applied Physics-I

COURSE OBJECTIVES: This course enables the students to

1.	Remember the various sources of energy and their historical impact on society.
2.	Understand the scientific principles behind solar, wind, and biomass energy conversion.
3.	Apply energy conservation techniques to reduce the carbon footprint in industrial settings.
4.	Analyze the economic and environmental trade-offs of different energy storage systems.
5.	Evaluate the feasibility of renewable energy integration in existing infrastructure.
6.	Create a basic plan for a green facility or energy-efficient workspace.

COURSE OUTCOMES: After the completion of this course, students will be able to:

CO1	Identify global and national energy reserves and explain the historical impact of fossil fuel consumption on climate change.
CO2	Explain the operational mechanics of solar, wind, and biomass energy conversion and apply these principles to site-specific energy needs.
CO3	Analyze energy consumption patterns within a facility to identify inefficiencies and perform basic energy audits for industrial equipment.
CO4	Evaluate the environmental and economic trade-offs of clean technologies (Hydrogen, Nuclear) and waste-to-energy conversion methods.
CO5	Formulate a basic plan for a green workspace that integrates passive cooling, sustainable material selection, and energy-efficient lighting.

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COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	**Energy Fundamentals and Environment** 1.1 Global & National Energy Scenarios: Current reserves and consumption patterns. 1.2 Energy-Environment Linkage: Climate change, greenhouse effect, and global warming. 1.3 Carbon Footprint: Calculation basics and methods for reduction in industrial sectors. 1.4 Sustainability Principles: Trade-offs between economic growth and environmental preservation. Course Outcome: CO1, CO3 Teaching Hours: 8 hrs
2	**Renewable Energy Sources** 2.1 Solar Energy: Principles of Photovoltaic (PV) cells and Solar Thermal collectors. 2.2 Wind & Hydro Power: Components, Turbine types, site selection, 2.3 Biomass & Bio-energy: Basics of biogas plants and ethanol production from agricultural waste. 2.4 Emerging Sources: Introduction to Tidal, Wave, and Geothermal energy conversion. 2.5 Energy Storage: High-efficiency batteries and pumped storage concepts. Course Outcome: CO1, CO2 Teaching Hours: 10 hrs
3	**Energy Conservation & Efficiency** 3.1 Energy Audit: Types of audits and methodology for industrial facilities. 3.2 Efficient Systems: Energy-efficient motors, variable frequency drives (VFDs), and LED lighting systems. 3.3 Economics of Energy: Cost-benefit analysis of switching to renewable sources. 3.4 Optimization Tools: Software and manual techniques for monitoring real-time energy usage. Course Outcome: CO2, CO3 Teaching Hours: 6 hrs
4	**Clean Technology & Waste-to-Energy** 4.1 Hydrogen & Fuel Cells: Production, storage, and applications in transport/industry. 4.2 Nuclear Energy: Basic reactor types and safety protocols for containment. 4.3 Waste Management: Converting Municipal Solid Waste (MSW) into energy (incineration/pyrolysis) . 4.4 Industrial Byproducts: Utilization of Fly Ash and slag in sustainable engineering. Course Outcome: CO3, CO4 Teaching Hours: 8 hrs
5	**Green Building & Sustainable Practices** 5.1 Green Building Concepts: LEED/GRIHA rating systems and site selection. 5.2 Sustainable Materials: Low embodied energy materials and recycled construction components.

	5.3 Passive Design: Orientation for natural ventilation, daylighting, and solar shading. 5.4 HVAC Efficiency: Energy-efficient cooling systems and building automation basics. Course Outcome: CO2, CO4, CO5 Teaching Hours: 8 hrs

TEXT BOOK:

Sl. No.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Energy Technology	O.P. Gupta; Khanna Book Publishing, 2nd Edition, 2019	978-93-86173-68-3
2.	Solar Energy: Principles of Thermal Collection and Storage	S.P. Sukhatme and J.K. Nayak; Tata McGraw Hill, 4th Edition, 2017	978-9352607112
3.	Non-Conventional Energy Resources	B.H. Khan; McGraw Hill Education (India), 3rd Edition, 2017	9789352601882
4.	Renewable Energy: Power for a Sustainable Future	Godfrey Boyle; Oxford University Press, 4th Edition, 2024	978-0199681273

REFERENCE BOOKS:

Sl. No.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Energy and the Environment	Robert A. Ristinen and Jack J. Kraushaar; John Wiley & Sons, 3rd Edition, 2015	978-0471739890

E-REFERENCES:

NPTEL Course: Non-Conventional Energy Resources by Dr. Prathap Haridoss, IIT Madras. https://nptel.ac.in/courses/121106014

NPTEL Course: Energy Resources, Economics and Environment by Prof. Rangan Banerjee, IIT Bombay. https://onlinecourses.nptel.ac.in/e-learning/preview/noc22_hs43

NPTEL Course: Renewable Energy Engineering: Solar, Wind And Biomass Energy Systems, Prof. Vaibhav Vasant Goud, Prof. R. Anandalakshmi, IIT Guwahati. https://nptel.ac.in/courses/103103206

Virtual Labs: Solar Energy Remote Lab for simulating Photovoltaic characteristics and solar radiation monitoring. https://vlab.amrita.edu/?sub=1&brch=195&sim=360&cnt=1

Mapping of Course Outcomes onto Program Outcomes & Program Specific Outcomes:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	1	0	0	3	0	1	NA	NA	NA
CO2	3	2	2	1	3	0	2	NA	NA	NA
CO3	2	3	2	3	2	1	1	NA	NA	NA
CO4	2	2	1	0	3	0	2	NA	NA	NA
CO5	3	2	3	1	3	2	2	NA	NA	NA

Grading: No Correlation – 0, Low Correlation – 1, Moderate Correlation- 2, High Correlation – 3

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DEPARTMENT OF CIVIL ENGINEERING

SYLLABUS (CBCS) – 2026

COURSE: DOE 463 PRINCIPLES OF GEOSPATIAL ENGINEERING

PROGRAMME: DIPLOMA IN CIVIL ENGINEERING							
COURSE CODE: DOE 463			COURSE TITLE: PRINCIPLES OF GEOSPATIAL ENGINEERING				
OPTIONAL: OPEN ELECTIVE - I							
TEACHING SCHEME AND CREDITS					EXAMINATION SCHEME		
L	T	P	HOURS/WEEK	CREDIT	PE	FINAL	TOTAL
3	-	-	3	3	50	50	100

PREREQUISITE: DBS103 Applied Physics-I, DBS105 Mathematics-I, DBS 201 Applied Physics-II.

COURSE OBJECTIVES: This course enables the students to

1.	Remember the fundamental definitions, branches of Geospatial Engineering, and the architecture of various global and regional GNSS systems like NavIC.
2.	Understand the physics of Remote Sensing, including EM spectrum interactions and the operational characteristics of multispectral sensors.
3.	Apply GIS frameworks to perform geo-referencing, digitization, and spatial data modelling for civil engineering projects.
4.	Analyze the accuracy of digital field data and UAV-based mapping for site layouts and volume calculations.
5.	Evaluate the suitability of geospatial applications for structural health monitoring, watershed management, and urban utility mapping.
6.	Create basic digital elevation models (DEM) and thematic maps to solve real-world infrastructure challenges.

COURSE OUTCOMES: After the completion of this course, students will be able to:

CO1	Explain the role of geospatial technologies and satellite systems in modern Indian infrastructure.
CO2	Utilize GNSS and DGPS techniques for high-precision field mapping and error correction.
CO3	Interpret remote sensing data and spectral response curves for land use analysis.
CO4	Develop GIS-based spatial models using vector and raster data for site suitability.
CO5	Execute digital surveys using Total Stations and UAVs for 3D terrain modelling.

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DEPARTMENT OF CIVIL ENGINEERING

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	**Introduction to Geospatial Engineering and Satellite Positioning (GNSS)** 1.1. Fundamentals: Definitions and importance of Geospatial Engineering. Branches: Geodesy, Photogrammetry, Remote Sensing (RS), GIS, and GNSS. Comparison between Geomatics and Geoinformatics. Role of a Geospatial technologist in India's infrastructure growth. 1.2. GNSS Systems: Introduction to GPS (USA), GLONASS (Russia), Galileo (EU), and NavIC (India). 1.3. Architecture: Space, Control, and User segments; Signal structure basics. 1.4. Field Techniques: Static, Kinematic, and DGPS for high-precision field mapping. 1.5. Accuracy: Signal interference, multipath errors, and atmospheric corrections. Course Outcome: CO1, CO2 Teaching Hours: 6 hrs
2	**Remote Sensing (RS) Principles & Platforms** 2.1 Physics of RS: EM Spectrum, Solar reflection, and Thermal emission; Laws of Radiation and their relevance. 2.2 Interactions: EM radiation interaction with the atmosphere (scattering, absorption, emission) and the ground (spectral response curves). 2.3 2.3 Sensors: Multi-spectral scanners and imaging devices; Characteristics of LANDSAT, SPOT, and Sentinel sensors. 2.4 Data: RS Platforms (Airborne/Satellite); Basis of remote sensing image representation (Pixels/DN values). Course Outcome: CO3 Teaching Hours: 6 hrs
3	**Geographic Information Systems (GIS)** 3.1 Framework: Essential components of GIS (Hardware, Software, Data, People, Methods). 3.2 Data Models: Different types of vector data (Point, Line, Polygon) and Raster data structures. 3.3 Topology: Concept of topology and its importance in spatial connectivity and adjacency. 3.4 Operations: Geo-referencing, Digitization, and demonstration through GIS software. Course Outcome: CO4 Teaching Hours: 6 hrs
4	**Digital Land Surveying & UAV Mapping** 4.1 Total Station: Principles, electronic data logging, and application in site layouts. 4.2 Drone Surveying (UAV): Introduction to Drones for topographic mapping and volume calculations. 4.3 Lidar Basics: Light Detection and Ranging (LiDAR) for 3D terrain modelling and forest canopy analysis. 4.4 Digital Mapping: Creation of Digital Elevation Models (DEM) and contours from digital field data.

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	Course Outcome: CO4, CO5	Teaching Hours: 5 hrs
5	**Geospatial Applications in Infrastructure** 5.1 Transportation & Monitoring: Highway alignment, corridor mapping, Plastic Waste Road monitoring, and structural health monitoring of bridges/dams. 5.2 Urban & Building Assets: Site suitability analysis, Smart City layouts, and GIS-based utility mapping (water/gas pipelines). 5.3 Water Resources: Watershed management, flood risk mapping, and permeable pavement system planning. Course Outcome: CO1, CO5	Teaching Hours: 5 hrs

TEXT BOOK:

Sl. No.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Remote Sensing and GIS	B. Bhatta; Oxford University Press, 3rd Edition, 2021	978-0199496648
	Surveying (Vol. II)	S.K. Duggal; McGraw Hill Education (India), 4th Edition, 2013	978-1259029837
2.	Remote Sensing and Image Interpretation	Thomas Lillesand, Ralph W. Kiefer, and Jonathan Chipman; Wiley, 7th Edition, 2015	978-1118343289

REFERENCE BOOKS:

Sl. No.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Textbook of Remote Sensing and GIS	M. Anji Reddy; BS Publications, 5th Edition, 2024	978-9395038560
2.	Elements of Photogrammetry with Applications in GIS	Paul R. Wolf, Bon A. Dewitt, and Benjamin E. Wilkinson; McGraw Hill, 4th Edition, 2014	978-0071761123
3.	Introduction to Geographic Information Systems	Kang-tsung Chang; McGraw Hill Education, 9th Edition, 2018	978-1259929649

E-REFERENCES:

NPTEL Course:

a. https://archive.nptel.ac.in/content/storage2/courses/105107122/home.htm
b. https://nptel.ac.in/courses/105107155

SRO-IIRS Outreach Program:

https://elearning.iirs.gov.in/available_courses.php

Virtual Labs:

a. https://remotesensinglab.com/
b. https://ars-nitk.vlabs.ac.in/
c. https://sl-iitr.vlabs.ac.in/exp/study-of-gps/theory.html

Software:

a. https://qgis.org/download/
b. https://wocat.net/documents/1077/WOCAT_FAO_Tutorial_QGIS.pdf

Mapping of Course Outcomes onto Program Outcomes & Program Specific Outcomes:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	0	0	0	2	1	2	NA	NA	NA
CO2	2	3	0	3	0	0	1	NA	NA	NA
CO3	2	2	1	2	2	0	1	NA	NA	NA
CO4	1	2	3	3	1	0	2	NA	NA	NA
CO5	2	3	2	3	2	2	2	NA	NA	NA

Grading: No Correlation – 0, Low Correlation – 1, Moderate Correlation- 2, High Correlation – 3

UNIVERSITY POLYTECHNIC
BIRLA INSTITUTE OF TECHNOLOGY MESRA – 835215 (RANCHI)
DEPARTMENT OF CIVIL ENGINEERING

SYLLABUS (CBCS) - 2026

COURSE: DCV 402 GEOTECHNICAL ENGINEERING LABORATORY

PROGRAMME: DIPLOMA IN CIVIL ENGINEERING							
COURSE CODE: DCV 402			COURSE TITLE: GEOTECHNICAL ENGINEERING LABORATORY				
COMPULSORY: PROGRAM CORE							
TEACHING SCHEME AND CREDITS					EXAMINATION SCHEME		
L	T	P	HOURS/WEEK	CREDIT	PE	FINAL	TOTAL
-	-	2	2	1	50	50	100

COURSE OBJECTIVES: This course enables the students to;

1.	To train students in determining basic phase relationships, including moisture content, specific gravity, and in-situ density using standard field methods.
2.	To enable students to perform sieve and hydrometer analysis alongside Atterberg limits testing to systematically classify soils according to standard codes.
3.	To introduce testing methodologies for determining the coefficient of permeability and optimal compaction characteristics of soils.
4.	To instruct students on assessing the shear strength parameters of cohesive and cohesionless soils using direct shear and unconfined compression tests under specific loading constraints.
5.	To expose students to complex triaxial cell setups (Unconsolidated Undrained condition) to interpret simulated stress-strain behaviour for deep foundation and slope stability parameters.

Course Outcomes: After the completion of this course, students will be able to

CO1	Demonstrate proficiency in operating modern engineering apparatus to perform standard field and laboratory tests on various soil samples.
CO2	Conduct experimental setups to evaluate the coefficient of permeability and optimal densification parameters of soil samples.
CO3	Operate direct shear, unconfined compression, and triaxial testing systems to determine the strength parameters of cohesive and cohesionless soils.
CO4	Analyze experimental field data, plot standard geotechnical engineering curves, and calculate underlying mathematical relationships.
CO5	Evaluate soil characteristics against Indian Standard (IS) codes to systematically classify soils and produce standardized engineering test documentation.

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COURSE CONTENT DETAILS:

MODULE	EXPERIMENTS
1	Determination of moisture content and specific gravity. Course Outcome: CO1, CO5
2	Determination of bulk unit weight and dry unit weight of soil in the field by the core cutter method. Course Outcome: CO1, CO5
3	Determination of bulk unit weight and dry unit weight of soil in the field by the sand replacement method. Course Outcome: CO1, CO5
4	Determination of the grain size distribution of a given soil sample. Course Outcome: CO1, CO4, CO5
5	Determination of Atterberg limits. Course Outcome: CO1, CO4, CO5
6	Proctor Compaction Test. Course Outcome: CO2, CO4, CO5
7	Determination of the coefficient of permeability by the constant head and falling head method. Course Outcome: CO2, CO4, CO5
8	Determination of shear strength of soil using the direct shear test. Course Outcome: CO3, CO4, CO5
9	Determination of shear strength of soil using the unconfined compression test. Course Outcome: CO3, CO4, CO5
10	Determination of shear strength of soil using tri-axial shear test (UU only). Course Outcome: CO3, CO4, CO5

TEXT BOOK:

Sl. No.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Manual of Geotechnical Laboratory Soil Testing	Bashir Ahmed Mir, CRC Press (Taylor & Francis), 1st Edition, 2024	978-1032060095
2.	Soil Mechanics Laboratory Manual	Braja M. Das, Oxford University Press, 8th Edition, 2012	978-0199846375
3.	Geotechnical Engineering Laboratory Manual	Dr. S.K. Panigrahi, Scientific Publishers, 1st Edition, 2025	978-93-49499-96-6

REFERENCE BOOKS:

Sl. No.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Basic and Applied Soil Mechanics	Gopal Ranjan and A.S.R. Rao, New Age International, 3rd Edition, 2016	978-8122440393
2.	Geotechnical Engineering: Principles and Practices of Soil Mechanics and Foundation Engineering	V.N.S. Murthy (CRC Press), 1st Edition, 2002	978-0824708733

E-REFERENCES:

https://smfe-iiith.vlabs.ac.in/
https://gte-nitk.vlabs.ac.in/

Mapping of Course Outcomes onto Program Outcomes & Program Specific Outcomes:

COs	PO1	PO2	P3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	1	0	3	1	1	2	3	1	1
CO2	3	2	1	3	1	1	2	3	1	1
CO3	3	2	2	3	1	1	2	3	1	1
CO4	3	3	2	2	0	1	2	2	2	1
CO5	2	2	2	1	3	2	3	2	3	2

Grading: No Correlation – 0, Low Correlation – 1, Moderate Correlation- 2, High Correlation - 3

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BIRLA INSTITUTE OF TECHNOLOGY MESRA – 835215 (RANCHI)
DEPARTMENT OF CIVIL ENGINEERING

SYLLABUS (CBCS) - 2026

COURSE: DCV 404 CONCRETE TECHNOLOGY LABORATORY

PROGRAMME: DIPLOMA IN CIVIL ENGINEERING							
COURSE CODE: DCV 404			COURSE TITLE: CONCRETE TECHNOLOGY LABORATORY				
COMPULSORY: PROGRAM CORE							
TEACHING SCHEME AND CREDITS					EXAMINATION SCHEME		
L	T	P	HOURS/WEEK	CREDIT	PE	FINAL	TOTAL
-	-	2	2	1	50	50	100

COURSE OBJECTIVES: This course enables the students:

1	To interpret the physical and mechanical properties of cement and aggregates through standard laboratory tests.
2	To evaluate properties of fresh concrete, such as workability, using practical methods.
3	To design a concrete mix for a given grade and assess its strength characteristics.
4	To perform non-destructive tests for quality assessment of concrete.
5	To develop practical skills in testing procedures, data analysis, and interpretation as per IS codes.

COURSE OUTCOMES: After the completion of this course, students will be able to:

CO1	Determine the physical properties of cement and aggregates using standard laboratory tests.
CO2	Evaluate the workability of fresh concrete using the slump cone and compaction factor tests.
CO3	Design and prepare concrete mixes of specified grades and analyze compressive strength results at different curing periods.
CO4	Assess the quality of concrete using non-destructive testing methods such as UPV and rebound hammer tests.
CO5	Interpret experimental results and correlate them with standard specifications and theoretical concepts.

LISTS OF EXPERIMENTS

Sl. No.	EXPERIMENTS
1	**Test on Cement** Determination of fineness of cement. Determination of the specific gravity, Determination of standard consistency, initial and final setting times of cement.

	Course Outcome: CO1, CO5
2	**Test on Aggregates** Sieve analysis of coarse and fine aggregates. Determination of specific gravity and water absorption of fine and coarse aggregates. Determination of the bulk density of fine and coarse aggregate. Determination of the bulking of sand. Course Outcome: CO1, CO5
3	**Test on Fresh Concrete** Determination of workability of concrete by the slump cone and compaction factor test. Course Outcome: CO1, CO2, CO5
4	**Concrete Mix Design** To prepare a concrete mix of a particular grade and determine its compressive, flexural and split tensile strength. Course Outcome: CO1, CO2, CO3, CO5
5	**Non-Destructive Test (NDT)** Demonstration of NDT equipment. Course Outcome: CO4, CO5

REFERENCE BOOKS:

Sl. No.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Concrete Technology	Gambhir, M.L. (2004), Tata McGraw-Hill Education, New Delhi	978-0070583740
2.	Concrete Manual, Gambhir, M.L. (1992),	Dhanpat Rai & Sons, New Delhi.	-
3.	IS: 10262-2019	Indian Standard Concrete Mix Proportioning-Guidelines, BIS, New Delhi.	-
4.	SP 23 (1982)	Handbook on Concrete Mixes, BIS, New Delhi.	-

E-REFERENCES:

https://nptel.ac.in/courses/105102012
https://nptel.ac.in/courses/105106176

Mapping of Course Outcomes onto Program Outcomes & Program Specific Outcomes

COs	PO1	PO2	P3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	1	3	1	0	1	2	1	1
CO2	2	2	1	3	1	0	1	2	1	1
CO3	3	3	3	3	3	2	1	3	2	1
CO4	2	2	1	3	3	1	1	3	1	2
CO5	2	3	1	2	3	1	2	2	2	1

Grading: No correlation – 0, Low correlation - 1, Moderate correlation – 2, High Correlation - 3

UNIVERSITY POLYTECHNIC
BIRLA INSTITUTE OF TECHNOLOGY MESRA – 835215 (RANCHI)
DEPARTMENT OF CIVIL ENGINEERING

SYLLABUS (CBCS) - 2026

COURSE: DCV 406 CIVIL ENGINEERING DRAWING

PROGRAMME: DIPLOMA IN CIVIL ENGINEERING							
COURSE CODE: DCV 406			COURSE TITLE: CIVIL ENGINEERING DRAWING				
COMPULSORY: PROGRAMME CORE							
TEACHING SCHEME AND CREDITS					EXAMINATION SCHEME		
L	T	P	HOURS/WEEK	CREDIT	PE	FINAL	TOTAL
-	-	3	3	1.5	50	50	100

COURSE OBJECTIVES: This course enables the students:

1	Understand the fundamentals of building drawings, scales, symbols, and drafting conventions used in civil engineering.
2	Develop the ability to prepare and interpret drawings of building components such as masonry bonds, foundations, walls, and staircases.
3	Apply engineering drawing principles for the preparation of plans, elevations, sections, and building service layouts.
4	Gain proficiency in preparing water supply and drainage drawings for residential buildings.
5	Utilize AutoCAD software for drafting, editing, and preparing professional building drawings.

COURSE OUTCOMES: After the completion of this course, students will be able to:

CO1	Explain the types of building drawings, scales, conventional symbols, and drafting standards used in building construction.
CO2	Prepare drawings of masonry bonds, load-bearing structures, shallow foundations, and staircases using standard drafting practices.
CO3	Develop and interpret residential building plans, elevations, and sectional drawings for building construction.
CO4	Prepare water supply and drainage layouts for residential buildings and analyze their functional requirements.
CO5	Create residential building plans, elevations, and sections using AutoCAD tools and commands.

LISTS OF EXPERIMENTS

Sl. No.	EXPERIMENTS
1	**Types of Drawings and Scales** Introduction to index map, key plan, village map, site plan, and layout plan with suitable scales, applications, and standard drawing sheet sizes. Course Outcome: CO1, CO2

2	**Standard Symbols in Building Drawings** Conventional symbols are used for engineering materials, electrical installations, water supply, and sanitary fittings. Course Outcome: CO1, CO2
3	**Masonry Bonds** Types of commonly used masonry bonds in building construction. Course Outcome: CO2, CO3
4	**Load-Bearing Structures and Foundations** Drawings and details of load-bearing walls and shallow foundations. Course Outcome: CO2, CO3
5	**Residential Building Drawings** Preparation and interpretation of plans, elevations, and sectional views of residential buildings. Course Outcome: CO2, CO3, CO4
6	**Staircase Drawings** Types of staircases with plan and sectional details. Course Outcome: CO2, CO3, CO4
7	**Water Supply and Drainage Drawings** Detailed drawings and layouts of water supply and drainage systems for buildings, including: a) Drainage layout for single-storey buildings b) Water supply layout for single-storey buildings c) Drainage layout for multi-storeyed buildings Course Outcome: CO2, CO4, CO5
8	**Introduction to AutoCAD** Basic Drawing Commands, Editing Commands, Layers, Dimensioning, and Plotting. Course Outcome: CO1, CO5
9	**CAD Drafting of Building Plans** Preparation of residential building plans using AutoCAD. Course Outcome: CO3, CO4, CO5
10	**CAD Drafting of Building Elevations and Sections** Preparation of elevations and sections of residential buildings using AutoCAD. Course Outcome: CO3, CO4, CO5

REFERENCE BOOKS:

Sl. No.	Title	Author, Publisher, Edition and Year of publication	ISBN
1	Building Drawing	M.G. Shah, C.M. Kale, S.Y. Patki, Tata McGraw-Hill Education	978-0071077879
2	Civil Engineering Drawing and House Planning	B.P. Verma, Khanna Publishers, New Delhi	978-8174091222
3	Building Construction	B.C. Punmia, Ashok Kumar Jain, Arun Kumar Jain, Laxmi Publications	978-8131804281
4	Building Planning and Drawing	N. Kumaraswamy, A. Kameswara Rao, Charotar Publishing House	978-9385039474
5	Civil Engineering Drawing	S.S. Bhavikatti, I.K. International Publishing House	978-9380026660

E-REFERENCES:

https://nptel.ac.in/
https://onlinecourses.swayam2.ac.in

Mapping of Course Outcomes onto Program Outcomes & Program Specific Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	1	0	0	0	1	1	3	1
CO2	3	2	3	1	0	0	0	3	3	0
CO3	3	3	3	1	0	0	0	3	3	0
CO4	2	3	3	1	2	0	0	3	2	2
CO5	2	2	3	3	0	1	1	2	3	1

Grading: No correlation – 0, Low correlation - 1, Moderate correlation – 2, High Correlation - 3