

Programme : Diploma in CE
Programme Code : 01 /15
Name of Course : Mechanics of Materials & Structures
Course Code : AM 467

Teaching Scheme:

	Hours /Week	Total Hours
Theory	04	64
Practical	02	32

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	Two class tests, each of 60 minutes	3Hrs.	--	--	--
Marks	20	80	--	25	25

Course Rationale:

It is essential to acquaint the students about various concepts and principles required in design & analysis of various structures. In this course the ability to think critically during analysis of a structure is to be developed. The response of structural members to various actions such as tension, compression, bending is to be analysed in the theoretical input. During practicals, the properties and strengths of various materials are to be determined by performing different test using the standard procedures. Using the test results the suitability of the material is decided

Course Objectives:

At the end of this course the students will be able to –

- Understand the basic principles of behavior of the material subjected to various loads.
- Apply the principles to field situation.
- Understand the procedure of testing the materials

- Develop the ability of interpreting results.
- Know and understand various theories and various principles of subject.

Course Content:

Chapter No.	Name of Topic/Sub topic	Hrs	Weightage
1	Stress and strains.		
	1.1 Concepts of elastic, deformable and rigid bodies, concept of deformation, strain and stress.	10	10
	1.2 Axial stress-Tensile, compressive, axial strain, shear strain, lateral strain, Poisson's ratio. Problems on determination of stresses and deformation of bars of uniform and varying cross section.		
	1.3 Axial stress-Tensile, compressive, axial strain, shear strain, lateral strain, Poisson's ratio. Problems on determination of stresses and deformation of bars of uniform and varying cross section.		
	1.4 Composite sections under axial load, simple problems on analysis of composite sections.		
	1.5 Concept of temperature stresses. Thermal stresses in bars of uniform section.		
2	Elastic Constants:		
	2.1 Lateral strain, Poisson's ratio, biaxial and triaxial stresses, volumetric strain, change in volume, Bulk modulus.	08	08
	2.2 Shear stress and strain, shear modulus, state of simple shear, complementary shear.		
	2.3 Relation between E,G,K, numerical problems on relation between E,G.K and μ .		
3	Strain Energy:		
	3.1 Concept of strain energy, resilience, proof resilience, Modulus of resilience.	06	08
	3.2 Stresses induced and strain energy stored due to gradual, sudden & impact load.		

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4	Shear force and bending moment:				
	4.1	Review of types of beams, types of supports, types of loads.	10	16	
	4.2	Concepts and Definitions of shear force, bending moment at any section of the beam, sign convention, relation between shear force bending moment and rate of loading.			
	4.3	Plotting SFD and BMD for simply supported, cantilever, overhanging beams subjected to point loads, uniformly distributed load. Point of contra flexure, its importance.			
5	Moment of Inertia:				
	5.1	Concept of MI, Parallel axes theorem, perpendicular axes theorem (no derivation). Radius of gyration.	08	12	
	5.2	Moment of inertia for standard geometrical figures.			
	5.3	MI of rolled steel sections such as I, T, L, channel sections and built up symmetrical section.			
6	Bending stresses;				
		Concept of pure bending, theory and equation of simple bending.(No derivation), assumptions in theory of simple bending, bending stress distribution diagram for symmetrical and unsymmetrical sections.	08	08	
	6.1	Moment of resistance of a section, its importance, modulus of section.			
	6.2	Numerical problems on determination of bending stress, moments of resistance of various sections and simple beam design.			
7	Shear Stress				
	7.1	Shear stress equation (No derivation) meanings of terms in equations,	06	08	
	7.2	Nature of shear stress distribution diagrams for rectangular square symmetrical & Unsymmetrical sections, T,L, and channel sections.			
	7.3	Numerical problems on determination of shear stresses across the sections.			

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8	Simple frames			
	8.1	Concept of perfect and imperfect frames. Assumptions made in analysis of perfect frames.	08	10
	8.2	Method of joints, method of sections.		
	8.3	Graphical method (No problems in theory examination.)		
Total			64	80

List of Practicals/Experiments/Assignments:

Sr. No.	Name of Practical/Experiment/Assignment	Hrs
10.	Study of UTM.	04
11.	Study of Extensometer	02
12.	Tension Test on M.S. bar.	02
13.	Tension Test on M.S. bar.	
14.	Crushing strength of bricks	04
15.	Water absorption test on bricks.	04
16.	Abrasion test on flooring tiles.	04
17.	Shear test on metals.	02
18.	Assignment No. 1- Plotting of SFD and BMD on graph papers. 02 Problems - Cantilevers 02 Problems - S.S. beams 02 Problems - Overhanging beams. Home Assignment. Flexural test on flooring or roofing files.	08
19.	Bending test on Timber.	02
Total		32

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
10.	Stress and Strains	Lecture method, Demonstration method
11.	Elastic Constants	Lecture method Tutorial method
12.	Strain energy	Lecture method Demonstration method
13.	Shear force & Bending moment	Lecture method, Tutorial method,
14.	Moment of Inertia	Demonstration, Lecture method
15.	Bending Stresses	Lecture method Tutorial method
16.	Shear Stresses	Lecture method Tutorial method
17.	Simple Frames	Lecture method Tutorial method

Text Books:

Sr. No	Author	Title	Publication
1.	Khurmi R.S.	Strength of Material	S.Chand
2.	Junnarkar S.B	Mechanics of Structures	Charotar
3.	R. S. Biyani	Mechanics of Structures	Nirali.

Reference Books:

Sr. No	Author	Title	Publication
1.	Singer Pytel	Strength of Materials	Harper & Row
2.	Timoshenko	Mechanics of Structures	McGraw Hill
3.	Ramamrutham R.S.	Strength of Materials	Dhanpat Rai & Sons

Learning Resources: Books, Models, Relevant I.S. codes, Data of results of testing of material.

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Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1.	Stress and strains	02	06	02	10
2.	Elastic Constants	02	06	--	08
3.	Strain energy	02	06	--	08
4.	Shear force & Bending moment	04	06	06	16
5.	Moment of Inertia	02	04	06	12
6.	Bending stresses	02	02	04	08
7.	Shear stresses	02	02	04	08
8.	Simple frames	04	02	04	10
Total		20	34	26	80

(Prof.)
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Programme : Diploma in CE
Programme Code : 01 /15
Name of Course : Concrete Technology
Course Code : AM 468

Teaching Scheme:

	Hours /Week	Total Hours
Theory	03	48
Practical	02	32

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	Two class tests, each of 60 minutes	3Hrs.	--	--	--
Marks	20	80	--	25	25

Course Rationale:

Concrete is the most widely used construction material in all types of Civil engineering structures. A Civil Engineering technician has to plan, supervise and ensure the quality of final product of concrete, i.e. its durability, strength, tolerance, appearance and finish. To discharge duties effectively, he must be able to supervise the concrete construction at all stages of concrete chain, which broadly consists of making of concrete and interaction of its various ingredients both in plastic and hardened stage. For this purpose, a technician must know the basic properties of concrete as well as of the ingredients like cement, aggregate, water etc. He should learn and practice the basic principles governing the strength, durability and workability of concrete. He should learn and practice the basic principles of mix design and develop supervisory skills required for various operations in concrete in concrete chain.

Course Objectives:

At the end of this course the students will be able to –

- To develop overall understanding of concrete operations in civil Engineering construction.
- To understand the properties of concrete and its ingredients with the focus on importance and effect of these properties on concrete and concreting operations.
- Understand basic principles of quality control in construction operation.
- To develop supervisory skills in all concrete operations prior to, during and after concreting by making use of knowledge acquired and practice tools developed by ISI & IRC.

Course Content:

Chapter No.	Name of Topic/Sub topic	Hrs	Weightage
1	Introduction		
	1.1 Definition of concrete, role of concrete in national five years plan, Need for supervisory skills in concrete operations, concept of concrete chain. Comparison of Concrete with other construction materials.	02	06
2	Cement		
	2.1 Uses of cement in construction.	06	14
	2.2 List of methods of manufacturing of Portland cement. Dry and wet processes (list of method only. No detailed procedure to be asked in theory) Chemical constituents of O.P.C., its Physical properties, hydration of cement.		
	2.3 Characteristics and uses of following types cement only a) O.P.C b) Rapid Hardening cement c) High strength cement (43 and 53 grade) d) Portland Slag Cement & Portland Pozzolana Cement		

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		sulphate resisting cement, White Cement.		
	2.4	Standard tests on cement - consistency, initial and final setting and compressive strength of cement.		
	2.5	Storage of cement, adulterations in cement.		
3	Aggregates (Fine & Coarse)			
	3.1	General ,sources ,availability	06	08
	3.2	Classification of aggregates		
	3.3	Testing of aggregates - sieve analysis, fineness modulus Silt content of fine aggregates, impact, crushing of coarse aggregates, grading of aggregates and gap grading of aggregates.		
4	Properties of Fresh & Hardened Concrete			
	4.1	Quality of water required for concreting	12	18
	4.2	Fresh Concrete - Definition of workability, segregation & bleeding effects. Factors affecting workability. Measurement of workability by slump cone, compaction factor method. Suggested workability for different conditions by ISI & IRC.		
	4.3	Hardened Concrete - concept of hydration of cement, Duff Abram's w/c ratio to compressive strength relationship .Definition of strength of concrete & grades of concrete, factors affecting strength of concrete. Properties of hardened concrete, Elasticity, Creep, Shrinkage, Durability, & Permeability (Definition & interpretation).		
	4.4	Mix Design - Definition, objectives, grades of concrete, Design mixes, principles of mix design, list of methods of mix design, IS code method (only procedural steps).		
	4.5	Definition of admixtures, types of admixtures, and functions of admixtures.		

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5	Concreting Operations			
	5.1	Necessity of various operations, method, procedures, advantages, disadvantages (no detailing of equipment)	14	18
	5.2	Batching: Types of batching measurement of water.		
	5.3	Mixing: types of mixing, mixing time, types of mixers.		
	5.4	Transporting: Methods of transporting concrete, precautions during transporting.		
	5.5	Formwork: Materials for formwork & their specifications, various forms for different types of concrete works, erection & time removal of formwork. Removal of time for different RCC works.		
	5.6	Placing: - stripping time precautions in placing concrete underwater concrete.		
	5.7	Compaction: Hand and machine compaction different types of vibrators and their principles.		
	5.8	Curing: - Definition, necessity and different methods of curing.		
	5.9	Finishing of concrete, different methods of finishing.		
6	Types of joints & its applications			
	6.1	Joints in concrete :-Types of joints & its applications. Removal/Rectification of cracks.	06	12
	6.2	Water proofing of concrete:-Necessity, different methods, effects of acids, oils & salts on concrete.		
	6.3	Repair & maintenance of concrete works.		
	6.4	Special Concrete:- precast concrete, ferrocete, Prestressed concrete, Tremie concrete, Shortcrete & Or Fibre Reinforced & Polymer concrete. Guniting Light weight & heavy weight concrete, Air entrained concrete.		
	6.5	Hot weather & cold weather concreting.		
7	Testing of Cement and Concrete			
	7.1	Non destructive testing of cement and concrete	02	04
Total			48	80

List of Practicals/Experiments/Assignments:

Sr. No.	Name of Practical/Experiment/Assignment	Hrs
1.	Fineness of Cement	02
2.	Soundness of Cement	02
3.	Standard Consistency	02
4.	Initial & Final setting	04
5.	Compression strength of Cement	02
6.	Field Tests of Cement	02
7.	Fineness modulus of fine/coarse aggregates	02
8.	Bulk density of aggregate	02
9.	Bulking of fine aggregate	02
10.	Aggregate Impact value	02
11.	Aggregate crushing value	02
12.	Measurement of workability	02
13.	Compression strength of Concrete	06
Total		32

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1	Introduction	Lecture method, Demonstration
2	Cement	Lecture method, Demonstration
3	Aggregate	Lecture method, Demonstration
4.	Admixture & Water	Lecture method, Demonstration
5.	Properties of Fresh & Hardened Concrete	Lecture method, Demonstration
6.	Concrete Operations	Lecture method, Demonstration
7.	Special concrete	Lecture method, Demonstration

Text Books:

Sr. No	Author	Title	Publication
1.	Shri M.S. Shetty	Concrete Technology	S.Chand & Co. Prakashan

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2.	Shri.M.L.Gambhir	Concrete Technology	T.M.H. Publication.
3.	K.T. Krishnaswamy A.V. Khandekar	Concrete Technology	Dhanpat Rai & Sons
4.	R.K. Agarwal	Concrete Technology	Indira Publishing House, Delhi

Reference Books:

Sr. No	Author	Title	Publication
1.	Dr.Nevile & Brooks	Concrete Technology	Eddison Wesley,London
2.	Dr.Orchard	Concrete Technology	App. Science Publisher Ltd. London..

Learning Resources: Books, Models, Books, Transparencies, Relevant IS codes 4. Video , Charts, Concrete Manual

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1.	Introduction	--	--	--	--
2.	Cement	04	04	06	14
3.	Aggregate -Fine & Coarse	04	04	06	14
4.	Properties of fresh & Hardened	10	--	08	18
5.	Concrete Operation	06	08	04	18
6.	Special Concrete	06	06	-	12
7.	Testing of cement & concrete	02	02	--	04
Total		32	24	24	80

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Programme : Diploma in CE
Programme Code : 01 /15
Name of Course : Soil Mechanics
Course Code : AM 469

Teaching Scheme:

	Hours /Week	Total Hours
Theory	03	48
Practical	02	32

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	Two class tests, each of 60 minutes	30.	--	--	--
Marks	10	40	--	25	25

Course Rationale:

All Civil Engineering structures are resting on soil beds. Hence the knowledge of soil and its behavior is essential for technicians. In laboratory the experiments integrate the knowledge and develop desired skills in the students.

Course Objectives:

At the end of this course the students will be able to :

- Know the properties and behavior of soils.
- Know and understand various theories and various principle of the course.
- Develop the ability of interpreting results.
- Understand the procedures of testing of soil in Laboratory and in the field.
- Comprehend, think and understand other skills.

Course Content:

Chapter No.	Name of Topic/Sub topic	Hrs	Weightage
1	Introduction		
	1.1 Definition: Soil, Soil Mechanics	04	04
	1.2 Scope in Civil Engineering		
	1.3 Origin of Soil, Formation of soil. Major soil deposit in India.		
2	Physical Properties of Soil		
	2.1 Soil as a three phase system.	10	08
	2.2 Physical properties: Void ratio, porosity, sp. Gravity, bulk density, dry density, unit wt., Water content, degree of saturation, density index.		
	2.3 Relationship Between: Void Ratio & porosity, Void Ratio, Sp. Gravity & degree of saturation.		
	2.4 Laboratory determination of G, yb, yd, w.		
	2.5 Field test: Determination of field density. (Numerical problems on physical properties).		
3	Index properties of soil		
	3.1 Sieve analysis, Mechanical analysis (Dry only), partial size distribution curve, Cu & Cc.	08	06
	3.2 Soil classification: I.S. classification, plasticity chart. Consistency of soil: LL, PL, SL, Plasticity index, Consistency index.		
	3.3 Laboratory tests: Determination of LL & PL. (Numerical problems on index properties).		

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4	Compaction			
	4.1	Concept of compaction & consolidation.	08	06
	4.2	Compaction: Light & heavy compaction, Zero air void line, O.M.C., Std. Proctor test. Modified Proctor test. Factors affecting compaction.		
	4.3	Field Compaction: Requirement of compaction, compaction control.		
	4.4	Soil stabilization: Scope, purpose, methods.		
	4.5	CONSOLIDATION: Concept of consolidation. Difference between consolidation & compaction		
5	Permeability of soil			
	5.1	Definition, Concept of permeability. Determination of coefficient of permeability: Constant head permeability test, Falling head permeability test. Factors affecting permeability.	08	06
	5.2	Field test of determination of K. Use of Filters. (Numerical problems on permeability of soil).		
6	Shear strength of soil			
	6.1	Concept of shear strength.	06	06
	6.2	Cohesive, Non cohesive soils. Factor affecting shear strength.		
	6.3	Determination of shear strength: Direct shear test, vane shear test		
7	Application of soil engineering			
	7.1	C.B.R. test: Necessity, method of application.	04	04
	7.2	Bearing capacity plate load test.		
	Total		48	40

List of Practicals/Experiments/Assignments:

Sr. No.	Name of Experiment/Assignment	Hrs
1.	To determine the specific gravity of soil by pycnometer method.	04
2.	To determine bulk & dry density of soil by core cutter method and sand replacement method.	04
3.	Dry sieve analysis of soil & to plot PSDC. To determine plastic and liquid limit of soil. Study of Shrinkage limit.	04
4.	To determine OMC & ydmax of soil by standard proctor test. Study of consolidation test. Study of modified proctor test.	04
5.	To determine coeff. Of permeability by variable head method. Study of constant head permeability.	04
6.	Direct shear test. 2. Vane shear test. 3. Triaxial shear test. 4. Study of unconfined compression test.	04
7.	Study of plate load test. 2. Study of C.B.R. test.	08
Total		32

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1.	Introduction	Lecture method, Demonstration method
2.	Physical properties of soil	Lecture method, Demonstration method, Group Discussion.
3.	Index properties of soil	Lecture method, Demonstration
4.	Compaction & Consolidation	Lecture method, Demonstration method, Group Discussion.
5.	Permeability of soil	Lecture method, Demonstration method
6.	Shear strength of soil	Lecture method, Demonstration method
7.	Application in Civil Engineering	Lecture method, Demonstration method, Group Discussion.

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Text Books:

Sr. No	Author	Title	Publication
1.	K.R. Arora	Soil Methanics	Geotechnical Engineering
2.	B.J. Kasmalkar	Introduction of Soil Mechanics	Pune Vidyarthi Griha
3.	S.R. Pathak	Geotechnical Engineering	

Reference Books:

Sr. No	Author	Title	Publication
1.	B.C. Punmia	Soil Methanics	Standard Publisher edc3
2.	V.N.S. Murthy	Soil Methanics	
3.	S.C. Scott	Soil Methanics	

Learning Resources:

Books, Models, Transparencies, Relevant IS codes, Video, Charts, Concrete Manual

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1.	Introduction	04	--	--	04
2.	Physical properties of Soil	04	02	02	08
3.	Index properties of Soil	03	03	--	06
4.	Compaction & Consolidation	02	02	02	06
5.	Permeability of Soil	02	02	02	06
6.	Shear Strength of Soil	02	02	02	06
7.	Application of Soil Engineering	--	--	04	04
Total		17	11	12	40

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Programme : **Diploma in CE**
Programme Code : **01 /15**
Name of Course : **Civil Engg. Drawing**
Course Code : **CE461**

Teaching Scheme:

	Hours /Week	Total Hours
Theory	02	32
Practical	06	96

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	Two class tests, each of 60 minutes	4Hrs.	--	--	--
Marks	20	80	--	25	50

Course Rationale:

Drawing is a universal language of Engineers. An Engineer must be well conversant with drawings. It is the language through which Engineers can communicate with skilled, semiskilled and unskilled labour.

The student has to use this subject to develop ability to read, understand and prepare drawings, to use it for different subjects during diploma course. He will be taught to draw Civil Engg. Structure and its various parts using conventions and symbols as per BIS 696.

Course Objectives:

At the end of this course the student will able to

- Read and interpret Civil Engg. Drawing
- Draw as per BIS 696
- Prepare working drawing in design and Drawing section as a Draftsman and also interpret drawing for estimating while working as estimator.

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- Draw detail drawing considering rules and laws for submission to sanctioning authority.
- Draw perspective drawing.

Course Content:

Chapter No.	Name of Topic/Sub topic		Hrs	Weightage
1	Introduction			
	1.1	Purpose of drawing - primary requirements of good drawing. Symbols and notations as per BIS 696 in Civil Engg. Drawing.	04	06
	1.2	Types of Lines, Lettering, Dimensioning, North Point, Selection of scales/		
	1.3	Different types of drawing - preliminary drawing, working drawing, location drawing, layout plans, site plans, submission drawings.		
2	Principles of Planning			
	2.1	Principles of Planning of buildings	04	05
	2.2	Orientation of Building.		
3	Agencies in Building Construction work.			
	3.1	Role of different agencies involved in construction work such as owner, Architects, structural engineer, contractor, promoter, quantity surveyor, and supervisor. Plan sanctioning.	04	06
	3.2	Building Bye Laws. Terminology - Building height. Building Line, covered area, floor area and floor area ratio, plinth and plinth area.		
	3.3	Concept of Measured drawing and its Application. Concept of Vastushashtra		
4	Planning of Buildings			
	4.1	Planning of residential building - Development of line plan, drawing of plan, elevation, sections, preparing schedule of doors, windows Construction notes, Area statement site plan etc	10	45

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	4.2	.Planning of public Buildings - Data required for planning public building such as Library, community centre, post office, high school, primary health centre, market, hospital, bank, hostel and their line plans only.		
5	Perspective Drawing			
	5.1	Introduction. Concept of one point and two point perspective and its application.	05	10
6	K.T. Weir & slab culvert			
	6.1	Study of construction of Kolhapur Type Weir with the help of readily available data and drawing.	05	08
	6.2	Study of construction of R.C. Slab Culvert with the help of readily available data and drawing		
		Total	32	80

List of Practicals/Experiments/Assignments:

Sr. No.	Name of Practical/Experiment/Assignment	Hrs
1.	Symbols for Doors, windows, materials in section	03
2.	Foundation for R.C.C. Framed structure and plinth filling.	03
3.	Single shutter flush door without ventilator.	03
4.	Fully glazed steel or Aluminum sliding window - double shutter with ventilator.	03
5.	Louvered window	03
6.	Different types of stairs	03
7.	Types of steel trusses, connection of roof covering (such as GI, AC sheets, Mangalore tiles and purline.	03
8.	Dog - legged stairs (R.C.C.)	03
9.	Structural steel sections	03
10.	Fully paneled door - plan, elevation and section. (Plates on quarter imperial size).	03
	Sheet No. 1 Measured Drawing of small residential building with minimum two room, kitchen, sanitary block consisting of plan, elevation, section schedule of opening, site plan and construction note.	08
	Sheet No. 2 : Data drawing for two storied Framed (R.C.C.) residential building 3 rooms at ground floor with sanitary block and minimum two	15

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rooms and sanitary block on first floor. The building will have partly flat and partly pitched roof. The drawing shall include ground floor plan, first floor plan, elevation, and section schedule of openings, site plan and north directions.	
Sheet No. 3 : Tracing of sheet No. 2	04
Sheet No. 4 : Ammonia prints of above sheet.	02
Sheet No. 5 : Design and drawing of public building/industrial building from given data. The sheet shall consist of plan, elevation, section, site plan, area statement, schedule of openings, construction notes, North direction.	15
Sheet No. 6 : Line plans of at least four public buildings	06
Sheet No. 7 : One point & Two point perspective of two small objects, Such as steps, pedestal etc. on imperial size drawing sheet.	08
Sheet No. 8 : Preparing drawing of K.T.Weir with minimum 2 span. The sheet shall consist of plan, elevation, cross section through weir giving details of groove, wooden plank, foot bridge, construction notes and north direction.	08
Total	96

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1.	Introduction	Class room teaching, Plates
2.	Principals of Planning	Class room teaching,
3.	Agencies in Building Construction work	Class room teaching,
4.	Planning of Building	Class room teaching, Readymade drawings
5.	Perspective Drawing	Class room teaching, Transparencies
6.	K.T. Weir	Readymade drawings, Transparencies.

Text Books:

Sr. No	Author	Title	Publication
1.	Shah, Kale, Patki	Building Drawing	Tata MCGraw Hill, New Delhi
2.	Y.S.Sane	Planning and Design of building	Allies bookstall Poona - 4 & Engg. book publishes, Company Pune - 16.

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3.	R.S. Malik & G.S. Meo	Civil Engg. Drawing	New Asian Publishers Nai Sadak, New Delhi-6.
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Reference Books:

Sr. No	Author	Title	Publication
1.	M.Chakraborti	Civil Engg. Drawing	By Author - 21 B Bhabananda Road, Calcutta – 700026
2.	Shah and Kale	Perspective Drawing	Tata MCGraw Hill ,New Delhi
3.	S.V.Deodhar	The Test book of Building Drawing	New Vrinda Publishing House, M.G.Road, Jalgaon.

Learning Resources:

Books, Models, Relevant I.S.codes. Data of results of testing of material.

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1	Introduction	02	02	02	06
2	Principals of Planning	05	---	---	05
3	Agencies in Building Construction work	02	02	02	06
4	Planning of Building	05	10	30	45
5	Perspective Drawing	---	---	10	10
6	K.T.Weir & Slab Culvert	04	04	---	08
Total		18	18	44	80

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(Prof. S. B. Kulkarni)
C.D.C. Incharge
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I/c H.C.E.D.
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Programme : **Diploma in CE**
Programme Code : **01 /15**
Name of Course : **Surveying -I**
Course Code : **CE 462**

Teaching Scheme:

	Hours /Week	Total Hours
Theory	03	48
Practical	04	64

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	Two class tests, each of 60 minutes	3Hrs.	--	--	--
Marks	10	40	--	25	25

Course Rationale:

This is basic technology course, which is intended to teach the students' basic facts, concepts, principles, and procedures in surveying and leveling. With this knowledge and skill, he will be able to select appropriate survey and leveling methods depending upon requirement to carry out survey work in Building construction, Transportation engineering, Irrigation engineering, Water supply & Sanitary schemes for investigation of projects before & during execution of work, while working as an investigator for design department.

Course Objectives:

At the end of this course the students will be able to –

- To enable the students to understand working principles, construction, application and handling of various surveying instruments.
- To acquaint the students with the principles and methods of different types of survey.
- To promote the ability of carrying out various types of surveys depending upon the field conditions.

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Course Content:

Chapter No.	Name of Topic/Sub topic	Hrs	Weightage
1	Introduction to Surveying		
	1.1 Definition of surveying and leveling.	03	02
	1.2 Objects of surveying		
	1.3 Classification of surveying - Plane and geodetic survey.		
	1.4 General principles of surveying. Uses of surveying.		
	1.5 Scales - Representative factor, plain scale, vernier scale.		
2	Linear Measurements		
	2.1 Study of metric chain - 20m & 30m, components	06	08
	2.2 Study of metallic and steel tape		
	2.3 Instruments for marking stations pegs, arrows, ranging rod		
	2.4 Ranging - Direct and Indirect Method of chaining on level ground and on sloping ground		
	2.5 Testing and adjustment of chain,		
	2.6 Chain and tape corrections, problems on chain and tape corrections		
3	Chain and cross staff surveying		
	3.1 Principle of chain surveying. Well conditioned and ill-conditioned triangles.	10	08
	3.2 Reconnaissance survey and Index sketch, location sketches. Survey stations and their selection,		
	3.3 survey lines - base line, check line, tie line. Taking offsets - Perpendicular and oblique offsets. Short and long offsets. Number of offsets. Booking field notes.		
	3.4 Conventional symbols on survey maps for – cutting, embankment, marshy land, road, railway, river, bridge, tunnel, fencing, transmission line, cultivated land, residential zone, places of workshop etc.		

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4	Chain and Compass Survey			
	4.1	Principle of compass surveying.	09	08
	4.2	Traversing - open and closed traverse.		
	4.3	Bearing of lines - True Meridian, Magnetic meridian, Arbitrary meridian.		
	4.4	Fore bearing and back bearing of line. Whole circle and Reduced bearing Conversion of bearings. Calculation of included angles from bearing. Local attraction, Magnetic. Declination, Dip of needle. Correction of bearings affected by local attraction. Numerical examples on local attraction,		
	4.5	Construction, use and adjustment of prismatic compass		
	4.6	Traversing with chain & compass different methods of plotting traverse, closing error, graphical adjustment by Bowditch's Rule.		
5	Levelling			
	5.1	Definitions of various terms used in levelling.	15	10
	5.2	Dumpy level - Fundamental axes, and their desired relationships. Temporary adjustments of dumpy level.		
	5.3	Study & use of auto level		
	5.4	Levelling staff-telescopic & folding type and aluminum staff.		
	5.5	Systems of reducing the level -height of plane of collimation, method, rise and fall method. Arithmetic checks.		
	5.6	Classification of levelling- simple leveling, differential Levelling, fly leveling, check Levelling, profile levelling& cross sectioning.		
	5.7	Sources of errors in leveling and precautions to be taken.		
	5.8	Numerical problems on levelling & Computation of missing reading		

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6	Contouring			
	6.1	Definitions - Contour, contour interval, horizontal equivalent.		
	6.2	Characteristics of contour lines		
	6.3	Method of contouring – Direct method, indirect method,	05	04
	6.4	Methods of interpolation of contours. Uses of contour maps.		
	Total		48	40

List of Practicals/Experiments/Assignments:

Sr. No.	Name of Experiment/Assignment	Hrs
1.	Study and use of 20m & 30m chain metallic and steel tape, ranging rod, peg, arrow.	04
2.	Direct and indirect ranging. Study & use of line ranger. Measurement of distances with chain and tape.	04
3.	Study and use of open cross-staff and optical square	04
4.	Chain and cross staff survey to locate the boundaries of a field or plot and to determine its area.	04
5.	Running a survey line to locate adjacent objects such as building, road, trees, electric, poles, fencing, by taking offsets with open cross-staff / optical square. Booking field notes.	04
6.	Study and use of prismatic compass - component, their functions, adjustments. Observing bearing of lines. Calculation of included angles from the observed bearings.	06
7.	Observing fore bearings & back bearings of 4-5 sided traverses, identifying the stations affected by local attraction & calculation of corrected bearings.	06
	Project No 1: Chain and compass traverse survey - A closed traverse of minimum 5 sides enclosing a small building. Plotting the traverse on A1 size imperial drawing sheet. (1 day for survey & 6 hrs. for drawing)	
8.	Study & use of dumpy level temporary adjustments, study of levelling staves.	04
9.	Simple leveling recording in level book, reduction of levels by plane	04

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	of collimation method, arithmetic check	
10.	Differential leveling, change point, reduction of levels by plane of collimation plane method, rises & fall method, arithmetical check.	06
11.	Fly levelling- carrying B.M. from one point to another by fly levelling with double check.	06
12.	Study & use of auto- level, temporary adjustments.	04
	Project No. 2: Profile levelling and cross-sectioning - Running a base line 240m long with cross-section at 30m c/c. The length of cross-section may be 20m on either side with staff readings at 10m interval. Spot levels should be taken at every 10m along the base line. Plotting the L-section & min. 3 cross-sections on A1 size imperial sheet (1 day for survey & 6 hrs. for drawing.)	
13.	Contouring by direct method.	04
14.	Establishing grade contour.	04
	Project No.3: Block contouring - A block of 160m X 160m approximately with spot levels at 20m X 20m. Plotting the contours with contour interval of 0.5m/1.0m by interpolation on A1 size imperial drawing sheet. (1 day for survey & 8 hrs. for drawing)	
Total		64

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1.	Introduction to Surveying	Class room teaching
2.	Linear measurement	Class room teaching
3.	Chain & cross-staff survey	Class room teaching
4.	Chain & compass survey	Class room teaching & Field practicals
5.	Levelling	Class room teaching & Field practicals
6.	Contouring	Class room teaching & Field practicals

Text Books:

Sr. No	Author	Title	Publication
1.	Kanetkar T.P. & Kulkarni	Surveying & Levelling, Part 1.	Pune Vidyarthi Griha/L Prakashan Pune -30
2.	N.N. Bashak	Surveying & Levelling	Tata Mc-Graw Hill
3.	V.S. Gajare	Surveying	Nirali Prakashan, Pune-2.

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Reference Books:

Sr. No	Author	Title	Publication
1.	B.C. Punmia	Surveying Vol. I	Laxmi Publications, New Delhi.
2.	Duggal	Surveying & Levelling	Tata Mc-Graw Hill

Learning Resources: 1. Books 2. Survey Instruments

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1	Introduction to Surveying	02	--	--	02
2	Linear measurement	02	04	02	08
3	Chain & cross-staff survey	04	02	02	08
4	Chain & compass survey	02	02	04	08
5	Levelling	04	--	06	10
6	Contouring	--	02	02	04
Total		14	10	16	40

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Chairman, PBOS

Programme : **Diploma in CE**
Programme Code : **01/15**
Name of Course : **Surveying -II**
Course Code : **CE 463**

Teaching Scheme:

	Hours /Week	Total Hours
Theory	03	48
Practical	04	64

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	Two class tests, each of 60 minutes	2Hrs.	--	--	--
Marks	10	40	--	25	25

Course Rationale:

This is basic technology course, which is intended to teach the students' basic facts, concepts, principles, and procedures in surveying and levelling. With this knowledge and skill, he will be able to select appropriate survey and levelling methods depending upon requirement to carry out survey work in Building construction, Transportation engineering, Irrigation engineering, Water supply & Sanitary schemes for investigation of projects before & during execution of work, while working as an investigator for design department.

Course Objectives:

At the end of this course the students will be able to –

- To enable the students to understand working principles, construction, application and handling of various surveying instruments.
- To acquaint the students with the principles and methods of different types of survey.
- To promote the ability of carrying out various types of surveys depending upon the field conditions.

Course Content:

Chapter No.	Name of Topic/Sub topic	Hrs	Weightage
1	Transit Theodolite		
	1.1 Types of transit theodolite-Vernier theodolite, Digital theodolite, Micro-optic theodolite, Component parts, their functions, fundamental axes and their desired relationship.	12	08
	1.2 Technical terms used in theodolite survey		
	1.3 Temporary adjustments of transit theodolite.		
	1.4 Measurement of horizontal angle by method or repetition, errors eliminated by method of repetition.		
	1.5 Measurement of magnetic bearing of a line.		
	1.6 Measurement of vertical angle. Measurement of deflection angle.		
	1.7 Prolonging and ranging a line.		
2	Theodolite Traversing		
	2.1 Traversing with theodolite by method of included angles, checks in closed traverse, calculation of bearing from angles. Traverse computation-	12	08
	2.2 Latitude, departure, Consecutive co-ordinates, independent co-ordinates, error of closure, balancing the traverse by Bowditch's rule, Gale's traverse table.		
	2.3 Numerical problems on traverse computation.		
3	Tacheometric Survey		
	3.1 Definition and use of tacheometric survey,	06	06
	3.2 Instruments used for Tacheometric survey.		
	3.3 Principles of tachometric survey, use of anallatic lens.		
	3.4 Methods of tacheometry – Fixed hair method- line of sight is horizontal, inclined & staff held vertical. (Non derivations).		
	3.5 Contouring by tacheometry. Sample numerical problems.		

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4	Plane table Survey				
	4.1	Principle and application of plane table survey.	06	06	
	4.2	Study of plane table and accessories required for plane table survey. Setting up of plane table. Orientation of plane table-by magnetic needle and by back sighting.			
	4.3	Methods of plane tabling – radiation, intersection and traversing.			
	4.4	Merits & demerits of plane table surveying			
5	Planimeter				
	5.1	Construction and use of Planimeter.	04	04	
	5.2	Measurement of area on drawing using planimeter.			
	5.3	Study and use of digital planimeter.			
	5.4	Numerical problems with anchor point inside and outside the figure.			
6	Curves				
	6.1	Types of curves, degree of curve and radius of curve, relation between degree of curve and radius of curve. Notation for circular curve. Element of circular curve.	05	04	
	6.2	Method of setting out curve by offset from long chord. Simple numerical problems.			
7.	Introduction to Total Station and EDM				
	7.1	Study and use of Total Station.	03	04	
	7.2	Study and use of EDM.			
		Total	48	40	

List of Practicals/Experiments/Assignments:

Sr. No.	Name of Practical/Experiment/Assignment	Hrs
1.	Study use and temporary adjustments of transit theodolite.	04
2.	Measurement of horizontal angle with transit theodolite.	04
3.	Measurement of horizontal angle of by repetition method.	08
4.	Observation of magnetic bearing of a line.	02
5.	Measurement of vertical angle.	04
6.	Measurement of deflection angle.	04
7.	Prolonging and ranging a line-using a theodolite.	04
8.	Study and use of digital theodolite.	02
9.	Study and use of micro-optic theodolite.	02
	Project No.1: Theodolite traverse survey- Running a closed traverse of minimum 5 sides for a small area. Traverse computation by Gale's traverse table. Plotting of traverse on A1 size imperial drawing sheet.(1 day for survey and 8 hrs. for traverse computation and drawing.)	
10.	To find the level difference and horizontal distances using theodolite as a tacheometer.	04
11.	Study and use of plane table and its accessories. Temporary adjustments of plane table. Method of radiation.	04
12.	Plane tabling by method of intersection. Orientation of plane table by back sighting.	06
	Project No.2: Plane Table Traversing – Running a min. 5-sided traverse enclosing a small building, using method of traversing. Plotting on A1 size imperial drawing sheet. (1 day for survey and 4 hrs. for drawing.)	
13.	Study of planimeter Measurement of area using planimeter.	04
14.	Study of digital planimeter. Measurement of area using digital Planimeter.	04
15.	Setting out simple circular curve by offset from long chord.	04
16.	Demonstration of Total Station	04
	Instructions: 1. Separate period of one whole day per project is required for carrying out survey work. 2. Term work: Term work should consist of (a) record of all practicals & projects in the field-book. (b) One A1 size imperial drawing sheet for each projects (i.e. Three A1 size imperial drawing sheets.) 3. Batch of 20 students for practicals	
Total		64

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1.	Transit Theodolite	Class room teaching, Field practicals.
2.	Theodolite Traversing	Class room teaching, Field practicals.
3.	Tachemetric survey	Class room teaching, Field practicals.
4.	Plane Table Survey	Class room teaching, Field practicals.
5.	Planimeter	Class room teaching, Field practicals.
6.	Curves	Class room teaching, Field practicals.
7.	Introduction to Total Station and EDM	Class room teaching, Field practicals.

Text Books:

1.	B.C. Punmia	Surveying & Vol. II	Laxmi Publications, New Delhi.
2.	Duggal	Surveying & Levelling	Tata Mc-Graw Hill

Reference Books:

Sr. No	Author	Title	Publication
1.	Kanetkar T.P. & Kulkarni	Surveying & Levelling, Part 1.	Pune Vidyarthi Griha/L Prakashan Pune -30
2.	Kanetkar T.P. & Kulkarni	Surveying & Levelling, Part 2.	Pune Vidyarthi Griha/L Prakashan Pune -30
3.	N.N. Bashak	Surveying & Levelling	Tata Mc-Graw Hill
4.	B.C. Punmia	Surveying & Vol. I	Laxmi Publications, New Delhi.

Learning Resources:

Books , Survey Instruments

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Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1.	Transit Theodolite	04	02	02	08
2.	Theodolite Traversing	02	02	04	08
3.	Tacheometric Survey	--	02	04	06
4.	Plane Table Survey	02	--	04	06
5.	Planimeter	--	02	02	04
6.	Curves	--	02	02	04
7.	Introduction to Total Station and EDM	04	--	--	04
Total		12	10	18	40

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Programme : **Diploma in CE**
Programme Code : **01 /15**
Name of Course : **Hydraulics**
Course Code : **CE464**

Teaching Scheme:

	Hours /Week	Total Hours
Theory	04	64
Practical	02	32

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	Two class tests, each of 60 minutes	3Hrs.	--	--	--
Marks	20	80	--	25	25

Course Rationale:

The subject of hydraulics is a basic science and application for many Civil Engineering subjects like Irrigation, Water Supply, Sanitary Engineering, and Transportation Engineering etc.

The subject is intended to teach the facts, concepts principles of hydraulics, which will enable the students to apply them to different areas.

Course Objectives:

Students will be able to –

- The Appreciate the importance of hydraulics
- Calculate forces, pressure, center of pressure etc. on bodies.
- Design pipes for water supply and other purposes.
- Design canal sections and work out capacity of canal
- Understand the working of various pumps.

Course Content:

Chapter No.	Name of Topic/Sub topic	Hrs	Weightage
1	Introduction		
	1.1 Definition of hydraulics,	04	04
	1.2 Properties of water like density, unit weight, specific gravity, cohesion, adhesion, viscosity, surface tension, bulk modulus / compressibility.		
	1.3 Applications of hydraulics.		
2	Hydrostatics		
	2.1 Liquid pressure, pressure at a point in the liquid, PASCAL's law, variation of pressure and pressure diagram.	10	12
	2.2 Atmospheric, gauge and absolute pressure		
	2.3 Measurement of pressure - piezometer, simple u - tube manometer, differential monometers, Bourdon pressure gauge - its construction and working.		
	2.4 Total pressure and centre of pressure on horizontal, vertical and inclined plane surface.		
3	Hydrokinematics		
	3.1 Discharge, classification of flow - Steady and unsteady, uniform and non-uniform laminar and turbulent, compressible and incompressible, flow. Equation of continuity.)	04	04
	3.2 Contouring by tacheometry. Simple numerical problems.		
4	Hydrodynamics		
	4.1 Equation of motion, energies of flowing fluid,	10	12
	4.2 Bernoulli's theorem, limitations of Bernoulli's theorem, hydraulic gradient and energy gradient lines.		
	4.3 Application of Bernoulli's theorem to Venturimeter, Pitot tube, numerical problems		

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5	Measurement of flow			
	5.1	Coefficient of discharge, velocity and contraction.	10	12
	5.2	Flow through sharp edged circular orifice, Rectangular orifice.		
	5.3	Flow over notches and weirs - Rectangular, triangular, trapezoidal, cippoletti weir,		
	5.4	Francis formula, end contractions, velocity of approach and its effects.		
6	Flow through pipes			
	6.1	Laws of fluid friction Darcy - Weis Bach equation $h_f = f l v^2 / 2 g d$.	10	16
	6.2	Reynolds number,		
	6.3	Darcy's friction factor 'f' from Moody diagram, energy gradient and hydraulic gradient lines for pipes.		
	6.4	Minor losses - sudden enlargement, sudden contraction, loss at entrance and exit. Flow through pipes in series and parallel, siphon,		
	6.5	Nomogram.		
7.	Open channel flow			
	7.1	Types of flows in open channel - steady and unsteady, uniform and non-uniform laminar and turbulent, sub critical, critical an supercritical flow	10	10
	7.2	Hydraulic jump, specific energy diagrams		
	7.3	Geometric properties of channels, capacity of canal,		
	7.4	Most Economical channel section- Rectangular and Trapezoidal sections only.		
	7.5	Measurement of flow by floats and current meter		

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8.	Pumps			
	8.1	Types of pumps, principle of working component parts and working of centrifugal and reciprocating pumps.	06	10
	8.2	Calculation of power / H.P. of centrifugal pump,		
	8.3	Comparison of centrifugal and reciprocating pump,		
	8.4	Selection criteria for choice of pump,		
	8.5	Submersible pump.		
	Total		64	80

List of Practicals/Experiments/Assignments:

Sr. No.	Name of Experiment/Assignment	Hrs
1.	Tutorial	
2.	Study of pressure measuring devices Tutorial	04
	Tutorial	
3.	Verification of Bernoulli's theorem	04
4.	Determination of Cd of venturimeter	02
5.	Measurement of deflection angle.	02
	Tutorial	
6.	Determination of C_d , C_w and C_x of sharp - edged Circular orifice.	04
7.	Determination of C_d of rectangular / Triangular notch.	04
	Tutorial	
8.	Determination of coefficient of friction 'f' pipe.	04
9.	Determination of coefficient of friction 'f' pipe.	
10.	Nomogram for design of pipes.	04
	Tutorial	
11.	Study of current meter	02
	Tutorial	
12.	Study of centrifugal pump	02
13.	Tutorial	
	Total	32

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1.	Introduction	Class room teaching
2.	Hydrostatics	Class room teaching, laboratory demonstration
3.	Hydro kinematics	Class room teaching
4.	Hydrodynamics	Class room teaching, laboratory work
5.	Measurement of flow	Class room teaching, laboratory work
6.	Flow through pipes	Class room teaching, laboratory work
7.	Open channel flow	Class room teaching, laboratory work
8.	Pumps	Class room teaching, laboratory work, transparencies

Text Books:

Sr. No	Author	Title	Publication
1.	Chow V.T.	Open channel Hydraulics	McGraw Hill
2.	Ray	Fluid Dynamics	S. Chand & Co

Reference Books:

Sr. No	Author	Title	Publication
1.	King H.W.	Hydraulics	John Maily & Sons
2.	Bakhamteff	Hydraulics and open channels	McGraw Hill

Learning Resources: Hydraulics, Hydraulics & Fluid Mechanics, Hydraulics

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Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1.	Introduction	04	--	--	04
2.	Hydrostatics	02	02	08	12
3.	Hydro kinematics	02	--	04	06
4.	Hydrodynamics	--	04	08	12
5.	Measurement of flow	--	04	08	12
6.	Flow through pipes	02	06	08	16
7.	Open channel flow	--	02	06	08
8.	Pumps	02	02	06	10
Total		12	20	48	80

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Chairman, PBOS

Programme : Diploma in CE
Programme Code : 01 /15
Name of Course : Highway and Bridge Engineering
Course Code : CE465

Teaching Scheme:

	Hours /Week	Total Hours
Theory	04	64
Practical	02	32

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	Two class tests, each of 60 minutes	3Hrs.	--	--	--
Marks	20	80	--	--	25

Course Rationale:

Transportation plays an important role in development of the country. The major share of the budget is allotted to development of transportation. Progress of country is measured by the development of communication system, which has direct relation to prosperity of a nation. The civil engineer must possess knowledge and skills in different areas such as planning, execution, supervision and maintenance of highways, roads and bridges.

Course Objectives:

After studying this course, student will be able to :-

- Plan and align using available data.
- Understand the geometric design, construction, supervision and maintenance of highways, roads and bridges.
- Know the basic principles of traffic engineering.
- Understand the different conditions prevailing at the bridge site and select the least objectionable site and type of bridge.

Course Content:

Chapter No.	Name of Topic/Sub topic	Hrs	Weightage
A) Highway Engineering			
1	General		
	1.1 Necessity and benefits of roads.	03	06
	1.2 Classification of roads.		
	1.3 Highway planning in India.		
	1.4 Alignment of roads: Requirements and factors affecting alignment.		
2	Geometric design		
	2.1 Highway cross-section design-Right of way, width of carriageway, shoulders, formation width Camber-Definition, object.	10	14
	2.2 Gradient-Definition, types Sight distance-Types of sight distance		
	2.3 Curves- Types, widening of carriageway on horizontal curves.		
	2.4 Super elevation – Definition, object, methods of providing super elevation.(I.R.C. recommendations for each geometric design elements.)		
3	Construction of Highway		
	3.1 Highway pavements – objectives, classification – Flexible and rigid pavements.	18	20
	3.2 Earthwork and preparation of sub grade, embankment, cutting balancing of earthwork, borrow pits, spoil bank, lead and lift.		
	3.3 Earth roads – construction Soil stabilization – Necessity, methods.		
	3.4 W.B.M. roads – specification of materials used as per IRC recommendations, construction, maintenance.		
	3.5 Bituminous pavements –Definitions of bitumen, asphalt, cutback, tar and emulsion, Prime coat, tack coat, seal coat, surface dressing, grouted macadam-semi and full grout. Premix methods – Bituminous		

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		carpet, asphaltic concrete, sheet asphalt.		
	3.6	Cement concrete pavements- materials used method of construction, joints in cement concrete pavements.		
4	Traffic Engineering			
	4.1	Traffic volume study.	06	06
	4.2	Traffic control devices – markings, islands, traffic signs, signals.		
	4.3	Segregation of traffic-Flyovers, clover leaf.		
5	Highway drainage and arboriculture :			
	5.1	Highway drainage-Definition, necessity, surface, sub-surface and cross drainage.	03	04
	5.2	Arboriculture-Necessity, selection of trees.		
B) Bridge Engineering				
6.	6.1	General : Selection of site for a bridge.	02	02
7.	Component parts of bridges			
	7.1	Sub-structure-Foundation, pier, abutment, wing wall-function and types.	08	12
	7.2	Superstructure-Bearings-function, Types-Fixed bearing, neoprene, Pot-type PTFE bearing.		
	7.3	Bridge girders-function and type.		
	7.4	Bridge floors-open and solid floors.		
	7.5	Approaches-in cutting and embankment.		
8.	Types of Bridges :			
	8.1	Types depending upon function, span, materials used in construction, relative levels of bridge floor.	06	08
	8.2	Selection criteria for suitable type of bridge.		
9.	Culverts & Cause ways			
	9.1	Introduction culverts types of culverts, R.C.C. slab Culvert, Pipe culvert, Box culvert.	06	06
	9.2	Cause ways, classification of cause ways.		

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10.	Inspection and maintenance of bridges :			
	10.1	Check list for inspection of bridges.	02	02
	10.2	Routine and special maintenance.		
		Total	64	80

List of Practicals/Experiments/Assignments:

Sr. No.	Name of Experiment/Assignment	Hrs
1.	Assignment No. 1. : Geometric design of highway	04
2.	Assignment No. 2.: Earth roads and W.B.M. Roads.	04
3.	Assignment No.3. : Bituminous pavements.	04
4.	Assignment No.4.: Cement concrete pavements	04
5.	Assignment No. 5.	04
6.	Assignment No. 6. : Component parts of bridges.	04
7.	Assignment No. 7.: A visit report based on visit to different types of bridges/flyovers in and around Pune.	04
8.	Assignment No.8. Inspection and maintenance of bridges.	04
	Total	32

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
A) Highway Engineering :		
1.	General	Classroom teaching
2.	Geometric design	Classroom teaching
3.	Construction of Highway	Classroom teaching
4.	Traffic Engineering	Classroom teaching
5.	Highway drainage and arboriculture	Classroom teaching
B) Bridge Engineering :		
1.	General	Classroom teaching
2.	Component parts of bridge	Classroom teaching
3.	Types of bridges	Classroom teaching
4.	Hydraulic data	Classroom teaching
5.	Inspection and maintenance of bridges	Classroom teaching

Reference Books:

Sr. No	Author	Title	Publication
1.	M.S. Satarkar	Transportation Engineering	Govt. Polytechnic for Distance Learning, Pune.
2.	Arora and Luthra	Transportation Engineering	New India Publishing House, Delhi-51.
3.	A. Kamala	Transportation Engineering	Tata McGraw-Hill Publishing Co.Ltd., New Delhi.

Text Books:

1.	Justo and Khanna	Highway Engineering	Nem Chand and Brothers, Roorkee
2.	S. Ponnuswamy	Bridge Engineering	Tata McGraw-Hill Publishing Co.Ltd., New Delhi.
3.	G.V. Rao	Principle of Transportation & Highway Engineering.	Tata McGraw-Hill Publishing Co.Ltd., New Delhi.

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Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
A) Highway Engineering :					
1.	General	02	04	--	06
2.	Geometric design	04	06	04	14
3.	Construction of Highway	08	06	06	20
4.	Traffic Engineering	--	04	02	06
5.	Highway drainage and arboriculture	02	02	--	04
B) Bridge Engineering :					
6.	General	02	--	--	02
7.	Component parts of bridge	04	04	04	12
8.	Types of bridges	02	04	02	08
9.	Culverts & causeways	02	04	--	06
10.	Inspection and maintenance of bridges	02	--	--	02
Total		28	34	18	80

(Prof. J.M. Sonar)
L. C E D.
Prepared By

(Prof. S. B. Kulkarni)
Secretary, PBOS

(Prof. C.C. Dandvatimath)
I/c H.C.E D.
Chairman, PBOS

Programme : **Diploma in CE**
Programme Code : **01 /15**
Name of Course : **Construction Technology**
Course Code : **CE466**

Teaching Scheme:

	Hours /Week	Total Hours
Theory	04	64
Practical	02	32

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	Two class tests, each of 60 minutes	3Hrs.	--	--	--
Marks	20	80	--	25	25

Course Rationale:

Diploma holder technician has to act as a link between the engineer and the artisan. By studying this course the student will be aware of various component parts of a building structure and construction processes which will help him to understand the construction procedures effectively. It will also impart knowledge about co-ordination of various construction activities, repairs and maintenance of the structure.

Course Objectives:

After studying this course, student will be able to :-

- Know various technical terms related to different components of structure.
- Learn core construction processes in Civil Engineering construction.
- Integrate individual construction process in Civil Engg. Construction.
- Guide the masons, carpenters, labourers to work in a specified manner.
- Supervise construction work.
- Co-ordinate various items of work.

Course Content:

Chapter No.	Name of Topic/Sub topic	Hrs	Weightage
1	Introduction		
	1.1 Importance of the subject.	04	06
	1.2 Types of structure. Load bearing structure Framed structure. R.C.C. framed structure. Steel framed structure Composite, R.C.C. & steel framed structure.		
	1.3 Comparison of framed and load bearing structure.		
	1.4 Setting out of a framed and load bearing structure.		
2	Foundation		
	2.1 Definition and function	06	08
	2.2 Investigation for shallow foundation. Spread footings for walls, columns.		
	2.3 Pile foundations – Suitability, classification according to materials used in construction - Timber, concrete - precast and cast- in- situ, Steel, Sand, Composite, prestressed concrete. Comparative merits & Demerits.		
	2.4 Classification of pile according to function - End bearing, friction, sheet, anchor, dolphin, compaction, Batter. Grouping of piles, pile cap functions		
	2.5 Foundations in black cotton soil precautions for safety of foundations Under reamed pile foundation.		
	2.6 Dewatering - Necessity, Different Methods - Pumping, cement grouting well point single & Multistage. Chemical, freezing. Electro-osmosis.		
3	Masonry		
	3.1 Stone masonry. Terms used in stone masonry importance of through stones.	08	12
	3.2 Classification of stone masonry Rubble masonry - coursed, uncoursed, Random rubble, Dry rubble. Ashlar masonry - fine, rough - tooled, rock or quarry faced, chamfered, block in course.		
	3.3 Brick masonry -Terms used in brick masonry, sizes, No. of bricks required per cum. Bonds in brickwork		

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		for 1 and 1½ brick thick masonry. (Laying of bricks, precautions to be taken) stretcher bond, Header bond, English bond, Flemish (single & double) comparison of English & Flemish bonds,		
	3.4	Points to be observed while supervising brick masonry.		
	3.5	Hollow block masonry Construction method of hollow block masonry, situations where hollow block masonry is used, Merits and demerits of hollow block masonry		
4	Doors and windows			
	4.1	Parts of door frame and shutter.	06	06
	4.2	Method of fixing door frame		
	4.3	Materials used for frame and shutter of door & window.		
	4.4	Various types of door - Steel, Aluminum, Rolling shutter, Collapsible, sliding, PVC.		
	4.5	Various types of windows - Steel, Aluminum, Louvered.		
	4.6	Common types of grills for windows - M.S., Aluminum, welded wire mesh.		
	4.7	Common sizes of doors & windows used in building.		
5	Lintel & Arches:			
	5.1	Function and component parts.	03	04
	5.2	Materials used for lintels - Stone, concrete, steel, precast and cast - in – situ.		
	5.3	Types of Arches - Flat and relieving.		
6.	Roofs			
	6.1	Necessity Types - Pitched and flat, Component parts of pitched roof	05	06
	6.2	Steel trusses - Types, Advantages of steel trusses over timber trusses.		
	6.3	R.C.C. flat roof - Method of construction of Precast slab units like Siporex.		
	6.4	Drainage of pitched and flat roofs.		

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	6.5	Roof covering for pitched roofs - country tiles, Mangalore tiles, C.G.I. Sheets, A.C. sheets, trafford sheets, - Method of fixing of sheets		
7.	Stairs			
	7.1	Function location & size terms used in stair	04	04
	7.2	Requirement of good stair.		
	7.3	Thumb rules for design of stair.		
	7.4	R.C.C. stairs - simply supported, cantilever and balanced cantilever.		
	7.5	Steel stairs -Finishes to rise and tread. Lift - Location, requirement		
8.	Floors			
	8.1	Ground floor - Requirement of floor plinth filling.	05	06
	8.2	Upper floor - R.C.C. floor.		
	8.3	Different floor finishes. Flooring for special purposes such as factories, warehouses, railway and platforms.		
	8.4	Mezzanine floor - Location, requirement and use.		
	8.5	Basements - location, construction of difficulties.		
9.	Scaffolding, shoring, under pinning			
	9.1	Scaffolding - component parts, use Different types such as - single, Double, cantilever. Tubular scaffolding.	04	06
	9.2	Shoring - Necessity, component parts, Diff. types such as - Raking, flying and dead.		
	9.3	Underpinning - Necessity, points to be considered in under pinning,		
	9.5	Methods of underpinning such as - pit. Cantilever needle and pile method.		
10.	Finishing Works			
	10.1	Plastering – Necessity, preconstruction preparation,	10	12
	10.2	Internal plaster - Neeru finish,		
	10.3	External plaster - Diff. types such as sponge finish, rough, pebble, dash.		
	10.4	Pointing–Necessity, preconstruction preparation. Different		

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	10.5	types of pointing painting - Necessity surface preparation,		
	10.6	Different types of paints - white wash, Dry distemper, Oil bound distemper, plastic emulsion, oil paint, cement paint.		
	10.7	Causes & prevention of cracks in building, principle causes of cracks in R.C.C. members, cracks in concrete & Terrazzo floors General measures of prevention of cracks		
11.	Formwork & Centering			
	11.1	Necessity, materials used in formwork and centering.	05	04
	11.2	Formwork and centering for column, beam, chajja and stair.		
	11.3	Removal of formwork and centering		
	11.4	Requirements of good formwork		
12.	Allied Process			
	12.1	Water proofing - Necessity & Importance	04	06
	12.2	Different methods of water proofing for R.C.C. slabs		
	12.3	such as Bituminous tar felt, Hindustan type and advanced techniques.		
	12.4	Damp proofing. Causes and effects of Dampness.		
	12.5	Methods of damp proofing at various points in building.		
	12.6	Damp proofing in basement.		
	12.7	Termite proofing. Necessity. Pre / post construction treatment		
		Total	64	80

List of Practicals/Experiments/Assignments:

Sr. No.	Name of Experiment/Assignment	Hrs
1.	Actual setting out of a small load bearing structure.	04
2.	Transferring level by using water tubes	04
3.	Assignment (1): An assignment on pile foundation and under reamed pile foundation	02
4.	Field tests on bricks .	04
5.	Assignment (2) : Assignment on bonds in brickwork and Hollow block masonry Merits	02
6.	Assignment (3) : Assignment on erection of door frame	02
7.	Assignment (4) : Assignment on Different types of roof coverings for pitched roof	02
8.	Assignment (5) : An assignment on different types of scaffolding and shoring.	04
9.	Assignment (6) : An assignment on formwork and centering for column, beam, chajja and stair.	04
10.	Assignment (7) : An assignment of water proofing, Damp proofing and Termite proofing.	04
	Total	32

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1.	Introduction	Classroom teaching, site visit, Transparencies
2.	Foundation	Classroom teaching, site visit
3.	Masonry	Classroom teaching, site visit, charts, transparencies
4.	Doors & Windows	Classroom teaching, site visit, models, transparencies
5.	Lintel & Arches	Classroom teaching, site visit
6.	Roofs	Classroom teaching, site visit, models Transparencies
7.	Stairs	Classroom teaching, models
8.	Floors	Classroom teaching, site visit
9.	Scaffolding shoring, underpinning	Classroom teaching, model, site visit, Transparencies
10.	Finishing works	Classroom teaching, site visit
11.	Formwork & centering	Classroom teaching, site visit, Transparencies
12.	Allied processes	Classroom teaching, site visit, Transparencies

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Text Books:

Sr. No	Author	Title	Publication
1.	S.C. Rangwala	Building construction	Charotar Book Stall
2.	Tomlinson	Advanced construction Tech.	

Reference Books:

Sr. No	Author	Title	Publication
1.	Sushilkumar	Building Construction	Standard Publishers distributors, Delhi -6
2.	T.D. Ahuja and G.S. Birdi	Fundamentals of Building construction	Dhanpat Rai and Sons

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1.	Introduction	02	02	--	04
2.	Foundation	04	02	02	08
3.	Masonry	06	02	04	12
4.	Doors & Windows	02	02	02	06
5.	Lintel & Arches	02	02	--	04
6.	Roofs	02	02	02	06
7.	Stairs	02	02	--	04
8.	Floors	02	02	02	06
9.	Scaffolding shoring, underpinning	02	02	02	06
10.	Finishing works	02	04	02	08
11.	Formwork & centering	02	02	---	04
12.	Allied processes	04	02	---	06
13.	Cracks in buildings	--	02	04	06
Total		32	28	20	80

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