

Certificate Programme in Building Maintenance & ICD in Civil Engineering

Semester-I (ICD)							
S.No	Sub. Code	Subject Name	L	T	P	Hrs.	Credits
1	AM-111	Mathematics- I	4	1	0	5	5
2	PH -111	Physics-I	4	0	2	6	5
3	CY-111	Chemistry-I	4	0	2	6	5
4	HU-111	Communication Skills-I	2	0	0	2	2
5	WS-111	Workshop Practice-I	0	0	4	4	2
6	ME-111	Engineering Drawing	0	0	4	4	2
7	CS-111	Computer Fundamentals	3	0	2	5	4
Total			17	1	14	32	25
Semester-II (ICD)							
S.No	Sub. Code	Subject Name	L	T	P	Hrs.	Credits
1	AM-121	Mathematics- II	4	1	0	5	5
2	PH-121	Physics-II	4	0	2	6	5
3	CY-121	Chemistry-II	4	0	2	6	5
4	HU-121	Communication Skills-II	1	0	2	3	2
5	WS-121	Workshop Practice-II	0	0	4	4	2
6	HU-122	Principles of Management and Industrial Psychology	3	0	0	3	3
7	CV-121	Building Materials	2	0	2	4	3
Total			18	1	12	31	25
Semester –III A							
1	TO-201	Two Weeks Practical Training during Summer Vacation				80	S/US
Semester-III B(ICD)							
S.No	Sub. Code	Subject Name	L	T	P	Hrs.	Credits
1	AM-211	Applied Mathematics	3	1	0	4	4
2	EE-211	Fundamentals of Electrical Engineering	3	0	2	5	4
3	EC-211	Fundamentals of Electronics Engineering	3	0	2	5	4
4	CV-211	Surveying-I	2	0	2	4	3
5	CV-212	Building Construction and Drawing	2	0	2	4	3
6	CV-213	Concrete Technology	2	0	2	4	3
7	CV-214	Water Supply and Waste Water Engineering	2	0	2	4	3
Total			17	1	12	30	24
Semester-IV							
S.No	Sub. Code	Subject Name	L	T	P	Hrs.	Credits
1	CV-221	Surveying-II	2	0	2	4	3
2	CV-222	Irrigation Engineering & Drawing	2	0	4	6	4
3	CV-223	Highway Engineering	3	0	2	5	4
4	CV-224	Quantity Surveying & Valuation	2	0	0	2	2
5	CV-225	Structural Mechanics	3	1	2	6	5
6	CV-226	Building Maintenance	2	0	4	6	4
7	MC-221	Moral values and Professional Ethics	1	0	0	1	0
Total			15	1	14	30	22
Semester-V A							
	TP-301	Four Weeks Industrial Training/Surveying Camp during Summer				160	S/US
Semester-V B							
S.No	Sub. Code	Subject Name	L	T	P	Hrs.	Credits
1	CV-311	Construction Management and Accounts	3	0	0	3	3
2	CV-312	Soil and Foundation Engineering	2	1	4	7	5
3	CV-313	Fluid Mechanics	2	0	4	6	4
4	CV-314	Railways, Bridges and Tunnel Engineering	2	0	2	4	3
5	CV-315	CAD in Civil Engineering	2	1	2	5	4
6	CV-316	Design and Drawing of RCC Structures	2	0	4	6	4
7	TP-301E	Industrial Training (Evaluation only--S/US)					S/US
Total			13	2	16	31	23
Semester-VI							
S.No	Sub Code	Subject Name	L	T	P	Hrs.	Credits
1	HU-321	Entrepreneurship	2	0	0	2	2
2	MC-321	Environmental Studies	2	0	0	2	2
3	CV-321	Architectural Practices and Interior Design	3	0	4	7	5
4	CV-322	Design and Drawing of Steel Structures	4	0	2	6	5
5	CV-323	Construction Machinery and Equipment	3	1	0	4	4
6	CV-324	Earthquake Resistant Building Construction	3	0	0	3	3
7	CV-325	Project	0	0	4	4	2
Total			17	1	10	28	23

Title of the course : Building Materials

Subject Code : CV-121

Weekly load : 04

Credit : 03

LTP 2-0-2

Unit	Course Description	Lectures
Unit-I	Building Stones: Classification of Rocks: Geological classification: Igneous, sedimentary and metamorphic rocks. Chemical classification; Calcareous, argillaceous and siliceous rocks. Physical classification: Unstratified, stratified and foliated rocks. General characteristics of stones – Marble, Kota stone, Granite, Sand, Trap, Basalt stone, Lime stone and Slate. Requirements of good building stones. Identification of common building stones. Various uses of stones in construction. Quarrying of stones by blasting and its effect on environment.	5
	Bricks and Tiles: Introduction to bricks. Raw materials for brick manufacturing and properties of good brick making earth. Manufacturing of bricks: Preparation of clay (manual/mechanically). Moulding: hand moulding and machine moulding, brick table; drying of bricks, burning of bricks, types of kilns (Bull's Trench Kiln and Hoffman's Kiln), process of burning, size and weight of standard brick; traditional brick, refractory brick, clay-flyash bricks, sun dried bricks, only line diagram of kilns. Classification and specifications of bricks as per BIS: 1077. Testing of common building bricks as per BIS: 3495. Compressive strength, water absorption – hot and cold water test, efflorescence, Dimensional tolerance, soundness. Tiles: Building tiles; Types of tiles-wall, ceiling, roofing and flooring tiles, ceramic, terrazzo and PVC tiles: their properties and uses, Vitrified tiles, Paver blocks. Stacking of bricks and tiles at site	5
	Cement: Introduction, raw materials, flow diagram of manufacturing of cement. Various types of Cements, their uses and testing: Ordinary portland cement, rapid hardening cement, low heat cement, high alumina cement, blast furnace slag cement, white and coloured cement, portland pozzolana cement, super sulphate cement, Tests of cement – fineness, soundness, initial and final setting time etc.as per B.I.S. Code. Properties of cement	6
Unit-II	Lime: Introduction: Lime as one of the cementing materials. Classification and types of lime as per BIS Code. Calcination and slaking of lime	5
	Timber and Wood Based Products: Identification and uses of different types of timber: Teak, Deodar, Shisham, Sal, Mango, Kail, Chir, Fir, Hollock, Champ. Market forms of converted timber as per BIS Code. Seasoning of timber: purpose, methods of seasoning as per BIS Code. Properties of timber and specifications of structural timber. Defects in timber decay in timber. Preservation of timber and methods of treatment as per BIS. Other wood based products, their brief description of manufacture and uses: laminated board, block board, fibre board, hard board, sunmica, plywood, veneers, Cement Panel Board, moulded Door.	5
	Paints and Varnishes: Introduction, purpose and use of paints. Types, ingredients, properties and uses of oil paints, water paints and cement paints. Covering capacity of various paints. Types, properties and uses of varnishes. Trade name of different products	6

Recommended Books:

Author	Title	Publisher
Sharma, SK; and Mathur	Engineering Materials	S. Chand and Co
Surendra Singh	Engineering Materials	Vikas Publishing House Pvt. Ltd
Chowdhuri	Engineering Materials	Culcutta, Technical Publishers of India
Bahl, SK	Engineering Materials	Rainbow Book Co

Title of the course : Building Materials Lab

Subject Code : CV-121P

Practical Exercises:

- To identify the stones used in building works by visual examination
- To determine the crushing strength of bricks
- To determine the water absorption of bricks and efflorescence of bricks
- To identify various types of timbers such as: Teak, Sal, Chir, Sissoo, Deodar, Kail & Hollock by visual examination only
- To determine fineness (by sieve analysis) of cement
- To conduct field test of cement.
- To determine normal consistency of cement
- To determine initial and final setting times of cement
- To determine soundness of cement
- To determine compressive strength of cement
- The students should submit a report work on the construction materials, covering water proofing material, cements, steel, paints and timber products available in the local market. They will also show the competitive study based upon the cost, brand name, sizes available in the local market.

Title of the course : **Surveying-I**

Subject Code : **CV-211**

Weekly load : 04

LTP 2-0-2

Credit : 03

Unit	Course Description	Lectures
Unit-I	Introduction: Basic principles of surveying, concept and purpose of surveying, measurements-linear and angular, units of measurements, instruments used for taking these measurements, classification of surveying instruments.	5
	Chain surveying: Introduction, advantages and disadvantages. Direct and indirect ranging offsets and recording of field notes.	5
	Compass surveying: Purpose of compass surveying. Use of prismatic compass: setting and taking observations. Introduction to: Meridian - Magnetic and True, Bearing - Magnetic, True and Arbitrary, whole circle bearing and reduced bearing, fore and back bearing, magnetic dip and declination. Local attraction - causes, detection, errors and corrections, problems on local attraction, magnetic declination and calculation of included angles in a compass traverse.	6
Unit-II	Levelling: Purpose of levelling, concept of a leveled surface, horizontal surface, vertical surface, datum, reduced level and bench marks. Identification of various parts of Dumpy level and use of Dumpy level, Engineer' level, Auto level: advantages and disadvantages, use of auto level. Concepts of line of collimation, axis of the bubble tube, axis of the telescope and vertical axis. Levelling staff: single piece, folding, invar precision staff, telescopic. Temporary adjustment and permanent adjustment of dumpy level by two peg method. Concept of back sight, foresight, intermediate sight, change point, to determine reduces levels. Level book and reduction of levels by Height of collimation method and Rise and fall method. Arithmetic checks, problem on reduction of levels, fly levelling, check leveling and profile levelling (L-section and X-section), errors in levelling, permissible limits, reciprocal leveling. Numerical problems. Computations of areas of regular figures and irregular figures. Simpson's rule: prismatic formula and graphical method use of planimeter for computation of areas with numerical problems	8
	Plane Table Surveying Purpose of plane table surveying, equipment used in plane table survey: Setting of a plane table: Centering, levelling, orientation. Methods of plane table surveying: Radiation, Intersection, Traversing, Resection. Concept of two point and three point problems. Errors in plane table survey and precautions to control them. Testing and adjustment of plane table and alidad	8

Recommended Books

Author(s)	Title	Publisher
Hussain, SK and Nagraj	Text Book of Surveying	S Chand and Co. Ltd
Deshpande	A Text Book Surveying and Levelling	United Books Corporation
Kocher	Text Book of Surveying	Katson Publishing House
Kanetkar, TP and Kulkarni	Surveying and Leveling	AVG Parkashan

Title of the course : **Surveying-I Lab**

Subject Code : **CV-211P**

PRACTICAL EXERCISES

I. Chain surveying:

- i) a) Ranging a line
- b) Chaining a line and recording in the field book
- c) Taking offsets - perpendicular and oblique (with a tape only)
- d) Setting out right angle with a tape

ii) a) Chaining of a line involving reciprocal ranging

iii) Chaining a line involving obstacles to ranging

iv) Chain Survey of a small area.

Compass Surveying:

- i) a) Study of prismatic compass
- b) Setting the compass and taking observations
- c) Measuring angles between the lines meeting at a point

III. Levelling:

- i) a) Study of dumpy level and levelling staff
- b) Temporary adjustments of various levels
- c) Taking staff readings on different stations from the single setting and finding differences of level between them

ii) a) To find out difference of level between two distant points by shifting the instrument

iii) a) Longitudinal and cross sectioning of a road/railway/canal

iv) a) Setting a gradient by dumpy and auto-level

IV. Plane Table Surveying:

- i) a) Study of the plane table survey equipment
 b) Setting the plane table
 c) Marking the North direction
 d) Plotting a few points by radiation method
- ii) a) Orientation by
 - Trough compass
 - Back sighting
 b) Plotting few points by intersection, radiation and resection method
- iii) Traversing an area with a plane table (at least five lines)
- V. Layout of Buildings (from given drawing of two room residential building) by use of surveying instruments.

Title of the course : **Building Construction and Drawing**
Subject Code : **CV-212**
 Weekly load : 04
 Credit : 03

LTP 2-0-2

Unit	Course Description	Lectures
Unit-I	Introduction: Definition of a building, classification of buildings based on occupancy. Different parts of a building.	2
	Foundations: Concept of foundation and its purpose. Types of foundation-shallow and deep: Shallow foundation - constructional details of: Spread foundations for walls, thumb rules for depth and width of foundation and thickness of concrete block, stepped foundation, masonry pillars and concrete columns. Earthwork: Layout/setting out for surface excavation, cutting and filling, Excavation of foundation, trenches, shoring, timbering and de- watering	3
	Walls: Purpose of walls. Classification of walls - load bearing, non-load bearing, dwarf wall, retaining, breast walls and partition walls. Classification of walls as per materials of construction: brick, stone, reinforced brick, reinforced concrete, precast, hollow and solid concrete block and composite masonry walls. Partition walls: Constructional details, suitability and uses of brick and wooden partition walls.	3
	Masonry: Brick Masonry: Terminology, Bond – meaning and necessity; types of bonds, Construction of brick walls, Expansion and contraction joints, Stone Masonry: Glossary of terms, types of stone masonry, principles to be observed in construction of stone masonry walls.	4
	Arches and Lintels: Meaning and use. Glossary of terms Arches: Types of Arches and their construction. Lintels: Purpose of lintel, Materials used for lintels, Cast-in-situ and pre-cast lintels, Lintel along with sun-shade.	4
Unit-II	Doors: Glossary of terms with neat sketches. Classification based on materials. Different type of doors and windows. Ventilators, sky light window, Louvres shutters, Door and window frames – materials and sections, door closures, hold fasts.	2
	Damp Proofing and Water Proofing: Dampness and its ill effects on bricks, plaster, wooden fixtures, metal fixtures and reinforcement, Damp proofing materials and their specifications.	2
	Floors: Glossary of terms. Types of floor, description with sketches. The methods of construction of concrete, terrazzo and timber floors	2
	Roofs: Types of roofs. False ceilings. Special emphasis on maintenance of slopes, overlaps of roofing materials, applicability and problems of wind ties, size of anchoring bolts	2
	Stairs: Glossary of terms, Classification of staircase. Planning and layout of staircase: Relations between rise and tread, determination of width of stair, landing etc. Various types of layout.	2
	Surface Finishes: Plastering, Pointing, Painting, Selection of appropriate paints/finishes for interior and exterior surfaces. Importance of preparation of surfaces such as hacking, grooving etc before application of surface finishes.	2
	Anti Termite Measures: Anti-termite treatment of foundations, top surface of earth filling, junction of walls and floors, external perimeter of building and timber. Treatment in existing buildings	2
	Building Services: Introduction to fire fighting systems, Ducting for Air-conditioning, service lines for cable telephone, and electrical wiring, garbage disposal systems.	2

Recommended Books

Author(s)	Title	Publisher
Gupta, Sushil Kumar, Singla, DR, and Juneja BM	A Text Book of Building Construction	Katson Publishing House
Rangwala, SC	Building Construction	Anand, Charotar Book
Kulkarni, GJ	A Text Book of Building Construction	Ahmedabad Book Depot
Arora, SP and Bindra, SP	A Text Book of Building Construction	Dhanpt Rai

Title of the course : Building Construction and Drawing Lab
Subject Code : CV-212P

PRACTICAL EXERCISES

1. Demonstration of tools and plants used in building construction
2. To prepare Layout of a building: two rooms building with front verandah
3. To construct brick bonds (English bond only) in one, one and half and two brick thick: (a) Walls for L, T and cross junction (b) Columns
4. Drawing No. 1: details of spread footing foundations, load bearing and non-load bearing wall for given thickness of walls with the help of given data or rule of the thumb, showing offsets, position of DPC. The details of the concrete and brick apron have to be shown in the drawing.
5. Drawing No. 2: Plans of 'T' and Corner junction of walls of 1 Brick, 1-1/2 Brick and 2 brick thick in English bond
6. Drawing No.3: Elevation, sectional plan and sectional side elevation of flush door, glazed door, panelled door with wire gauge shutter.
7. Drawing No. 4: Drawing plan, elevation of a small building by measurement and foundation detail and sectional elevation.
8. Drawing No.5: Drawing detailed plan, elevation and section of a two room residential building from a given line plan, showing details of foundations, roof and parapet.

Title of the course : Concrete Technology
Subject Code : CV-213
 Weekly load : 04 LTP 2-0-2
 Credit : 03

Unit	Course Description	Lectures
Unit-I	Introduction: Definition of concrete, uses of concrete in comparison to other building materials	2
	Ingredients of Concrete: Cement: Types and properties. Aggregates: Classification, Characteristics of aggregates: , Grading of aggregates: coarse aggregate, fine aggregate; All-in- aggregate; fineness modulus, Water: Quality requirements as per IS:456-2000. Water Cement Ratio: Hydration of cement & principle of water-cement ratio, Duff Abram's Water-cement ratio law: Limitations of water-cement ratio law and its effects on strength of concrete. Admixtures.	5
	Properties of Concrete: Properties in plastic state: Workability, factors affecting workability, measurement, & slumps for placement in various conditions, Segregation, Bleeding and Harshness. Properties in hardened state: Strength, Durability, Impermeability, Dimensional changes;	5
	Proportioning for Normal Concrete: Objectives of mix design, introduction to various grades, are proportioning for nominal mix design as, Adjustment on site for: Bulking of fine aggregate, water absorption of aggregate, workability. Difference between nominal and controlled concrete.	4
Unit-II	Special Concretes: Concreting under special conditions, difficulties and precautions before, during and after concreting, Cold weather concreting, Under water concreting, Hot weather concreting. Ready mix concrete. Fibre reinforced concrete. Polymer Concrete. Fly ash concrete. Silica fume concrete	8
	Concreting Operations: Storing of Cement, Effect of storage on strength of cement, Determination of warehouse capacity for storage of Cement. Storing of Aggregate, Batching and mixing, selection of proper gauge box, Transportation of concrete, Placement of concrete, Compaction, Finishing concrete slabs, Curing: Objective & methods. Jointing: Location of construction joints, treatment of construction joints, expansion joints in buildings - their importance and location. Defects in concrete: Identification of and methods of repair	8

Recommended Books

Author(s)	Title	Publisher
Kulkarni, PD; Ghosh, RK	Text Book of Concrete Technology	Oxford and IBH Publishing, New Delhi
Birinder Singh	Concrete Technology	Kaption Publications
Gupta BL and Gupta Amit	Text Book of Concrete Technology	Standard Publishers Distributors, Delhi
Varshney, RS	Concrete Technology	Oxford and IBH Publishing, New Delhi

Title of the course : Concrete Technology Lab
Subject Code : CV-213P

PRACTICAL EXERCISES:

1. To determine flakiness and elongation index of coarse aggregates
2. To determine silt in fine aggregate
3. Determination of specific gravity and water absorption of aggregates
4. Determination of bulk density and voids of aggregates
5. To determine surface moisture in fine aggregate by displacement method
6. Determination of particle size distribution of fine, coarse and all in aggregate by sieve analysis (grading of aggregate)

7. To determine necessary adjustment for bulking of fine aggregate
8. To determine workability by slump test.
9. To verify the effect of water, fine aggregate/coarse aggregate ratio and aggregate/Cement ratio on slump
10. Compaction factor test for workability
11. Non destructive test on concrete by Rebound Hammer Test
12. Tests for compressive strength of concrete cubes for different grades of concrete

Title of the course : Water Supply and Waste Water Engineering
Subject Code : CV-214
 Weekly load : 04
 Credit : 03

LTP 2-0-2

Unit	Course Description	Lectures
Unit-I (Water Supply Engineering)	Introduction: Necessity and brief description of water supply system. Quantity of Water: Quality of Water, Physical, Chemical and bacteriological tests and their significance. Standard of potable water as per Indian Standard.	4
	Water Treatment Sedimentation, Coagulation, flocculation. Filtration, Disinfection of water, forms of chlorination. Flow diagram of different treatment units	6
	Conveyance of Water Different types of pipes, their suitability and uses, types of joints in different types of pipes. Appurtenances: Sluice, air, reflux valves, relief valves, scour valves, bib cocks, stop cocks, fire hydrants, and water meters their working and uses. Systems of water, Wastage of water – preventive measures, Maintenance of distribution system, Leakage detection Water supply fixtures and installations and terminology related to plumbing.	6
Unit-II (Waste Water Engineering)	Introduction: Purpose of sanitation. Necessity of systematic collection and disposal of waste. Collection and conveyance of sewage, Types of sewage: Domestic, industrial, storm water and its seasonal variation, Types of sewerage systems, Appurtenance, Manholes & ventilating shafts	4
	Laying and Construction of Sewers: Setting out/alignment of sewers. Excavations, Construction of surface mains and different sections required.	4
	Sewage Treatment and disposal: Meaning and principle of primary and secondary treatment and activated sludge process their flow diagrams. Introduction and uses of screens, grit chambers, detritus tanks, skimming tanks, plain sedimentation tanks, primary clarifiers, secondary clarifiers, filters, control beds, intermittent sand filters, trickling filters, sludge treatment and disposal, oxidation ponds ,Methods of Sewerage Disposal: General composition of sewage and disposal methods. Disposal by dilution. Self purification of stream. Disposal by land treatment.	5
	Building Drainage: Aims of building drainage and its requirements. Different sanitary fittings and installations. Traps, seals, causes of breaking seals.	3

Recommended Books:

Author	Title	Publisher
Duggal, KN	Elements of Public Health Engineering	S. Chand and Co
Rangwala, SC	Water Supply and Sanitary Engineering	Anand Charotar Books
Kshirsagar	Water Supply Engineering	Roorkee Publishing House
Hussain, SK	Text Book of Water Supply and Sanitary Engineering	Oxford and IBH Publishing Co

Title of the course : Water Supply and Waste Water Engineering Lab
Subject Code : CV-214

Practical Exercises

- 1) To determine turbidity of water sample
- 2) To determine dissolved oxygen of given sample
- 3) To determine Ph value of water
- 4) To perform jar test for coagulation
- 5) To determine BOD of given sample
- 6) To determine residual chlorine in water
- 7) To determine conductivity of water and total dissolved solids
- 8) To study the installation of following:
 - a) Water meter
 - b) Connection of water supply of building with main
 - c) Pipe valves and bends
 - d) Water supply and sanitary fittings
- 9) To study and demonstrate the joining/threading of GI Pipes, CI Pipes, SW pipes, D.I. pipes and PVC pipes.
- 10) To demonstrate the laying of SW pipes for sewers
- 11) Study of water purifying process by visiting a field lab.
- 12) To test house drainage

Title of the course : Surveying-II
Subject Code : CV-221
 Weekly load : 04
 Credit : 03

LTP 2-0-2

Unit	Course Description	Lectures
Unit-I	Contouring: Concept of contours, purpose of contouring, contour interval and horizontal equivalent, factors effecting contour interval, characteristics of contours, methods of contouring: Direct and indirect, use of stadia measurements in contour survey, interpolation of contours; use of contour map, Drawing cross section from a contour map; marking alignment of a road, railway and a canal on a contour map, computation of earth work and reservoir capacity from a contour map	5
	Theodolite Surveying: Working of a transit vernier theodolite, axes of a theodolite and their relation; temporary adjustments of a transit theodolite; concept of transiting, swinging, face left, face right and changing face; measurement of horizontal and vertical angles. Prolonging a line (forward and backward) measurement of bearing of a line; traversing by included angles and deflection angle method; traversing by stadia measurement, theodolite triangulation, plotting a traverse; concept of coordinate and solution of omitted measurements (one side affected), errors in theodolite survey and precautions taken to minimize them; limits of precision in theodolite traversing. Height of objects – accessible and non-accessible bases	6
	Tacho-metric surveying Tachometry, Instruments to be used in tachometry, methods of tachometry, stadia system of tachometry, general principles of stadia tachometry, examples of stadia tachometry and Numerical problems	5
Unit-II	Curves: Simple Circular Curve:Need and definition of a simple circular curve; Elements of simple circular curve - Degree of the curve, radius of the curve, tangent length, point of intersection (Apex point), tangent point, length of curve, long chord deflection angle, Apex distance and Mid-ordinate. Setting out of simple circular curve:- By linear measurements only: Offsets from the tangent, Successive bisection of arcs, Offsets from the chord produced. By tangential angles using a theodolite. Transition Curve:Need (centrifugal force and super elevation) and definition of transition curve; requirements of transition curve; length of transition curve for roads; by cubic parabola; calculation of offsets for a transition curve; setting out of a transition curve by tangential offsets only. Vertical curve:Setting out of a vertical curve	8
	Modern Surveying Introduction to the use of Modern Surveying equipment and techniques such as: EDM or Distomat, Planimeter, Total station, Introduction to remote sensing and GPS.	8

Recommended Books:

Author(s)	Title	Publisher
Hussain, SK and Nagraj	Text Book of Surveying	S Chand and Co
Deshpande, RS	A Text Book Surveying and Levelling	United Book Corporation, Pune
Kocher	A Text Book of Surveying	Katson Publishing House Ludhiana
Kanetkar, TP; and Kulkarni	Surveying and Leveling-Vol.2	AVG Prakashan

Title of the course : Surveying-II Lab
Subject Code : CV-221P

Practical Exercises

- I. **Contouring:**
 - i) Preparing a contour plan by radial line method by the use of a Tangent Clinometer/Tachometer
 - ii) Preparing a contour plan by method of squares
 - iii) Preparing a contour plan of a Road/Railway track/Canal by taking cross sections.
- II. **Theodolite:**
 - i) Taking out the Theodolite, mounting on the tripod and placing it back in the box
 - ii) Study of a transit vernier theodolite; temporary adjustments of theodolite
 - iii) Reading the vernier and working out the least count, measurement of horizontal angles by repetition and reiteration methods
 - iv) Measurement of vertical angles and use of tachometric tables
 - v) Measurement of magnetic bearing of a line
 - vi) Running a closed traverse with a theodolite (at least five sides) and its plotting
 - vii) Height of objects with and without accessible bases
- III. **Curves**
 - i) Setting out of a simple circular curve with given data by the following methods
 - a) Offsets from the chords produced
 - b) One theodolite method
- IV. **Minor instruments:**
 - i) Demonstration and use of minor instruments like Ceylon Ghat Tracer, Tangent Clinometer, Pantagraph, Abney level etc.
 - ii) Use of planimeter for computing areas
- V. Demonstration of digital instruments through field visits to Survey of India and other government agencies.
- VI. Total Station (only demonstrations).

Title of the course : Irrigation Engineering & Drawing
Subject Code : CV-222
 Weekly load : 06
 Credit : 04

LTP 2-0-4

Unit	Course Description	Lectures
Unit-I	Introduction: Definition of irrigation. Necessity of irrigation. Water Requirement for Crops: Principal crops in India and their water requirements. Crop seasons – Kharif and Rabi. Soil water, soil crop and crop water relationships, Duty, Delta and Base Period, their relationship. Gross commanded area (GCA), culturable commanded area (CCA), Intensity of Irrigation, Irrigable area. Hydrological Cycle	3
	Methods of Irrigation: Flow irrigation, Lift Irrigation, Sprinkler irrigation, Drip irrigation, suitability of drip irrigation, layout, component parts, advantages	3
	Canals: Classification, apurtenancs of a canal and their functions, Various types of canal lining - their related advantages and disadvantages, Maintenance of lined and unlined canals	3
	Tube Well Irrigation: Introduction, occurrence of ground water, location and command, advantages and disadvantages, comparison with canal irrigation. Tube wells, Yield of a well and methods of determining yield of well. Types of tube wells and their choice.	3
	Water Harvesting Techniques: Need and requirement of various methods, Run-off from roof top and ground surface, construction of recharge pits and recharge wells and their maintenance.	4
Unit-II	Dams: Classification of dams, causes of failure, earth dam, gravity dams – types, cross-sections of a dam,. Concept of small and micro dams. Concept of spillways and energy dissipaters	3
	Canal Head Works and Regulatory Works: Definition, object, general layout, functions of different parts of head works. Difference between weir and barrage	3
	Cross Drainage Works: Functions and necessity of the following types: aqueduct, super passage, level crossing, inlet and outlet. Definitions of following Hydraulic Structures : Falls. Cross and head regulators. Outlets. Canal Escapes	3
	River Training Works: Methods of river training, guide banks, retired (levees) embankments, groynes and spurs, pitched island, cut-off	3
	Water Logging and Drainage and Ground Water Re-charge: Definition of water logging – its causes and effects, detection, prevention and remedies. Surface and sub-surface drains and their layout. Concept and various techniques used for ground water re-charge	4

Recommended Books

Author(s)	Title	Publisher
Bharat Singh	Fundamentals of Irrigation Engineering	Nem Chand and Bros, Roorkee
Garg, Santosh Kumar	Irrigation Engineering and Hydraulics Structure	Khanna Publishers
Punmia, BC and Pande	Irrigation and Water	Standard Publishers
Brij Bansi	Power Engineering	LalDistributors, Delhi
Sharma, RK	Text Book of Irrigation Engineering and Hydraulics Structures	Oxford and IBH

Title of the course : Irrigation Engineering & Drawing Lab
Subject Code : CV-222

PRACTICAL WORK:

Drawings:

1. Typical cross sections of canals in fully & partly cutting and filling.
2. Layout plan of a canal headwork
3. Draw the cross section of an Earthen dams (homogenous, zoned type and diaphragm type)
4. Cross section of tube well
5. Details of an outlet (APM)

Title of the course : Highway Engineering
Subject Code : CV-223
 Weekly load : 05
 Credit : 04

LTP 3-0-2

Unit	Course Description	Lectures
Unit-I	Introduction: Importance of Highway engineering. Functions of IRC, CRRI, MORT&H, NHAI. IRC classification of roads.	4
	Highway Surveys and Plan: Topographic map, reading the data given on a topographic map. Basic considerations governing alignment for a road in plain and hilly area. Highway location; marking of alignment	5
	Road Geometrics Glossary of terms used in road geo-metrics and their importance, Necessity of curves, Super elevation and methods of providing super elevation. Sketch of typical cross-sections in cutting and filling on straight alignment and at a curve.	5
	Road Materials: Different types of road materials in use; soil, aggregate, binders – bitumen, cutback, Emulsion and Modified Bitumen (CRMB, PMB). Introduction to California Bearing Ratio, method of finding CBR value and its significance. Aggregate : Source and types, important properties, strength, durability. Binders: Common binders; bitumen, properties as per BIS specifications, penetration, softening point, ductility and viscosity test of bitumen, procedures and significance, cut back and emulsion and their uses, Bitumen modifiers	5
	Road Pavements: Road pavement: Flexible and rigid pavement, their merits and demerits, typical cross-sections, functions of various components. Sub-grade preparation, Sub base course, Base Course including water Bound Macadam (WBM) & Wet Mix Macadam (WMM) Bitumen Courses: Bituminous Macadam, Dense Bituminous Macadam (DBM). Surfacing:-Types of surfacing: Prime coat and tack coat, Surface dressing with seal coat, Open graded premix carpet, Mix seal surfacing, Semi dense bituminous concrete, Bituminous Concrete. Methods of constructions of flexible and rigid pavements as per MORT&H specifications and quality control, Roller compacted concrete.	5
Unit-II	Hill Roads: Introduction: Typical cross-sections showing all details of a typical hill road, partly in cutting and partly in filling. Special problems of hill areas:- Landslides: Causes, prevention and control measures, use of geogrids, geoflexibles, geo synthetics, Drainage, Soil erosion, Snow: Snow clearance, snow avalanches, frost, Land Subsidence.	6
	Road Drainage: Necessity of road drainage work, cross drainage works. Surface and subsurface drains and storm water drains. Location, spacing and typical details of side drains, side ditches for surface drainage. Intercepting drains, pipe drains in hill roads, details of drains in cutting embankment, typical cross sections	6
	Road Maintenance: Common types of road failures of flexible pavements: Pot hole, cracks, rutting, alligator, cracking, upheaval - their causes and remedies (brief description). Maintenance of bituminous road such as seal-coat, patch-work and resurfacing. Maintenance of concrete roads-filling cracks, repairing joints, maintenance of shoulders (berms), maintenance of traffic control devices.	6
	Airport Engineering : Necessity of study of airport engineering, aviation transport scenario in India. Factors to be considered while selecting a site for an airport with respect to zoning laws. Introduction to Runways, Taxiways and Apron	6

Recommended Books:

Author(s)	Title	Publisher
Khanna, SK and Justo	Highway Engineering	Nem Chand and Bros
Vaswani, NK	Highway Engineering	Roorkee Publishing House
Priyani, VB	Highway and Airport Engineering	Anand,Charotar BookStall
Sehgal, SB; and Bhanot, KL	A Text Book on Highway Engineering and Airport	S Chand and Co

Title of the course : Highway Engineering Lab
Subject Code : CV-223P

Practical Exercises:

1. Determination of penetration value of bitumen
2. Determination of softening point of bitumen
3. Determination of ductility of bitumen
4. Determination of impact value of the road aggregate
5. Determination of abrasion value (Los Angeles') of road aggregate
6. Determination of the California bearing ratio (CBR) for the sub-grade soil
7. Visit to Hot mix plant
8. Visit to highway construction site for demonstration of operation of
9. Tipper, tractors (wheel and crawler), scraper, bulldozer, dumpers, shovels, grader, roller, dragline, road pavers, JCB etc.
10. Mixing and spraying equipment

Title of the course : Quantity Surveying & Valuation
Subject Code : CV-224
 Weekly load : 02
 Credit : 02

LTP 2-0-0

Unit	Course Description	Lectures
Unit-I	Introduction : Quantity surveying and its importance. Duties of quantity surveyor, types of estimates Detailed estimates: Definition, Stages of preparation – details of measurement and calculation of quantities and abstract, Units of measurement for various items of work as per BIS:1200. Rules for measurements. Different methods of taking out quantities – centre line method and long wall and short wall method.	3
	Preparation of Detailed and Abstract Estimates from Drawings for: A small residential building with a flat roof comprising of- Two rooms with W.C., bath, kitchen and verandah. Earthwork for unlined channel. WBM road and pre-mix carpeting. Single span RCC slab culvert. Earthwork for plain and hill roads. RCC work in beams, slab, column and lintel, foundations. 10 users' septic tank.	3
	Calculation of quantities of materials for: Cement mortars of different proportion, Cement concrete of different proportion, Brick/stone masonry in cement mortar, Plastering and pointing, White washing, painting.	3
	Analysis of Rates: Steps involved in the analysis of rates. Requirement of material, labor, sundries, contractor's profit and overheads. Analysis of rates for finished items when data regarding labour, rates of material and labour is given: Earthwork in excavation in hard/ordinary soil and filling with a concept of lead and lift, RCC in roof slab/beam/lintels/columns, Brick masonry in cement mortar, Cement Plaster, White washing, painting. Running and maintenance cost of construction equipment.	3
	Contractorship: Meaning of contract. Qualities of a good contractor and their qualifications. Essentials of a contract. Types of contracts, their advantages, dis-advantages and suitability, system of payment. Single and two cover-bids; tender, tender forms and documents, tender notice, submission of tender and deposit of earnest money, security deposit, retention money, maintenance period. Classification and types of contracting firms/construction companies.	4
Unit-II	Preparation of Tender Document based on Common Schedule Rates (CSR): Introduction to CSR and calculation of cost based on premium on CSR. Exercises on writing detailed specifications of different types of building works from excavation to foundations, superstructure and finishing operation. Exercises on preparing tender documents for the following:- Earth work, Construction of a small house as per given drawing, RCC works, Pointing, plastering and flooring, White-washing, distempering and painting, Wood work including polishing, Sanitary and water supply installations, False ceiling, aluminum partitioning, Tile flooring.	8
	Valuation: Purpose of valuation, principles of valuation. Definition of various terms related to valuation like depreciation, sinking fund, salvage and scrap value, market value, fair rent, year's purchase etc. Methods of valuation (i) replacement cost method (ii) rental return method	8

Recommended Books:

Author(s)	Title	Publisher
Pasrija, HD, Arora, CL and S. Inderjit Singh	Estimating, Costing and Valuation (Civil)	New Asian Publishers
Rangwala, S.C Anand	Estimating and Costing	Charotar Book Stall
Mahajan Sanjay	Estimating and Costing	Satya Parkashan, Delhi
Chakraborti, M	Estimating, Costing and Specification in Civil Engineering	Calcutta

Title of the course : Building Maintenance
Subject Code : CV-226
 Weekly load : 06
 Credit : 04

LTP 2-0-4

Unit	Course Description	Lectures
Unit-I	Need for Maintenance: Importance and significance of repair and maintenance of buildings. Meaning of maintenance. Objectives of maintenance. Factors influencing the repair and maintenance	5
	Deterioration of Buildings : Definition of deterioration/decay. Factors causing deterioration, their classification Human factors causing deterioration, Chemical factors causing deterioration, Environmental conditions causing deterioration, Miscellaneous factors. Effects of various agencies of deterioration on various building materials i.e. bricks, timber, concrete, paints, metals, plastics, stones.	6
	Investigation and Diagnosis of Defects: Systematic approach/procedure of investigation. Sequence of detailed steps for diagnosis of building defects/problems. List non-destructive and others tests on structural elements and materials to evaluate the condition of the building and study of three most commonly used tests	5

Unit-II	Defects and their root causes: Define defects in buildings. Classification of defects. Main causes of building defects in various building elements- Foundations, basements and DPC, Walls, Column and Beams, Roof and Terraces, Joinery, Decorative and protective finishes, Services, Defects caused by dampness.	5
	Materials for Repair, maintenance and protection: Compatibility aspects of repair materials. State application of following materials in repairs:- Anti corrosion coatings, Adhesives/bonding aids, Repair mortars, Curing compounds, Joints sealants, Waterproofing systems for roofs, Protective coatings.	5
	Remedial Measures for Building Defects: Preventive maintenance considerations. Surface preparation techniques for repair. Crack repair methods- Epoxy injection, Grooving and sealing, Stitching, Adding reinforcement and grouting, Flexible sealing by sealant, Repair of surface defects of concrete, Repair of corrosion in RCC elements, Prevention of corrosion in reinforcement. Repair of DPC against Rising Dampness, Waterproofing of wet areas and roofs, various water proofing systems and their characteristics. Repair of joints in buildings- Types of sealing joints with different types of sealants, Techniques for repair of joints, Repair of overhead and underground water tanks.	6

Recommended Books:

Author(s)	Title	Publisher
Sushil Kumar Srivastava	Industrial Maintenance Management	S Chand & Co.
Mishra	Maintenance Engineering	PHI
A.K.Gupta	Reliability, Maintenance and Safety Engineering	University Science Press
Reliability Engineering	L.S. Srinath	East-West Press

Title of the course : Building Maintenance Lab

Subject Code : CV-226P

Practical Exercises:

1. Study of the tools and equipment used in building maintenance (civil, wood & electrical).
2. Studies on the types of deterioration of different types of buildings, their causes and root cause analysis for corrective measures.
3. Studies on the different types of building defects (civil, wood & electrical), their causes and root cause analysis for corrective measures.
4. Study of important materials used in building maintenance with their applications.
5. Study different preventive maintenance methods used for building maintenance.
6. Repair of surface defects of concrete and corrosion in RCC elements.
7. Repair of DPC against Rising Dampness, Waterproofing of wet areas and roofs.
8. Repair of sealing joints with different types of sealants.
9. Repair of overhead and underground water tanks

Title of the course : Structural Mechanics

Subject Code : CV-225

Weekly load : 06

LTP 3-1-2

Credit : 05

Unit	Course Description	Lectures
Unit-I	Introduction: Concept of moment, application of moments to simple mechanisms, concept of centroid and centre of gravity of laminas and solids, CG of compound bodies and centroid of composite areas.	3
	Properties of Materials: Classification of materials, elastic materials, plastic materials, ductile materials, brittle materials. Introduction to tensile test, compressive test, impact test, fatigue test, torsion test on metals.	4
	Simple Stresses and Strains: Concept of stress, normal and shear stresses. Concept of strain and deformation, longitudinal and transverse strain, poisson's ratio, volumetric strain. Hooke's law, moduli of elasticity and rigidity, Bulk modulus of elasticity, relationship between the elastic constants. Stresses and strains in bars subjected to tension and compression. Extension of uniform bar under its own weight, stress produced in compound bars (two or three) due to axial load. Stress-strain diagram for mild steel and HYSD steel, mechanical properties, factor of safety. Temperature stresses and strains.	6
	Shear Force and Bending Moment: Concept of a beam and supports (Hinges, Roller and Fixed), types of beams: simply supported, cantilever, propped, over hang, cantilever and continuous beams (only concept). Types of loads (dead load, live load, snow load, wind load seismic load as per IS Codes etc) and types of loading (point, uniformly distributed and uniformly varying loads). Concept of bending moment and shear force, sign conventions. Bending Moment and shear force diagrams for cantilever, simply supported and overhanging beams subjected to concentrated, uniformly distributed. Relationship between load, shear force and bending moment, point of maximum bending moment, and point of contraflexure.	6

	Moment of Inertia: Concept of moment of inertia and second moment of area and radius of gyration, theorems of parallel and perpendicular axis, second moment of area of common geometrical sections: rectangle, triangle, circle (<i>without derivations</i>). Second moment of area for L, T and I sections, section modulus.	5
Unit-II	Bending Stresses in Beams: Concept of pure/simple bending. Assumptions made in the theory of simple bending, derivation and application of bending equation to circular cross-section, I section, T&L sections only. Moment of resistance. Calculations of bending stresses in simply supported beam. Combined Direct and Bending Stresses: Concentric and eccentric loads single axis eccentricity only Effect of eccentric load on the section stresses due to eccentric loads, Numerical in the case of short columns. Simple problems on stability of masonry dams and retaining walls	6
	Shear Stresses in Beams: Concept of shear stresses in beams, shear stress distribution in rectangular, circular I, T, L sections (Formula to be stated, no derivation).	5
	Slope and Deflection: Necessity for determination of slope and deflection. Moment area theorem (no derivation, numerical problems)	5
	Columns: Theory of columns. Eulers and Rankine Formula (No derivation)	4
	Analysis of Trusses: Concept of perfect, redundant and deficient frames. Assumptions and analysis of trusses by: Method of joints, Method of sections, Graphical method	4

Recommended Books:

Author(s)	Title	Publisher
Ramamrutham, S	Strength of Materials	Dhanpat Rai and Sons
Ram Chandra	Applied Mechanics & Strength of Materials	Standard Publishers
Punmia, BC	Strength of Materials	Standard Publishers
Prasad VS	Structural mechanics	Galgotia Publications

Title of the course : **Structural Mechanics Lab**
Subject Code : **CV-225P**

PRACTICAL EXERCISES

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

Title of the course : **Construction Management and Accounts**
Subject Code : **CV-311**
 Weekly load : 03 LTP 3-0-0
 Credit : 03

Unit	Course Description	Lectures
Unit-I (Construction Management)	Introduction: Significance & main objectives of construction management. Functions of construction management, The construction team: owner, engineer, architect and contractors, their functions and inter-relationship	3
	Construction Planning: Stages of construction planning, Scheduling construction works by bar charts- Definition of activity, identification of activities though, Preparation of bar charts for simple construction work, Preparation of schedules for labour, materials, machinery and finances for small works, Limitations of bar charts. Scheduling by network techniques- Introduction to network techniques; PERT and CPM, differences between PERT and CPM terminology	5
	Site Organization: Principle of storing and stacking materials at site. Location of equipment. Preparation of actual job layout for a building. Organizing labour at site	4
	Control of Progress: Methods of recording progress. Analysis of progress. Taking corrective actions keeping head office informed. Cost time optimization for simple jobs - Direct and indirect cost, variation with time, cost optimization	4
	Inspection and Quality Control: Need for inspection and quality control. Principles of inspection. Stages of inspection and quality control for- Earth work, Masonry, RCC, Sanitary and water supply services	4

	Accidents and Safety in Construction: Accidents – causes and remedies. Safety measures for- Excavation work, Drilling and blasting, Hot bituminous works, Scaffolding, ladders, form work, Demolitions. Safety campaign and safety devices	4
Unit-II (Accounts)	Public Work Accounts: Introduction, technical sanction, allotment of funds, re-appropriation of funds bill, contractor ledger, measurement book running and final account bills complete, preparation of bill of quantities (BOQ), completion certificate & report, hand receipt, acquittance roll. Muster roll labour, casual labour roll-duties and responsibility of different cadres, budget-stores, returns, account of stock, misc. P.W. advances T & P – verification, survey report, road metal material charged direct to works, account - expenditure & revenue head, remittance and deposit head, definition of cash, precaution in custody of cash book, imprest account, temporary advance, treasury challan, preparation of final bills.	24

Recommended Books:

Author(s)	Title	Publisher
Shriath, LS	PERT and CPM- Principles and Applications	East West Press
Harpal Singh	Construction Management & Accounts	Tata McGraw Hill
Gahlot PS; Dhir, BM	Construction Planning & Management	Wiley Eastern Ltd.

Title of the course : **Soil and Foundation Engineering**
Subject Code : **CV-312**
Weekly load : 07
Credit : 05

LTP 2-1-4

Unit	Course Description	Lectures
Unit-I	Introduction: Importance of soil studies in Civil Engineering. Geological origin of soils with special reference to soil profiles in India: residual and transported soil, alluvial deposits, lake deposits, local soil found in Punjab, dunes and loess, glacial deposits, black cotton soils, conditions in which above deposits are formed and their engineering characteristics. Names of organizations dealing with soil engineering work in India, soil map of India. Physical Properties of Soils, Constituents of soil & representation by a phase diagram.	6
	Classification and Identification of Soils: Particle size, shape and their effect on engineering properties of soil, particle size classification of soils. Gradation and its influence on engineering properties. Relative density and its use in describing cohesionless soils. Behaviour of cohesive soils with change in water content, Atterberg's limit - definitions, use and practical significance. Field identification tests for soils.	5
	Permeability of Soils: Concept of permeability and its importance. Darcy's law, coefficient of permeability, seepage velocity and factors affecting permeability. Comparison of permeability of different soils.	5
Unit-II	Effective Stress: Stresses in subsoil. Definition and meaning of total stress, effective stress and neutral stress. Principle of effective stress. Importance of effective stress in engineering problems	2
	Shear Strength Characteristics of Soils: Concept and Significance of shear strength. Factors contributing to shear strength of cohesive and cohesion less soils, Coulomb's law. Stress and strain curve, peak strength and ultimate strength, their significance.	2
	Compaction: Definition and necessity of compaction. Definition and importance of optimum water content, maximum dry density; moisture dry density relationship for typical soils with different compactive efforts.	3
	Soil Exploration: Purpose and necessity of soil exploration. Reconnaissance, methods of soil exploration, Sampling; undisturbed, disturbed and representative samples, number and quantity of samples, resetting, sealing and preservation of samples.	3
	Bearing Capacity of soil: Concept of bearing capacity. Definition and significance of ultimate bearing capacity, net safe bearing capacity and allowable bearing pressure. Factors affecting bearing capacity. Concept of vertical stress distribution in soils due to foundation loads, pressure bulb. Use of geo-synthetics.	3
	Foundation Engineering: Concept of shallow and deep foundation; types of shallow foundations: combined, isolated, strip, mat, and their suitability. Factors affecting the depth of shallow foundations, deep foundations, type of piles and their suitability; pile classification on the basis of material, pile group and pile cap	3

Recommended Books:

Author(s)	Title	Publisher
Punmia, BC	Soil Mechanics and Foundations	Standard Publishers
Bharat Singh and Shamsher Prakash	Soil Mechanics and Foundations Engineering	Nem Chand and Bros Roorkee
Sehgal, SB	A Text Book of Soil Mechanics	CBS Publishers
Joseph E	Engineering Properties of soils Bowles and their Measurement	Tata McGraw Hill

Title of the course : Soil and Foundation Engineering Lab
Subject Code : CV-312P

PRACTICAL EXERCISES

1. To determine the moisture content of a given sample of soil
2. Auger Boring and Standard Penetration Test
 - a) Identifying the equipment and accessories
 - b) Conducting boring and SPT at a given location
 - c) Collecting soil samples and their identification
 - d) Preparation of boring log and SPT graphs
 - e) Interpretation of test results
3. Extraction of Disturbed and Undisturbed Samples
 - a) Extracting a block sample
 - b) Extracting a tube sample
 - c) Extracting disturbed samples for mechanical analysis.
 - d) Field identification of samples
4. Field Density Measurement (Sand Replacement and Core Cutter Method)
 - a) Calibration of sand
 - b) Conducting field density test at a given location
 - c) Determination of water content
 - d) Computation and interpretation of results
5. Liquid Limit and Plastic Limit Determination:
 - a) Identifying various grooving tools
 - b) Preparation of sample
 - c) Conducting the test
 - d) Observing soil behaviour during tests
 - e) Computation, plotting and interpretation of results
6. Mechanical Analysis
 - a) Preparation of sample
 - b) Conducting sieve analysis
 - c) Computation of results
 - d) Plotting the grain size distribution curve
 - e) Interpretation of the curve
7. Laboratory Compaction Tests (Standard Proctor test)
 - a) Preparation of sample
 - b) Conducting the test
 - c) Observing soil behaviour during test
 - d) Computation of results and plotting
 - e) Determination of optimum moisture and maximum dry density
8. Demonstration of Unconfined Compression Test
 - a) Specimen preparation
 - b) Conducting the test
 - c) Plotting the graph
 - d) Interpretation of results and finding/bearing capacity
9. Demonstration of:
 - a) Direct shear and vane shear test on sandy soil samples
 - b) Permeability test apparatus

Title of the course : Fluid Mechanics
Subject Code : CV-313
 Weekly load : 06
 Credit : 04

LTP 2-0-4

Unit	Course Description	Lectures
Unit-I	Introduction: Fluids: Real and ideal fluids, Hydrostatics, Hydrodynamics, and Hydraulics Properties of Fluids: Mass density, specific weight, specific gravity, viscosity, surface tension-cohesion, adhesion, capillarity, vapour pressure and compressibility. Units of measurement and their conversion	5
	Hydrostatic Pressure: Pressure, intensity of pressure, pressure head, Pascal's law and its applications. Total pressure, resultant pressure, and centre of pressure, total pressure and centre of pressure on horizontal, vertical and inclined plane surfaces of rectangular, triangular, trapezoidal and circular shapes.	6
	Measurement of Pressure: Atmospheric pressure, gauge pressure, vacuum pressure and absolute pressure. Piezometer, simple manometer and differential manometer.	5
Unit-II	Fundamentals of Fluid Flow: Types of Flow: Steady and unsteady flow, laminar and turbulent flow, uniform and non-uniform flow. Discharge and continuity equation (flow equation) {No derivation}. Types of hydraulic energy: potential energy, kinetic energy, pressure energy. Bernoulli's theorem; statement and description (without proof of theorem) Flow Measurements (brief description with simple numerical problems): Venturimeter and mouthpiece, Pitot tube, Orifice and Orificemeter, Current meters, Notches and weirs (simple numerical problems)	5
	Flow through Pipes: Definition of pipe flow; Reynolds number, laminar and turbulent flow, critical velocity and velocity distributions in a pipe for laminar flow. Head loss in pipe lines due to friction, sudden expansion and sudden contraction, entrance, exit, obstruction and change of direction (No derivation of formula). Hydraulic gradient line and total energy line. Flow from one reservoir to another through a long pipe of uniform cross section (simple problems). Pipes in series and parallel. Water hammer phenomenon and its effects.	5
	Flow through open channels: Definition of an open channel, uniform flow and non-uniform flow. Discharge through channels using: - Chezy's formula (no derivation), Manning's formula (no derivation). Most economical channel sections (no derivation):- Rectangular, Trapezoidal. Head loss in open channel due to friction	3
	Hydraulic Pumps: Introduction to hydraulic pump, reciprocating pump, centrifugal pumps	3

Recommended Books:

Author(s)	Title	Publisher
Jagdish Lal	Fluid Mechanics and Hydraulics	Delhi Metropolitan Book Co
Modi, PN, and Seth, SM	Hydraulics and Fluid Mechanics	Delhi Standard Publishers
Khurmi RS	Hydraulics and Hydraulics Machines	S Chand and Co

Title of the course : Fluid Mechanics Lab
Subject Code : CV-313P

PRACTICAL EXERCISES

1. To verify Bernoulli's Theorem
2. To find out venturimeter coefficient
3. To determine coefficient of velocity (C_v), Coefficient of discharge (C_d) Coefficient of contraction (C_c) of an orifice and verify the relations between them
4. To perform Reynold's experiment
5. To verify loss of head in pipe flow due to:
 - a) Sudden enlargement
 - b) Sudden contraction
 - c) Sudden bend
6. Demonstration of use of current meter and Pitot Tube
7. To determine coefficient of discharge of a rectangular notch/triangular notch.

Title of the course : Railways, Bridges and Tunnel Engineering
Subject Code : CV-314
 Weekly load : 04
 Credit : 03

LTP 2-0-2

Unit	Course Description	Lectures
Unit-I	RAILWAYS Introduction to Indian Railways. Railway surveys: Factors influencing the railways route, brief description of various types of railway survey. Classification of permanent way describing its component parts. Rail Gauge: Definition, types, practice in India. Rails – types of rails. Rail Fastenings: Rail joints, types of rail joints, fastenings for rails, fish plates, bearing plates. Sleepers: Functions of sleepers, types of sleepers, requirements of an ideal material for sleepers. Ballast: Function of ballast, requirements of an ideal material for ballast. Crossings and signaling: Brief description regarding different types of crossings/ signaling. Maintenance of track: Necessity, maintenance of track, inspection of soil, track and fixtures; maintenance and boxing of ballast maintenance gauges, tools. Earth work and drainage: Features of rail road, bed level, width of formation, side slopes, drains, methods of construction, requirement of drainage system.	16
Unit-II	BRIDGES: Introduction: Bridge – its function and component parts, difference between a bridge and a culvert. Classification of Bridges, Grade Separators, Road Over bridges (ROB), Road under bridge (RUB), Beam type –RCC, T-Beam, steel girder bridges, plate girder and box girder, balanced cantilever, Trussed bridges, Arch type – open spandrel and filled spandrel barrel and rib type, Suspension type – unstiffened and stiffened and table, According to the position of highest flood level submersible and non submersible. IRC classification. Bridge Foundations: Introduction to open foundation, pile foundation, well foundation Piers, Abutments and Wing walls: Piers-definition, parts; types –solid (masonry and RCC), open. Abutments and wing walls – definition, types of abutments(straight and tee), abutment with wing walls (straight, splayed, return and curved). Bridge bearings: Purpose of bearings; types of bearings – fixed plate, rocker and roller, Elastomeric bearings. Maintenance of Bridges: Inspection of bridges, Routine maintenance	9
	TUNNELS Definition and necessity of tunnels. Typical section of tunnels for a national highway and single and double broad gauge railway track. Ventilation –necessity and methods of ventilation, by blowing, exhaust and combination of blowing and exhaust. Drainage method of draining water in tunnels. Lighting of tunnels	7

Recommended Books:

Author(s)	Title	Publisher
Vaswani, NK	Railway Engineering	Anand Publishing House, Roorkee
Rangwala, SC	Railway Engineering	Charotar Book Stall
Deshpande, R	A Text Book of Railway Engineering	Poonam United Book
Algia, JS	Bridge Engineering	Charotar Book Stall

Title of the course : CAD in Civil Engineering
Subject Code : CV-315
 Weekly load : 05
 Credit : 04

LTP 2-1-2

Unit	Course Description	Lectures
Unit-I	Introduction and use of AutoCAD Development of various drawing elements e.g. line, rectangle, circle, surfaces, etc. using AutoCAD Develop plan, elevation, and section of single storey building by using AutoCAD.	16
Unit-II	Development of 3D view of a building. Development of various layouts like electrical, sanitary, water filling using layers concept.	16

Recommended Books:

Author(s)	Title	Publisher
Nighat Yasmin	Introduction to AutoCAD 2014 for Civil Engineering Applications	SDC Publication
Mark Dix, Paul Riley	Discovery AutoCAD 2014	Pearson Publication

Title of the course : Design and Drawing of RCC Structures
Subject Code : CV-316
 Weekly load : 06
 Credit : 04

LTP 2-0-4

Unit	Course Description	Lectures
Unit-I	Introduction: Concept of Reinforced Cement Concrete (RCC). Reinforcement Materials, Introduction to different methods of RCC design: Working stress method and Limit state method. Definitions and assumptions made in limit state of collapse (flexure), Design loads. Stress block, parameters. Shear and Development Length, Shear strength of concrete without shear reinforcement, Maximum shear stress, Shear reinforcement	6
	Singly Reinforced Beams: Basic assumptions and stress strain curve, neutral axis, balanced, under-reinforcement and over reinforced beams, Moment of resistance for singly reinforced beam. Design of singly reinforced beam including sketches showing reinforcement details. Theory and design of singly reinforced beam by Limit State Method	5
	Doubly Reinforced Beams: Theory and design of simply supported doubly reinforced rectangular beam by Limit State Method. Behaviour of T beam, inverted T beam, isolated T beam and 'L' beams (No Numerical).	5
Unit-II	One Way Slab: Theory and design of simply supported one way slab including sketches showing reinforcement details (plan and section) by Limit State Method.	4
	Two Way Slab: Theory and design of two-way simply supported slab with corners free to lift, no provisions for torsional reinforcement by Limit State Method including sketches showing reinforcement details (plan and two sections)	4
	Axially Loaded Column: Definition and classification of columns. Effective length of column. Specifications for longitudinal and lateral reinforcement. Design of axially loaded square, rectangular and circular short columns by Limit State Method including sketching of reinforcement (sectional elevation and plan)	4
	Pre-stressed Concrete: Concept of pre-stressed concrete. Methods of pre-stressing: pre-tensioning and post tensioning. Advantages and disadvantages of pre-stressing.	4

Recommended Books:

Author(s)	Title	Publisher
Punmia, BC	Reinforced Concrete Structure Vol I	Standard Publishers
Ramamurtham, S	Design and Testing of Reinforced Structures	Dhanpat Rai
Singh, Birinder	RCC Design and Drawing	Kapton Publishing

Title of the course : Design and Drawing of RCC Structures Lab
Subject Code : CV-316P

Practical Exercises:

Making Drawings on following:

1. Rectangular beams- singly reinforced, doubly reinforced and cantilever beams with shear reinforcement
2. Slabs- one way, two way slabs with torsional reinforcement and cantilever slabs
3. Columns – square, rectangular and circular columns with isolated footing

Title of the course : Architectural Practices and Interior Design
Subject Code : CV-321
 Weekly load : 07
 Credit : 05

LTP 3-0-4

Unit	Course Description	Lectures
Unit-I (Architectural Practices)	Architectural Design: Review of principles of Architecture, Site selection, climatic conditions, sun control, orientation of building & site and building by laws & its applications.	8
	Building Aesthetics: Feeling for aesthetics and utility, composition, unity, mass composition, order, expression, proportion, scale, accentuation & rhythm, contrast, balance, pattern.	8
	Landscaping: Soft and hard landscaping, basic principle of landscaping, assessment of land, design procedure, a case study of land scape for public/ commercial building campus.	8

Unit-II (Interior Design)	Elements and principles of Interior Design. Elements such as form, texture, light, colour, effect of light on colour and texture, space organization of space in design, space pattern, importance of colour as art element and various colour schemes.	5
	Interior Materials: Different interior materials, paneling, partitions, finishing materials, furniture. False ceiling, flooring, paints.	4
	Interior of Residential building: Use of space, circulation, standard size of furniture. Plans and elevation of interior with furniture for living space, dining space, kitchen, bed room, guest room etc.	5
	Interior of small commercial building: Planning of interior for small commercial units such as offices, consulting chambers, shops etc. Furniture details such as executive table, architectures table etc. used in commercial units.	5
	Town Planning Concepts of habitat including environment pollution, problems of metropolis, satellite town concept; garden city movement; focal points for integrated growth, zoning master plan and neighborhood planning action plans	5

Recommended Books:

Author(s)	Title	Publisher
M. G. Shah, C.M. Kale	Building construction	Tata McGraw Hill
Joseph De Chiara, Julins Panch martin Zelnik	Time saver standard for interior design & space planning	MC Graw Hill
Albert O. Halse	The use of colours in interiors	Mc Graw Hill

Title of the course : Architectural Practices and Interior Design Lab
Subject Code : CV-321P

Practical Exercises

- Scaling objects, Composition of drawings on different sizes of sheets.
- Study of 2D & 3D visual relationships, simple perspective and various geometric forms.
- Study of objects in light and shade, sketching techniques and its applications.
- Basic rendering techniques, rendering of Plans, elevations, sections & graphic Objects in 2D & 3D.
- Sciography of geometrical and architectural forms-shades and shadows on building facades.
- Plan & elevation: Plants, trees, objects, furniture, human beings.
- Landscape studies.
- Building studies, Indoor and Outdoor.
- Study Photography techniques.
- Preparation of Block model of geometrical objects using various types of materials like paper, hardboard, soft board, plastic/PVC sheet, thermocole, clay, plaster of Paris etc).
- Study different types of arches in roof structures like dome, vault, hipped roof, pitched roof etc;
- Clay and sand modeling of organic forms.

Title of the course : Design and Drawing of Steel Structures
Subject Code : CV-322
 Weekly load : 06 LTP 4-0-2
 Credit : 05

Unit	Course Description	Lectures
Unit-I	Structural Steel and Sections Properties of structural steel as per IS Code. Designation of structural steel sections as per IS handbook and IS:800	6
	Riveted Connections Types of rivets, permissible stresses in rivets, types of riveted joints, specifications for riveted joints as per IS 800. Failure of a riveted joint. Assumptions in the theory of riveted joints. Strength and efficiency of a riveted joint. Design of riveted joints for axially loaded members (No Staggered riveting).	7
	Welded connections Types of welds and welded joints, advantages and disadvantages of welded joints design of fillet and butt weld. Plug and slot welds (Descriptive No numerical on plug and slot welds)	7
	Tension Members Analysis and design of single and double section tension members and their riveted and welded connections with gusset plate as per IS:800	6
	Compression Members Analysis and design of single and double angle sections compression members (struts) and their riveted and welded connections with gusset plate as per BIS:800	6
Unit-II	Roof Trusses Form of trusses, pitch of roof truss, spacing of trusses, spacing of purlins, connection between purlin and roof covering. Connection between purlin and principal rafter (no design, only concept)	10

	Columns Concept of buckling of columns, effective length and slenderness ratio, permissible stresses in compression as per IS: 800 for different end conditions. Analysis and Design of axially loaded single section steel column. Types of column bases (Descriptive only). Beam and column, frame and seated connections (descriptive only, no design)	11
	Beams Analysis and design of single section simply supported laterally restrained steel beams. Introduction to plate girder and functions of various elements of a plate girder Fabrication and Erection of Steel Structures like trusses, columns and girders. Masonry structures – Design of brick column and wall foundations	11

Recommended Books:

Author(s)	Title	Publisher
Duggal, SK	Design of Steel Structures	Standard Publishers
Birinder Singh	Steel Structures Design and Drawing	Kaption Pub.house
Ram Chandra	Design of Steel Structures	Standard Publishers
LS Negi	Design of Steel Structure	Tata McGraw Hill

Title of the course : Design and Drawing of Steel Structures Lab
Subject Code : CV-322P

PRACTICALS:

DRAWINGS:

- Column beam connection drawings: a) Beam to beam b) Beam to column c) Column bases- slab base and gusseted base.
- Drawing of a roof truss with detail of joints for the given shape and span of truss.
- Drawing of plan and elevation of a riveted plate girder with details at the supports and connections of stiffness

Title of the course : Construction Machinery and Equipment
Subject Code : CV-323
 Weekly load : 04
 Credit : 04

LTP 3-1-0

Unit	Course Description	Lectures
Unit-I	General: Factors affecting selection of equipment, economic life of equipment, maintenance and repair cost.	7
	Earth Moving Equipment: Tractors, crawlers, bull dozers, rippers, scrapers, power shovels, dragline, hoes, trenching machines.	8
	Hauling, Hoisting & Transporting Equipment: Hoists, Winches, Cranes, Belt conveyors, Ropeways, trucks, wagons, capacities of trucks and wagons, effect of grade, rolling resistance and altitude on the cost/performance of hauling equipment.	9
Unit-II	Drilling, Blasting and Tunnelling Equipment : Definition of terms, bits, Jackhammers, Drifters, wagon drills, piston drills, blast hole drills, shot drills, diamond drills, tunnelling equipment, selecting the drilling method equipment; selecting drilling pattern;	8
	Pile Driving Equipment: Pile hammers, selecting a pile hammer, loss of energy due to impact, Energy losses due to causes other than impact.	8
	Construction Plants: Plants for grading, batching, mixing, types of mixers, concrete pumps, RMC plant, Wet Mix plant, Hot Mix plant.	8

Recommended Books:

Author(s)	Title	Publisher
Arora S.P. and Bindra S.P	Building Construction, Planning Techniques and Method of Construction	Dhanpat Rai
Sharma S.C	Construction Equipment and Management	Khanna Publishers
Deodhar, S.V	Construction Equipment and Job Planning	Khanna Publishers
Maresh Varma	Construction Equipment and its Planning and Application	Metropolitan Book Company

Title of the course : Earthquake Resistant Building Construction
Subject Code : CV-324
 Weekly load : 03
 Credit : 03

LTP 3-0-0

	Course Description	Lectures
Unit-I	Elements of Engineering Seismology: General features of tectonic of seismic regions. Causes of earthquakes, Seismic waves, earthquake size (magnitude and intensity), Epicentre, Seismograph, Classification of earthquakes, Seismic zoning map of India, Static and Dynamic Loading, Fundamental period. Seismic Behavior of Traditionally- Built Constructions of India. Performance of building during earthquakes and Mode of failure (Out-of-plane failure, in-plane failure, Diaphragm failure, Connection failure, Non-structural components failure). Special construction method, tips and precautions to be observed while planning, designing and construction of earthquake resistant building	24
Unit-II	Introduction to IS: 4326, IS: 13828, IS: 1893(Part 1), 154326 and IS: 13920 (latest edition). Seismic Provision of Strengthening and Retrofitting Measures for Traditionally-Built Constructions, Brick and RCC Structures. Provision of reinforcement detailing in masonry and RC constructions. Disaster Management: Disaster rescue, psychology of rescue, rescue workers, rescue plan, rescue by steps, rescue equipment, safety in rescue operations, debris clearance and casualty management	24

Recommended Books:

<i>Author(s)</i>	<i>Title</i>	<i>Publisher</i>
Jai Krishana & AR Chandrasekaran	Elements of Earthquake Engineering	Sarita Parkashan Meerut
RL Weigel	Earthquake Engineering	Prentice Hall Inc.
BL Gupta and NL Arora	Building Construction	Satya Prakashan