

SANDIP UNIVERSITY, SIJOL, MADHUBANI
II SEMESTER DIPLOMA IN CIVIL ENGINEERING

Skill Based Diploma in Engineering Course

SURVEYING (CE201T)

Subject Code CE201T	Theory						Credits 03	
	No. of Periods Per Week			Full Marks				
	L	T	P/S	ESE	:	70		
	03	—	—	TA	:	10		
	—	—	—	CT	:	20		

Contents : Theory

	Name of the Topic	Hrs/week	Marks
Unit -1	<p>TYPES OF SURVEY DEFINITION. OBJECTS OF SURVEYING,. PRINCIPLES OF SURVEYING. USES OF SURVEY, CLASSIFICATION OF SURVEYING. PRIMARY –PLAIN, GEODETIC. SECONDARY – BASED ON INSTRUMENTS, METHOD, OBJECT, NATURE OF FIELD.</p>	04	06
Unit -2	<p>Chain & Cross Staff Survey PRINCIPLE OF CHAIN SURVEY .STUDY AND USE OF INSTRUMENTS FOR LINEAR MEASUREMENTS – CHAIN, TAPE, RANGING ROD, ARROWS, PEGS , CROSS STAFF , OPTICAL SQUARE , LINE RANGER. RANGING –DIRECT AND INDIRECT RANGING CHAINING – PLAIN AND SLOPING GROUNDS. Chain Triangulation – Survey Station and their Selections, Survey lines, Check lines, Tie lines, base line. Taking offsets .long and short offset, degree of offset. OBSTACLES IN CHAINING. CHAIN & CROSS STAFF SURVEY FOR FINDING AREA OF A FIELD (NUMERICAL PROBLEMS) ERRORS IN CHAIN SURVEYING & APPLYING CORRECTIONS FOR CHAIN & TAPE (NUMERICAL PROBLEMS). CONVENTIONAL SIGNS RELATED TO SURVEY. Advanced Survey Equipments</p>	08	14
Unit – 3	<p>COMPASS SURVEY PRINCIPLE OF COMPASS SURVEY. BEARING OF LINES – MERIDIAN –TRUE, MAGNETIC, AND ARBITRARY. BEARING –FORE BEARING, BACK BEARING, WHOLE CIRCLE BEARING, QUADRANTAL BEARING SYSTEM AND REDUCED BEARING, CONVERSION OF BEARINGS, FINDING INCLUDED ANGLES FROM BEARINGS. PRISMATIC COMPASS – COMPONENT, CONSTRUCTION AND USE. LOCAL ATTRACTION, CAUSES, PRECAUTIONS TO BE TAKEN TO AVOID AND CORRECTION OF BEARINGS AFFECTED DUE TO LOCAL ATTRACTION, CALCULATION OF INCLUDED ANGLES. TRAVERSING – OPEN TRAVERSE, CLOSED TRAVERSE, CHECK ON OPEN AND CLOSED TRAVERSE. GRAPHICAL ADJUSTMENT FOR</p>	12	16

	<p>CLOSING ERROR. NUMERICAL PROBLEMS ON CALCULATION OF BEARINGS, ANGLES AND LOCAL ATTRACTION.</p> <p>Tacheometric Survey</p>		
Unit – 4	<p>Levelling 4.1 Definitions – Level surface, Level line, horizontal line, Vertical line, Datum surface , Reduced level, Bench mark and its types .</p> <p>DUMPY LEVEL –COMPONENTS, CONSTRUCTION, LINE OF SIGHT, LINE OF COLLIMATION, BUBBLE TUBE AXIS, LEVELLING STAFF – TELESCOPIC AND FOLDING TYPE .FORESIGHT, BACK SIGHT, INTERMEDIATE SIGHT, CHANGE POINT, HEIGHT OF COLLIMATION .</p> <p>FUNDAMENTAL AXES AND THEIR RELATIONSHIP RECORDING IN LEVEL BOOK. TEMPORARY ADJUSTMENTS OF DUMPY LEVEL. METHOD OF REDUCTION OF LEVELS – HEIGHT OF INSTRUMENT METHOD AND RISE AND FALL METHOD. ARITHMETICAL CHECKS, NUMERICAL PROBLEMS, COMPUTATION OF MISSING READINGS. CLASSIFICATIONS OF LEVELLING - SIMPLE, DIFFERENTIAL, PROFILE, CROSS SECTIONAL, FLY AND CHECK LEVELLING. STUDY AND USE OF TILTING LEVEL & AUTO LEVEL. SOURCES AND ERRORS IN LEVELLING, PRECAUTIONS AND DIFFICULTIES FACED IN LEVELLING.</p>	16	20
Unit – 5	<p>CONTOURING DEFINITIONS – CONTOUR, CONTOUR INTERVAL, HORIZONTAL EQUIVALENT. CHARACTERISTICS OF CONTOURS .METHOD OF LOCATING CONTOURS. INTERPOLATION OF CONTOURS. ESTABLISHING GRADE CONTOURS. USES OF CONTOUR MAPS. INTERPRETATION OF TYPICAL CONTOUR SHEETS.</p> <p>Plane Table Survey</p>	04	08
Unit – 6	<p>AREA AND VOLUME MEASUREMENTS CONSTRUCTION AND USE OF POLAR PLANIMETER FOR MEASUREMENT OF AREA AND SIMPLE NUMERICAL PROBLEMS. Aerial Survey and Remote sensing</p>	04	06
	<p>STUDY AND USE OF DIGITAL PLANIMETER .CONCEPT OF COMPUTATION OF VOLUME BY TRAPEZOIDAL AND PRISMOIDAL FORMULAE. (NO NUMERICAL PROBLEMS)</p>		
	TOTAL	48	70

Text / Reference Books:-

Titles of the Book	Name of Authors	Name of the Publisher
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Surveying and Levelling	N.N.BASAK	Tata Mc Graw-Hill
SURVEYING AND LEVELLING PART I AND II	T .P. Kanetkar & S. V, Kulkarni	PUNE VIDHYARTHI GRIHA Prakashan
SURVEYING AND LEVELLING VOL. I AND II	Dr. B. C. Punmiya	Laxmi Plublication
TEXT BOOK OF SURVEYING	S.K.Husain, M.S. Nagaraj	S. Chand and company
SURVEYING AND LEVELLING VOL. I AND II	S. K. Duggal	TATA MC GRAW-HILL
PLANE SURVEYING	A.M.Chandra	NEW AGE INTERNATIONAL PUBLISHERS
Surveying	Vinod Kumar	Foundation Publishing

MECHANICS OF STRUCTURES (CE202T)

Subject Code CE202T	Theory						Credits
	No. of Periods Per Week			Full Marks			100
	L	T	P/S	ESE	:	70	03
	03	—	—	TA	:	10	
	—	—	—	CT	:	20	

Contents : Theory

Name of the Topic		Hrs/week	Marks
Unit -1	Stress & Strain Definition of rigid body, plastic body, mechanical properties of metal such as elasticity & elastic limit. Definition of stress, strain, modulus of elasticity, S. I. Unit. Classification of stress, strain, Sign convention. Stress, strain curve for mild steel and HYSD bar , yield stress/ proof stress, Ultimate stress, breaking stress and percentage elongation. Deformation of body due to axial load. Deformation of a Body subjected to axial forces. Deformation of body of stepped c/s due to axial load, max. stress and min. stress induced. Stresses in bars of composite section & deformation. Shear stress, shear strain & modulus of rigidity, complementary shear stress, state of simple shear, punching shear.	10	10
Unit -2	<u>Elastic Constants & Principal Stresses</u> Definition of lateral strain, Poisson's ratio, Change in lateral dimensions Volumetric strain due to uni-axial force and change in volume Biaxial and tri-axial stresses and volumetric strain & change in volume Definition of bulk modulus, volumetric strain. Relation between modulus of elasticity, modulus of rigidity and bulk modulus. Definition of principal planes & principal stresses Principal planes & stress due to bi-axial stress system & due to state of simple shear. (Analytical method only)	08	10
Unit – 3	Shear Force And Bending Moment : Types of beams - cantilever, simply supported, fixed and continuous beams, types of loading- point load, uniformly distributed load, support reactions for determinate structures Concept of shear force and bending moment, sign convention. Relation between bending moment, shear force and rate of loading Shear force and bending moment diagrams for simply supported beams, overhanging beams and cantilever subjected to point loads, UDL and couples, point of contra flexure	08	14
Unit – 4	Moment Of Inertia: Concept of moment of inertia M.I of plane areas such as rectangle, triangle, circle, semicircle and quarter circle Parallel axis and perpendicular axis theorem M.I of composite sections, built up sections, symmetrical and unsymmetrical sections, radius of gyration & polar moment of inertia.	06	10

Unit – 5	<p>Stresses In Beams: Bending Stresses in Beams: Concept of pure bending, theory of simple bending, assumptions in theory of bending, neutral axis, bending stresses and their nature, bending stress distribution diagram, moment of resistance. Application of theory of bending to symmetrical and unsymmetrical sections. Shear stresses in beams: Shear stress equation, meaning of terms in equation, shear stress distribution for rectangular, hollow rectangular, circular sections and hollow circular sections Relation between max. shear stress and average shear stress.</p>	06	10
Unit – 6	<p>Analysis Of Trusses 6.1 Definition frames, classification of frames, perfect, imperfect, redundant and deficient frame, relation between members and joints, assumption in analysis. Method of joint, method of section and graphical method to find nature of forces.</p>	06	10
Unit – 7	<p>Strain Energy Types of loading – gradual, suddenly applied load & Impact load Definition of strain energy, modulus of resilience and proof resilience. Comparison of stresses due to gradual load, sudden load and impact load.</p>	04	06
	Total	48	70

Text /Reference Books:-		
Titles of the Book	Name of Authors	Name of the Publisher
Strength of Materials	F. L. Singer	Harper& Row Publishers
Strength of Materials	R. S. Khurmi	S. Chand & Company Delhi
Mechanics of Structures volume –I & II	S. B. Junnarkar	Charotar Publishing House, Anand.
Mechanics of Structures	Aakash Verma	Foundation Publishing

GEO-TECHNICAL ENGINEERING (CE203T)

Subject Code CE203T	Theory				Credits		
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
	—	—	—	CT	:	20	

Contents : Theory

Name of the Topic		Hrs/week	Marks
Unit -1	Overview Geotechnical Engineering IS definition of soil Importance of soil in Civil Engineering as construction material in Civil Engineering Structures, as foundation bed for structures Field application of geotechnical engineering foundation design, pavement design, design of earth retaining structures, design of earthen dams (brief ideas only)	02	02
Unit -2	Physical Properties of Soil Soil as a three phase system Water content, Determination of water content by oven drying method as per IS code Void ratio, porosity and degree of saturation, density index Unit weight of soil mass – bulk unit weight, dry unit weight, unit weight of solids, saturated unit weight, submerged unit weight Determination of bulk unit weight and dry unit weight by core cutter method and sand replacement method as per IS code Specific gravity, determination of specific gravity by pycnometer. Consistency of soil, stages of consistency, Atterberg's limits of consistency viz. Liquid limit, plastic limit and shrinkage limit, plasticity index. Determination of liquid limit, plastic limit and shrinkage limit as per IS code. Particle size distribution, mechanical sieve analysis as per IS code particle size distribution curve, effective diameter of soil, Uniformity coefficient and coefficient of curvature, well graded and uniformly graded soils. Particle size classification of soils & IS classification of soil	08	20
Unit – 3	Permeability of Soil & Seepage Analysis Definition of permeability Darcy's law of permeability, coefficient of permeability, typical values of coefficient of permeability for different soil Factors affecting permeability Determination of coefficient of permeability by constant head and falling head permeability tests, simple problems to determine coefficient of permeability. Seepage through earthen structures, seepage velocity, seepage pressure, phreatic line, flow lines and equipotential lines. Flow net, characteristics of flow net, application of flow net (no numerical problems)	04	10

Unit – 4	<p>Shear Strength of Soil Shear failure of soil, field situation of shear failure Concept of shear strength of soil Components of shearing resistance of soil – cohesion, internal friction Mohr-coulomb failure theory, Strength envelope, strength equation Purely cohesive and cohesion less soils Laboratory determination of shear strength of soil – Direct shear test, Unconfined compression test & vane shear test, plotting strength envelope, determining shear strength parameters of soil</p>	04	08
Unit – 5	<p>Bearing Capacity of Soils Concept of bearing capacity, ultimate bearing capacity, safe bearing capacity and allowable bearing pressure Terzaghi's analysis and assumptions made. Effect of water table on bearing capacity Field methods for determination of bearing capacity – Plate load test and standard penetration test. Test procedures as Per IS:1888 & IS:2131. Typical values of bearing capacity from building code IS:1904 Definition of active earth pressure and passive earth pressure, structures subjected to earth pressure in the field.</p>	04	08
Unit – 6	<p>Compaction of Soil & Stabilization Concept of compaction, purpose of compaction field situations where compaction is required. Standard proctor test – test procedure as per IS code, Compaction curve, optimum moisture content, maximum dry density, Zero air voids line. Modified proctor test Factors affecting compaction Field methods of compaction – rolling, ramming & vibration and Suitability of various compaction equipments. California bearing ratio, CBR test, significance of CBR value Difference between compaction and consolidation Concept of soil stabilization, necessity of soil stabilization Different methods of soil stabilization – Mechanical soil stabilization, lime stabilization, cement stabilization, bitumen stabilization, fly-ash stabilization</p>	06	14
Unit – 7	<p>Site Investigation And Sub Soil Exploration Necessity of site investigation & sub-soil exploration. Types of exploration – general , detailed. Method of site exploration open excavation & boring Criteria for deciding the location and number of test pits and bores Disturbed & undisturbed soil samples for lab testing. Field identification of soil – dry strength test, dilitancy test & toughness test Empirical correlation between soil properties and SPT values.</p>	04	08
Unit – 8	Liquefaction	03	06
	Total	30	70

Text/Reference Books:-		
Titles of the Book	Name of Authors	Name of the Publisher
Soil Mechanics & Foundation Engineering	Dr. B. C. Punmia	Standard Book house, New Delhi
Soil Mechanics & Foundation Engineering	Murthi	Tata McGraw Hill , New Delhi
Soil Mechanics	B. J. Kasmalkar	Pune Vidhyarti Griha, Pune
Geo-technical Engineering	Gulhati & Dutta	Tata McGraw Hill , New Delhi
Geo Technical Engineering	Kuldep Singh	Foundation Publishing

TRANSPORTATION ENGINEERING (CE204T)

Subject Code CE204T	Theory						Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
	—	—	—	CT	:	20	

Contents: Theory

	Name of the Topic	Hrs/week	Marks
Unit -1	<p>Overview of Transportation Engineering Role of transportation in the development of nation. Modes of transportation system – roads, railway, airways, waterways, Importance of each mode, comparison and their relative merits and demerits. Necessity & importance of Cross drainage works for roads & railways.</p>	02	04
Unit -2	<p>Railway Engineering. Alignment and Gauges Classification of Indian Railways, zones of Indian Railway. Alignment- Factors governing rail alignment. Rail Gauges – types, factors affecting selection of gauge. Rail track cross sections – standard cross section of BG & M.G Single & double line in cutting and embankment. Permanent ways Ideal requirement, component parts. Rails – function & its types. Rail Joints – requirements, types, Creep of rail , causes & prevention of creep. Sleepers – functions & Requirement, types – wooden, metal, concrete sleepers & their suitability, sleeper density. Ballast – function & different types with their properties, relative merits & demerits. Rail fixtures & fastenings – fish plate, bearing plates, spikes, bolts, keys, anchors & anti creepers. Railway Track Geometrics. Coning of wheels, tilting of rails, Gradient & its types, Super elevation limits of Super elevation on curves, cant deficiency negative cant, grade compensation on curves. Branching of Tracks Definition of point & crossing, a simple split switch turnout consisting of points and crossing lines. Sketch showing different components, their functions & working. Line sketches of track junctions-crossovers, scissor cross over, diamond crossing, triangle. Inspection of points and crossings Station and Yards : Site selection for railway stations, Requirements of railway station, Types of stations (way side, crossing, junction & terminal) Station yards , types of station yard, Passenger yards, Goods yard Locomotive yard – its requirements, water column , Marshalling yard – its types. Track Maintenance- Necessity, types, Tools required and their function, orgnisation, duties of permanent way inspector, gang mate, key man</p>	18	26

Unit – 3	<p>Bridge Engineering :</p> <p>Site selection and investigation Factors affecting selection of site of a bridge. Bridge alignment Collection of design data Classification of bridges according to function, material, span, size, alignment, position of HFL.</p> <p>Component parts of bridge. Plan & sectional elevation of bridge showing component parts of , substructure & super structure. Different terminology such as effective span, clear span, economical span, waterway, afflux, scour, HFL, freeboard, etc. Foundation – function, types Piers-function, requirements, types. Abutment – function, types Wing walls – functions and types. Bearing – functions, types of bearing for RCC & steel bridges. Approaches –in cutting and embankment. Bridge flooring- open and solid floors</p> <p>Permanent and Temporary Bridges- Permanent Bridges - Sketches & description in brief of culverts, causeways, masonry, arch, steel, movable steel bridges, RCC girder bridge, prestressed, girder bridge, cantilever, suspension bridge. Temporary Bridges- timber, flying, floating bridges</p> <p>Inspection & Maintenance Of Bridge. Inspection of bridges Maintenance of bridges & types – routine & special maintenance.</p>	18	26
Unit – 4	<p>Tunnel Engineering.</p> <p>Definition, necessity, advantages, disadvantages Classification of tunnels. Shape and Size of tunnels Tunnel Cross sections for highway and railways Tunnel investigations and surveying –Tunnel surveying locating center line on ground, transferring center line inside the tunnel. Shaft - its purpose & construction. Methods of tunnelling in Soft rock-needle beam method, fore-poling method. line plate method, shield method. Methods of tunnelling in Hard rock-Full-face heading method, Heading and bench method, drift method. Precautions in construction of tunnels Drilling equipments-drills and drills carrying equipments Types of explosives used in tunnelling. Tunnel lining and ventilation.</p>	10	14
	Total	48	70

Text /Reference Books:-

Titles of the Book	Name of Authors	Name of the Publisher
Railway Engineering	S.C. Saxena	Dhanpatrai & sons
Railway Track	K.R. Antia	The New Book Co. Pvt. Ltd Mumbai
Principles of Railway Engineering	S.C. Rangwala	Charotar Publication
Principles and Practice of Bridge Engineering	S.P. Bindra	Dhanpatrai & sons
A Text Book of Transportation Engineering	N.L. Arora and S.P. Luthra	IPH New Delhi
Elements of Bridge Engineering	J.S. Alagia	Charotar Publication
Bridge Engineering	D.R. Phatak	Everest Publisher

Elements of Bridges	D. Johnos Victer	Oxford & IBH Publishing co.
Road, Railway and Bridges	Birdi & Ahuja.	Std. Book House
Tunnel Engineering	S.C. Saxena	Dhanpatrai & sons
Explosive Engineering	C. B. Navalkar	--
Transportation Engineering	Bipin Sinha	Foundation Publishing
2. IS / International Codes. : IS 4880, I.S. 5878, Part-I to X.		

HYDRAULICS (CE205T)

Subject Code CE205T	Theory						Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
	—	—	—	CT	:	20	

Contents: Theory

Name of the Topic		Hrs/week	Marks
Unit -1	<p>Properties Of Fluid Definition of fluid, Difference in behavior of fluid with respect to solids. Introduction to fluid mechanics and hydraulics, Branches of hydraulics- Hydrostatics and hydrodynamics, Importance of Hydraulics with respect to Irrigation and Environmental engineering. Physical properties of fluid Mass density, Weight density, Specific volume, Specific gravity, Surface tension and capillarity, Compressibility, Viscosity, Newton's law of viscosity – Dynamic and kinematics viscosity. Ideal and Real liquids</p>	04	06
Unit -2	<p>HYDROSTATIC PRESSURE Free liquid surface, Definition of pressure and its SI unit Hydrostatic pressure at point, Pascal's law Variation of pressure in horizontal and vertical direction in static liquid Pressure diagram. Total hydrostatic pressure and center of pressure, Determination of total pressure & center of pressure on vertical & inclined faces of dams, sluice gates, sides and bottom of water tanks, Determination of total hydrostatics pressure & center of pressure on sides and bottom of tank containing two liquids. Determination of net hydrostatic pressure and center of pressure on vertical surface in contact with liquid on either side. Numerical Problems.</p>	08	10
Unit – 3	<p>Measurement Of Liquid Pressure In Pipes Concept of pressure head and its unit, Conversion of pressure head of one liquid in to other devices for pressure measurements in pipes – Piezometer, U-tube manometer, Bourdon's pressure gauge. Principle of working and limitations. Measurement of pressure difference using differential manometer – U-tube differential manometer and inverted U-tube differential manometer. Numerical Problems.</p>	04	06
Unit – 4	<p>Fundamentals Of Fluid Flow Concept of flow, Gravity flow and pressure flow. Types of flow – steady and Unsteady, uniform and non-uniform, Laminar and turbulent. Various combinations of flow with practical examples, Reynolds number and its application, Stream line and equi- potential line. Flow net and its uses Discharge and its units Continuity equation for fluid flow. Datum head, pressure head, velocity head and total head, Bernoulli's theorem, Loss of head and modified Bernoulli's theorem, Impulse momentum theorem Numerical Problems.</p>	06	08

Unit – 5	<p>Flow Of Liquid Through Pipes Loss of head due to friction, Darcy-Weisbach Equation Friction factor, relative roughness. Moody's diagram and its use. Common range of friction factor for different types of pipematerial. Minor loss of head in pipe flow- loss of head due to sudden Contraction, sudden expansion, gradual contraction & expansion, at entrance and exit of pipe in various pipe fittings. Pipes in series and parallel Equivalent pipe – Dupuit's equation Hydraulic gradient line and Energy gradient line, Siphon pipe. Water hammer in pipes – cause effects and remedial measures Use of Nomograms for design of water distribution system. Numerical</p>	07	10
Unit – 6	<p>Flow Through Open Channel Types of channels- artificial & natural, purposes of artificial channel, Different shapes of artificial channels Geometrical properties of channel section–wetted area, wetted Perimeter, hydraulics radius Prismatic channel sections, steady- uniform flow through prismatic channel section. Chezy's equation and Manning's equation for calculation of discharge through an open channel, common range of values of Chezy's constants and Manning's constant of different types of channel surfaces. Most economical channel section, conditions for most economical channel sections. Froud's number and its significance. Critical, sub-critical and supercritical flow in channel Hydraulic jump its occurrence in field, uses of hydraulic jump.</p>	07	14
Unit – 7	<p>Flow Measuring Devices Velocity measuring devices for open channels. Floats-surface, sub- surface and float rod, Pitot tube – principle, expression for velocity Current meter-cup type & propeller type Discharge measuring devices for channels , Notches -Types of notches, expression for discharge. Francis formula, end contraction and velocity of approach Weirs - Broad crested weir, ogee spillway, and expression for discharge. Flumes - Venturi flume, standing wave flume, expression for discharge. Velocity area method for measurement of discharge through open channels. Discharge measuring devices for pipes. Venturimeter – Component parts, principle of working, Study and use of Water meter Flow through orifice Orifice- Definition and use, Types of orifice based on various criteria. Coefficient of contraction, coefficient of velocity and coefficient of discharge, Relationship between them. Discharge through small sharp-edged circular orifice Determination of hydraulic coefficient of orifice. Numerical.</p>	08	10
Unit – 8	<p>Hydraulic Machines Pumps - Definition and types. Suction head, delivery head, static head and manometric head. Centrifugal pump - component parts and their functions, principle of working, priming. Reciprocating pump - component parts and working. Submersible pump and Jet pump. Selection and choice of pump. Computation of power required for pumps. Turbines - Definition and types.</p>	04	06
	Total	48	70

Text/Reference Books:-		
Titles of the Book	Name of Authors	Name of the Publisher
Hydraulics & Fluids Mechanics	Dr. P.N.Modi & Dr. S.M.Seth	Standard Book House, Dehli
Hydraulics & Fluids Mechanics	S.Ramamrutham	Dhanpat Rai & Sons, Delhi
A Text Book of Hydraulics, Fluids Mechanics Hydraulics Machines	R.S.Khurmi	S.Chand & Company Ltd. New Delhi
A Text Book of Fluids Mechanics Hydraulics Machines	R.K.Rajput	S.Chand & Company Ltd. New Delhi
Fluids Mechanics Hydraulics	Dr. Jagdish Lal	Metropolitan Book Co. Private Ltd. New Delhi
Hydraulics Laboratory Manual	S.K.Likhi	T.T.T.I. Chandhigrah
Flow Through open Channels	K.G. Ranga Raju	Taio McGraw. Hill Publishing Company Ltd. New Delhi.
Hydraulics	B.K. Singh	Foundation Publishing

SURVEYING LAB(CE206P)

Subject Code CE206P	Practical					Credits
	No. of Periods Per Week			Full Marks	:	50
	L	T	P/S	ESE	:	50
	—	—	04	Internal	:	15
	—	—	—	External	:	35
						01

CONTENTS : PRACTICAL

SKILLS TO BE DEVELOPED:

INTELLECTUAL SKILLS:

- 1) IDENTIFY THE DIFFERENT INSTRUMENTS FOR LINEAR MEASUREMENT AND LEVELLING
- 2) RECORD AND OBSERVING NECESSARY OBSERVATION WITH THE SURVEY INSTRUMENTS
- 3) CLASSIFY AND DISCRIMINATING VARIOUS TYPES OF SURVEY INSTRUMENTS.
- 4) IDENTIFY THE ERRORS OF THE SURVEY INSTRUMENTS.

MOTOR SKILLS:

1. MEASURE DISTANCES, BEARINGS AND FINDING REDUCED LEVELS WITH SURVEY INSTRUMENTS.
2. PREPARE DRAWING USING SURVEY DATA.
3. PREPARE CONTOUR MAP OF A GIVEN TERRAIN/TOPOGRAPHY.
4. MEASURE AREA OF AN IRREGULAR SHAPE FIGURE WITH PLANIMETER.

INSTRUCTIONS:

- 1) GROUP SIZE FOR SURVEY PRACTICAL WORK SHOULD BE MAXIMUM 6 STUDENTS.
 - 2) EACH STUDENT FROM A GROUP SHOULD HANDLE THE INSTRUMENT INDEPENDENTLY TO UNDERSTAND THE FUNCTION OF DIFFERENT COMPONENTS AND USE OF THE INSTRUMENT.
 - 3) DRAWING, PLOTTING SHOULD BE CONSIDERED AS PART OF PRACTICAL.
 - 4) ONE FULL DAY PER PROJECT IS REQUIRED FOR CARRYING OUT PROJECT WORK.
- Practical SHALL CONSIST OF RECORD OF ALL PRACTICAL AND PROJECTS IN FIELD BOOK AND DRAWING OF PROJECT WORK ON FULL IMPERIAL SIZE DRAWING SHEETS.
 - 1) MEASUREMENT OF DISTANCES WITH CHAIN & TAPE ON GROUND WITH DIRECT OR INDIRECT RANGING.
 - 2) CONSTRUCTION AND USE OF OPTICAL SQUARE AND OPEN CROSS STAFF FOR SETTING OUT PERPENDICULAR AND RUNNING A SURVEY LINE FOR LOCATING DETAILS .
 - 3) MEASUREMENT OF AREA BY CHAIN AND CROSS STAFF SURVEY.
 - 4) USE OF PRISMATIC COMPASS AND OBSERVING FORE BEARING AND BACK BEARING.
 - 5) MEASURING FORE BEARING AND BACK BEARING OF 5-6 SIDE CLOSED POLYGON. IDENTIFYING STATIONS AFFECTED BY LOCAL ATTRACTION AND CALCULATION OF CORRECTED F.B. & B.B.
 - 6) MEASURING FORE BEARING AND BACK BEARING FOR AN OPEN TRAVERSE (5 TO 6 SIDED). CALCULATE DIRECT ANGLES BETWEEN SUCCESSIVE LINES.
 - 7) USE OF DUMPY LEVEL, TEMPORARY ADJUSTMENTS AND TAKING READING ON LEVELLING STAFF. RECORDING READINGS IN FIELD BOOK.
 - 8) Total Station
 - 9) DIFFERENTIAL LEVELLING PRACTICE, REDUCTION OF LEVEL BY RISE & FALL METHOD, H.I. METHOD.
 - 10) CARRYING BENCH MARK FROM ONE POINT TO ANOTHER POINT ABOUT 200 M BY FLY LEVELLING WITH TILTING LEVEL.
 - 11) USE OF AUTO LEVEL AND TAKING OBSERVATION.
 - 12) MEASUREMENT OF AREA OF IRREGULAR FIGURE BY POLAR PLANIMETER
 - 13) MEASURING AREA ENCLOSED BY CLOSED CONTOURS ON CONTOUR MAP PREPARED EARLIER, BY SIMPLE DIGITAL PLANIMETER

List Of Projects:

- 1) Plane table survey project for 5-6 sided traverse and locating details of buildings , Roads etc. by radiation and Intersection method , Sheet to be drawn by each student separately on A-1 size imperial drawing sheet.

- 2) Theodolite traverse Survey for a closed traverse of 5-6 sides for a small area. Computation by Gale's traverse table. Plotting the traverse with details on A1 size imperial drawing sheet.

- 3) Setting out simple circular curve by Rankine's method of Deflection angles for a given problem and plotting the details of curve on A-1 size imperial drawing sheet

MECHANICS OF STRUCTURE LAB (CE207P)

Subject Code CE207P	Practical			Credits		
	No. of Periods Per Week			Full Marks	:	50
	L	T	P/S	ESE	:	50
	—	—	03	Internal	:	15
	-	-	-	External	:	35

Contents : Practical

Skill to be developed:

Intellectual Skills:

1. Interpret the results.

Calculate design parameters.

Motor Skills:

1. Observe the phenomenon during testing of specimen.
2. Draw the graphs and diagrams.

List of Practical:

Group – A (Any Six)

1. Identify the components of universal testing machine & tension test on mild steel.
2. Tension test on tor steel / deformed bars.
3. Izod Impact test on mild steel, brass, copper and cast iron.
4. Charpy impact test on mild steel, brass, copper and cast iron.
5. Flexural test on timber.
6. Flexure test on floor tiles or roofing tiles.
7. Shear Test on metal.
8. Water Absorption & Compression test (Dry & Wet) on bricks
9. Abrasion Test on flooring tiles.

Group - B

1. Drawing of Shear force and Bending Moment diagrams on Graph Paper (6 Problems)
2. Graphical Solution of Two Problems on simple frames i) Cantilever
ii) Simply supported on A2 size sheet with their analytical solutions

GEO TECHNICAL ENGG. LAB (CE208P)

Subject Code CE208P	Practical			Credits		
	No. of Periods Per Week			Full Marks	:	50
	L	T	P/S	ESE	:	50
	—	—	02	Internal	:	15
	-	-	-	External	:	35

Contents: Practical

Skills to be developed:

Intellectual Skills:

- a. Identify properties of soil.
- b. Interpret test results.
- c. Follow IS procedure of testing.

Motor Skills:

- a. Measure the quantities accurately.
- b. Handle the instruments carefully.

List of Practical (Any ten):-

1. Determination of water content of given soil sample by oven drying method as per IS Code.
2. Determination of bulk unit weight dry unit weight of soil in field by core cutter method as per IS Code.
3. Determination of bulk unit weight dry unit weight of soil in field by sand replacement method as per IS Code.
5. Determination of Liquid limit & Plastic limit of given soil sample as per IS Code.
6. Determination of grain size distribution of given soil sample by mechanical sieve analysis as per IS Code.
7. Determination of coefficient of permeability by constant head test
8. Determination of coefficient of permeability by falling head test
Practical (Live demo or Prerecorded demo)
9. Determination of shear strength of soil using direct shear test.
10. Determination of shear strength of soil using Laboratory Vane shear test
11. Determination of MDD & OMC by standard proctor test on given soil sample as per IS Code.
12. Determination of CBR value of given soil sample.
13. Determination of shear strength of soil using unconfined compressive strength.
14. Determination of shear strength of soil using tri-axial shear test.

HYDAULICS LAB (CE209P)

Subject Code CE209P	Practical						Credits
	No. of Periods Per Week			Full Marks	:	50	02
	L	T	P/S	ESE	:	50	
	—	—	04	Internal	:	15	
-	-	-	External	:	35		

Contents : Practical

Skills to be developed:

Intellectual Skills:

- a. Interpret test results
- b. Calculate quantities of parameters
- c. Draw graphs

Motor Skills:

- a. Measure different parameters accurately
- b. Adjust levels by operating valves

List of Practical:

1. Measurements of pressure and pressure head by Piezometer, U-tube manometer
2. Measurement of pressure difference by U-tube differential manometer. Study of bourdon's gauge
3. Verification of Bernoulli's theorem
4. Reynolds experiment to study types of flow.
5. Determination of Darcy's friction factor for a given pipe
6. Determination of Minor losses in pipes (any two)
7. Study and use of Moody's diagram, Nomogram of Manning's equation
8. Determination of Manning's constant or Chezy's constant for given rectangular channel section.
9. Demonstration of Hydraulic jump
10. Determination of coefficient of discharge for given rectangular or triangular notch.
11. Determination of coefficient of discharge for a given Venturimeter.
12. Demonstration and use of Pitot tube and current meter
13. Determination of hydraulic coefficients for sharp edge orifice.
14. Study & use of water meter.
15. Study of a model of centrifugal and reciprocating pump.
16. Use of characteristic curves/ nomograms /charts / catalogs from manufactures for selection of pump for the designed discharge and head (Refer IS: 9694)

COMPUTER AIDED DRAWING – TW (CE211P)

Subject Code CE211P	Term Work						Credits
	No. of Periods Per Week			Full Marks	:	25	02
	L	T	P/S	Internal	:	07	
	—	—	03	External	:	18	

CONTENTS: TERM WORK

	Name of the Topic	Hrs/week
Unit -1	CAD Software Meaning, various CAD software available in the market AutoCAD, Felix Cad, Auto Civil, 3D Max ; etc.) Starting up of CAD, CAD Window, Tool bar, Drop down menu, Command window, Saving the drawing. Introduction of Graphic screen.	
Unit -2	CAD Commands WCS icon, UCS icon, co-ordinates, drawing limits, grid, snap, ortho features. Drawing commands, line, circle, polyline, multiline, ellipse, polygon etc. Editing commands – Copy, move, offset, fillet, chamfer, trim, lengthen, mirror, rotate, array etc. Working with hatches, fills, dimensioning, text etc.	
Unit – 3	Submission / Working Drawing Generation of line plan, Detailed Plan, elevation, section, site plan, Area statement Generation of 3D view and print commands Introduction to Auto Civil , 3D Max.	

Note: Above theoretical aspects should be covered in the practical periods.

A) Building Drawing:

Following exercises shall be completed with CAD software and Print of all the drawings should be prepared on A3 / A4 size paper

- 1) Preparation of line plan of a residential building.
- 2) Preparation of line plan of a Public building.
- 3) Preparation of detailed plan of a small residential building.
- 4) Preparation of submission drawing of residential building – showing Plan, Elevation, Section, Schedule of openings, Site Plan and Area Statement

B) Civil Engineering Drawing.

Preparation of Drawings with CAD software for the following exercises (Any THREE) and Print of all the drawings should be prepared on A3 /A4 size paper.

- 1) Plan, Cross Section and Longitudinal section of a Culvert (Pipe culvert/Box Culvert).
- 2) Section of an Earthen Dam.
- 3) Plan and Section of K. T. Weir.
- 4) Cross Section of Retaining wall.
- 5) Bonds in brickwork – Plan and Elevation for English bond and Flemish bond for one brick thick wall.
- 6) Cross Section of ESR.
- 7) Cross Section of Clarri-flocculator.

Text Reference Books:-		
Titles of the Book	Name of Authors	Name of the Publisher
Reference Manual of AutoCAD	AutoDesk	
Reference Manual of Felix cad	Felix CAD	
Reference Manual of Intel CAD	--	
Reference Manual of Auto Civil	--	
Reference Manual of 3D- Max	--	
Computer Aided Drawing	R.C. Tayal	Foundation Publishng