DRAFT SYLLUBUS OF DIPLOMA ENGINEERING

(3rd Semester to 6th Semester)

BRANCH : CIVIL ENGINEERING

Under

TRIPURA UNIVERSITY

(A Central University)

Suryamaninagar

DRAFT SYLLABUS OF THE

CIVIL ENGINEERING

(3RD TO 6TH SEMESTER)

Curricular Structure

3rd Semester

Sl. No	Theoretical Paper					Sessional / Practical paper			
	1st half (50mark)	2nd half (50 mark)	Mark	CPW	Credit	Name of Sessional / practical	Mark	CPW	Credit
i	Building materials & Construction (DCE-301)		100	4	4	Computer aided design & drafting – I (DCE-305S)	100	4	2
ii	Hydraulics & Hydraulic structure (DCE-302)		100	4	4	Quantity surveying (DCE-306S)	100	4	2
iii	Field surveying (DCE-303)		100	3	3	Civil engineering Drawing - I (DCE-307S)	100	4	2
iv	Quantity surveying (DCE-304)		100	3	3	Civil engineering lab – I (DCE-308S)	100	3	2
v						Field surveying practice - I (DCE-309S)	100	4	2
vi						Hydraulics Lab (DCE-310S)	100	3	2
			400	14	14		600	22	12

CPW = Contact hour Per Week (for Theory, Tutorial, & Sessional/practical)

4th Semester

Sl. No	Theoretical Paper					Sessional / Practical paper			
	1st half (50mark)	2nd half (50 mark)	Mark	CPW	Credit	Name of Sessional / Lab	Mark	CPW	Credit
i	Irrigation engineering (DCE-401)		100	4	4	High way Material Testing laboratory (DCE-405S)	100	4	2
ii	STRENGTH OF MATERIALS & THEORY OF STRUCTURES (DCE-402)		100	3	3	Concrete Testing laboratory (DCE-406S)	100	4	2
iii	Water & Waste Water Engineering (DCE-403)		100	4	4	Industrial/field visit – I (DCE-407S)	100	3	2
iv	Costing, contract & valuation (DCE-404)		100	3	3	Civil Engineering Drawing -II (DCE-408S)	100	4	2
v						Public Helth Engineering Laboratory. (DCE-409S)	100	4	2
vi						Communication Skill (DCE-410S)	100	3	2
			400	14	14		600	22	12

Total marks : 2000 @ 1000 per semester , Number of Contact periods : 36 per week , Total Credit : 52 @ 26 per semester

Student should under go Industrial training for at least 2 week duration, corresponding grade for 2 credit (as received from industry) will be reflected on 5th semester grade card.

5th Semester

Sl. No	Theoretical Paper					Sessional / Practical paper			
	1st Half (50mark)	2nd Half (50 mark)	Mark	CPW	Credit	Name of Sessional / Lab	Mark	CPW	Credit
i	Industrial Management DHU-501	Entrepreneurship Development DHU501	100	4	4	Civil engineering Drawing – III DCE-504S	100	5	2
ii	Soil mechanics DCE- 501		100	3	3	Civil engineering lab – II DCE-505S	100	4	2
iii	Structural design & Detailing-I- DCE-502		100	4	4	PROJECT -I DCE-506S	100	4	2
iv	Transportation engineering DCE-503		100	3	3	Field surveying practice - II DCE-507S	100	4	2
v						Computer aided design & drafting-II DCE – 508S	100	4	2
vi.						Industrial/field visit.-II DCE-509S	100		
			400	14	14		600	22	12

6th Semester

Sl. No	Theoretical Paper					Sessional / Practical paper			
	1st half (50mark)	2nd half (50 mark)	Mark	CPW	Credit	Name of Sessional / practical	Mark	CPW	Credit
i	Professional ethics & values DHU-601	Optimisation Technique - DHU-601	100	4	4	Civil engineering drawing – IV DCE-604S	100	4	2
ii	Structural design & Detailing-IIDCE-601		100	4	4				
iii	Concrete Technology DCE-602		100	3+1T	3	Civil engineering laboratory – III DCE-605S	100	4	2
						PROJECT -II DCE-606S	200	7	4
iv	Elective DCE-603 Opt. any one of the following • Advanced Transportation Engineering – DCE-604/1 • Foundation engineering- DCE-604/2		100	3	3	Advanced Transportation Engineering Laboratory -DCE-607/1S Foundation engineering Laboratory – DCE 607/ 2 S	100	4	2
v						Generic Skill	50	2	1
vi						Final Viva DCE-610S	50	-	1
	Total		400	14	14		600	22	12

Total marks : 2000 @ 1000 per semester , Number of Contact periods : 36 per week , Total Credit : 52 @ 26 per semester

Sl. No	Theoretical Paper					Sessional / Practical paper			
	1st half (50mark)	2nd half (50 mark)	Mark	CPW	Credit	Name of Sessional / practical	Mark	CPW	Credit
i	Building materials & Construction (DCE-301)		100	4	4	Computer aided design & drafting – I (DCE-305S)	100	4	2
ii	Hydraulics & Hydraulic structure (DCE-302)		100	4	4	Quantity surveying (DCE-306S)	100	4	2
iii	Field surveying (DCE-303)		100	3	3	Civil engineering Drawing - I (DCE-307S)	100	4	2
iv	Quantity surveying (DCE-304)		100	3	3	Civil engineering lab – I (DCE-308S)	100	3	2
v						Field surveying practice - I (DCE-309S)	100	4	2
vi						Hydraulics Lab (DCE-310S)	100	3	2
			400	14	14		600	22	12

BUILDING MATERIALS & CONSTRUCTION(DCE-301)

Total Marks : 100, Credit : 4 , CPW :4

DETAIL COURSE CONTENT

Group –A (1st half)

BUILDING MATERIALS

BRICKS AND TILE

Manufacture – Classification – Quality requirements

Special bricks**:** Uses only on heavy duty burnt clay bricks — Fly ash bricks burnt — Clay hollow bricks — Acid resistance bricks — Fire clay bricks — Refractory bricks

STONES

Sources — Classification: Geological, Physical & Chemical with examples and use — Strength and tests — Quality requirement

LIME AND LIME PRODUCTS

Classification of lime — Properties and specific uses — Slaking and setting of lime

SAND

Sources of sand**:** Pit, River & Sea — Coarse, medium & fine sand with their uses — Characteristics of good quality sand for mortar and concrete work — Function of sand in mortar and concrete — Bulking of sand

CEMENT

Definition of Portland Cement — Ingredients of Portland Cement — Common proportions and their functions

Different types of cement**:** Ordinary Portland Cement, Rapid Hardening Cement, Low Heat Portland Cement, Blast Furnace Slag Cement, Pozzolona Cement, High Strength Cement, Sulphate Resisting Cement, White & Coloured Cement (Properties & uses only) — Different grade of cement

Field test for cement — Stacking and storing of cement — Precautionary measures

MORTAR

Cement–sand mortar – usual proportions and specific uses — Lime *surki* & lime-sand mortar – usual proportions and specific uses — Composite mortar – usual proportion and specific uses — Mud mortar – composition and use

CONCRETE

Definition and chief ingredients of concrete — Lime-concrete – ingredients used and their qualities, different mix proportions and their specific use in construction

Cement-concrete — Coarse and fine aggregates — Binding materials — Characteristics of good quality coarse aggregates, recommended size of coarse aggregate for various concrete works, fineness modulus of coarse aggregates — Characteristics of good quality fine aggregates — Grading and fineness modulus

Specification and function of water in concrete, slump of concrete – its determination and recommended values for various works — Water cement ratio: Definition, its effect on strength of concrete — Curing of concrete

Controlled concrete and ordinary concrete — Nominal mix proportions — Grades of concrete and their specific uses

TIMBER

Definition — Characteristics of good quality timber — Names of commonly used good quality timbers and their specific uses in construction — Defects in timber — Decay and diseases (short discussion only)

Seasoning of timber – object, common methods of seasoning — Natural & artificial preservation of timber – common methods — Timber products & substitute

METALS AND OTHER ENGINEERING MATERIALS

Characteristics and uses of**:** Cast Iron, Mild Steel, High Tensile Steel (HTS), HYSD, Alloy Steel — Uses of**:** Expanded metal, IRC fabric, Cast Aluminium, Brass, Polymer, Plain & Frosted Glass, Tar & Bitumen

PAINTS AND VARNISHES

Definition — Object and characteristics of good paint — Composition of oil bound paint**:** Bases, Vehicle, Filler, Solvent & Pigment — Types of various paints, characteristics and uses — Method of applying paint to different surfaces — Varnishes: Definition, composition and uses

Group-B (2^{ND} HALF)

BUILDING CONSTRUCTION

CONSTRUCTION PLANNING AND STORAGE OF MATERIALS

Definition of construction planning, planning techniques, advantages, networking technique only (in brief) — Storage of materials at site (necessity only)

FOUNDATION

Concept of foundation — Object of foundation — Determination of width and depth of foundation

Different types of foundation used at specific locations (no details of constructions) — Causes of failure of foundation

BRICKS AND STONE MASONRY

Brick masonry — Technical terms used in brick masonry — Bonding — Object of bonding — Different types of bonding — Their uses at specific location

General principles and precautions in brick masonry work — Mortar, tools and equipment used in brick masonry works

Brick corbel — Reinforced brickwork**:** Its advantages & uses over ordinary brickwork — Brick parapet**:** Object of providing it — Thickness of walls**:** Factors governing it

Stone masonry — Classification**:** Rubble & Ashlars – Their characteristics and uses – Mortar with usual proportion — List of tools and equipment used in stone masonry

DAMP PROOFING

Dampness — Causes of dampness & its effects — Prevention of dampness — Materials used for damp proofing

Damp proof course used for basement and at plinth — Damp proofing of roofs — Illustrative sketches1

LINTEL AND ARCHES

Lintels – its advantages and classification

Arches — Object of providing it — Parts of an arch — Classification of arches (schematic sketches) — Comparison between arches and lintels

ROOFS AND ROOF COVERINGS

Classification of roofs**:** Flat roof and pitched roof — Different types of merits and demerits of flat & pitched roof

Roof coverings**:** Thatch, Slates, Tiles, A.C. Sheet, G.C.I. Sheet – their specific uses

DOORS AND WINDOWS

Doors**:** Names of different types — Their uses at specific locations

Windows**:** Names of different types — Their uses at specific locations

SCAFFOLDING

Object of scaffold — Names of different types of scaffold — Their specific uses — Different parts of a brick layer's scaffold & mason's scaffold — Advantages of steel scaffold over timber scaffold

STAIR AND STAIRCASES

Definition and object of stair — Names of different parts of a stair — Requirements of a good stair — Standard dimensions — Classification of different types of a stair with illustrative simple line sketches, their uses at specific locations

FLOORING

Floor — Object of a floor — Name of different types of floors — Their uses at various locations

Composition and construction details of artificial stone flooring — Terrazzo or mosaic flooring

WALL FINISH

Plastering & Pointing — White & Colour Washing — Distempering & cement based painting — Object, composition and uses at specific locations

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HYDRAULICS & HYDRAULIC STRUCTURE(DCE-302)

DETAIL COURSE CONTENT

Total Marks : 100, Credit : 4 , CPW :4

Ist half

HYDRAULICS

INTRODUCTION

Definition of Hydraulics, Hydrostatics and Hydrodynamics

FLUID PROPERTIES**:** Density, Specific Weight, Specific Gravity, Viscosity, Surface Tension — Ideal fluid and real fluid

FLUID STATIC

FLUID PRESSURE**:** Hydrostatics Law, Pressure Head, Absolute & Gauge Pressure, Vacuum Pressure

MEASUREMENT OF PRESSURE BY GAUGES**:** Piezometer tube, simple and differential manometer — Working principles and simple problems related to engineering application

STATIC FLUID PRESSURE ON PLANE SURFACE**:** Total pressure & centre of pressure on horizontal, vertical and inclined immersed surface, rectangular and circular surface — Simple problems related to engineering application in sluice gate & lock gate

FLUID FLOW

TYPES OF FLUID FLOW**:** Steady and unsteady flow, uniform and non-uniform flow, laminar and turbulent flow — Reynolds's number, rate of flow, mean velocity and continuity equation

ENERGY OF FLOWING FLUID**:** Pressure energy, kinetic energy & potential energy — Bernoulli's Theorem**:** Statement and explanation only (no proof) — Hydraulic and energy gradient — Simple problems

FLUID MEASUREMENT

FLOW THROUGH ORIFICES**:** Types of orifice — Vena contracta — Co-efficient of contraction, velocity and discharge — Discharge through sharp small orifices — Numerical problems

VENTURIMETER, ORIFICE METER & PITOT TUBE**:** Purpose of such instruments, short description and direct application of formula to solve simple problems (no deduction)

FLOW OVER NOTCHES**:** Difference between orifice and notch — Derivation of discharge formula over rectangular and V-notch — Numerical problems

FLOW OVER WEIR**:** Difference between weir and notch — Derivation of discharge formula over rectangular weir — Numerical problems

FLOW THROUGH PIPES

Darcy Weisbach formula for frictional head loss in pipe

MINOR LOSSES IN PIPE FLOW**:** Loss due to sudden enlargement and contractions — Losses at entrance in the pipe and at exit of pipe, pipe bends, pipe fittings, application of formula directly — Solution of simple problems for losses in pipe

Energy and hydraulic gradient lines for flow through pipes

OPEN CHANNEL FLOW

Definition of open channel — Wetted perimeter — Hydraulic mean depth — Computation of discharge through an open channel — Statement of Chezy's formula — Manning's formula and Kutter's formula — Critical velocity, CVR, design of canal for a given discharge (using Kennedy's and Kutter's formula) — Numerical problems

Condition of maximum discharge through the channel of rectangular and trapezoidal section

Definition and expression for specific energy, critical depth, critical velocity, super critical and sub critical flow — Numerical problems

Hydraulic jump — Numerical problems

2nd half

HYDRAULIC STRUCTURE

STORAGE DAM

Types of dams — Choice of type of dam — Determination of height

GRAVITY DAMS**:** General principles of design, low and high dams, forces acting — Stability and stresses in gravity dams — Uplift, foundation treatment and drainage galleries

EARTHEN DAMS**:** Homogeneous type, zoned type, diaphragm type (labelled sketches with suitability) — Causes of failure of earthen dam — Drainage of dam & its foundation — Core wall and cut-off wall

Rock fill dams — Arch dams — Composite dams (Definition and sketch only)

SPILL WAYS**:** Definition, function, types — Spillway gates

RIVER INTAKE

Introduction, various types and general principles of their hydraulic design

CANAL STRUCTURE

CROSS DRAINAGE WORKS**:** Aqueducts – Super Passage – Siphon – Syphon Aqueduct – Level Crossings — Definitions, function and label sketches

CANAL FALL**:** Definition, function, typical sketches of two most common types

VENTURI FLUMES**:** Definition, function, labelled sketch only

RIVER TRAINING WORKS

Definition, object, different types of river training works — Spars, Groynes, Mattresses, Aprons, Bell's Band, Levels — Description, use and typical sketches

Different measures for maintaining minimum depth of navigation

BRIDGES AND CULVERTS

Introduction, general principles of hydraulic design, alignment, selection of site, number of spans

Water way calculation, scour depth, afflux clearance depth of foundation – Definition and principles only

Box and pipe culverts, cause ways and submersible bridges – Definition, use and typical sketches only

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F I E L D S U R V E Y I N G (DCE-303)

Total Marks : 100, Credit : 3 , CPW :3

D E T A I L C O U R S E C O N T E N T

First half

INTRODUCTION

Definition and object of surveying

Primary divisions of surveying

Classification of surveying

Principles of surveying

Measurements, units of measurements

Work of the surveyor

Scales

LINEAR MEASUREMENTS

Method of determining distances

Instruments for measurements of distance and their use Engineers, Gunter's & metric chain, & other minor instruments

Ranging out survey lines, line ranger

Methods of chaining survey lines**:** (i) on level ground (ii) on sloping ground

Degree of accuracy in chaining

Errors and mistake in chaining

Numerical Problem on correction in chain and tape measurements

CHAIN SURVEYING

Triangulation & traversing

Chain triangulation

Reconnaissance, fixing stations well conditioned triangle

Chain line, check line, tie line, base line, etc.

Offsets

Booking field notes.

Right angle setting in field, use of cross staff and optical square and with chain and tape

Obstacles in chaining
Numerical problems on chaining past obstacles
Plotting. Calculation of areas
Demonstration of Mouza map & use

COMPASS SURVEYING

Compass traverse
Methods of traversing
Instruments for measurement of angles, Clinometers, Ghat tracer etc.
Bearing of lines, designation of bearings-relation of included angles and bearing latitude and departure
Local attraction-causes, effects & elimination
Dip of the needle, magnetic declination-causes
Traversing with chain and compass
Plotting of the traverse
Closing error and its adjustment
Errors in compass surveying
Numerical problems

PLANE TABLE SURVEYING

Definition, objects and suitability
Equipment necessary in plane table surveying
Advantage and disadvantage of plane table surveying
Setting up of the plane table
Methods of plane table surveying

COMPUTATION OF AREAS

Methods of computation of areas
Determination of area from Mouza map
Numerical problems

COMPUTATION OF VOLUME

Method of computation of volumes
Numerical problems

LEVELLING

Definition of terms used in levelling,Types of levels
Types of levelling staff, Temporary adjustment of dumpy level
Principles of levelling, Bench mark, reduced level, level surface and horizontal surface
Booking staff readings ,Classification of levelling
Profile levelling, Errors due to curvature & refraction and corrections for them
Reciprocal levelling, Levelling difficulties
Errors in levelling precautions, Precision of levelling
Permanent adjustment of dumpy level, Numerical problems

CONTOURING

Definition of different terms,Characteristics of contour line
Uses of contour map, Methods of contouring
Computation of volume by spot level & contours.

CURVE SETTING

Classification of curve, simple, compound, reverse and transition curves
Degree of curvature, relation between radius and degree of curvature
Elements of simple circular curve and vertical curve
Setting out curve by Rankine's method of tangential angles- (one & two theodolite method

Q U A N T I T Y S U R V E Y I N G(DCE-304)

Total Marks : 100, Credit : 3 , CPW :3

D E T A I L C O U R S E C O N T E N T

First half

DEFINITION OF AN ESTIMATE AND TYPES

Definition of an estimate and its different types — Factors to be considered during preparation of a detailed estimate — Units of dimensions for materials and works and mode of measurement for different items of works and materials with the background of BIS-1200 — Degree of accuracy in estimate method of measurement for different items of works and materials

SYMMETRICAL & UNSYMMETRICAL BOUNDARY WALL (USING MODULAR & TRADITIONAL BRICKS)

Symmetrical and unsymmetrical boundary wall using both modular & traditional bricks following any method.

CENTRE LINE, LONG WALL & SHORT WALL METHOD WITH EXAMPLE

Centre line or "out to out" and "in to in" method — Underground masonry water tank/septic tank by any methods

DEFINITION OF FLOOR AREA, CARPET AREA, PLINTH AREA, FAR

Definition of floor area, carpet area, plinth area, covered area and F.A.R.

ESTIMATE OF DIFFERENT ITEMS OF WORKS INVOLVED IN A SINGLE STOREY RESIDENTIAL BUILDING :-

Quantity estimate of different items of work involved in a single storey double-roomed masonry building showing front varandah, one kitchen and one W.C. & bath.

2nd half

ESTIMATE OF R.C.C. BEAMS, CHUJIA, LINTEL AND SLAB (ONE WAY & TWO WAY REINFORCEMENT) SHOWING BAR BENDING SCHEDULE)

Bar bending schedule for reinforcement calculation in standard proforma including calculation of volume of concrete of beams, chajja, lintel and slab, quantity of shuttering for R.C.C. work.

CALCULATION OF QUANTITY OF MATERIALS OF DIFFERENT ITEMS OF WORKS

Calculation of quantity of materials of different items of works namely**:** Brick work – Cement concrete works – Timber work – Plastering – Painting – Flooring

CALCULATION OF VOLUME OF EARTH WORK OF DIFFERENT WORKS

Mid-section formula, Trapezoidal formula or Average end formula, Prismoidal formula and its applications in case of earth work calculation in roads both in cutting and in embankment, tanks and irrigation canals (with no transverse slope).

COMPUTER AIDED DESIGN & DRAFTING – I

(DCE-305S)(Sessional)

Total Marks : 100, Credit : 2 , CPW :4

DETAIL COURSE CONTENT

GETTING STARTED – I

Starting AutoCAD – AutoCAD screen components – Starting a drawing: Open drawings, Create drawings (Start from scratch, Use a template & Use a wizard) – Invoking commands in AutoCAD – Drawing lines in AutoCAD – Co-ordinate systems: Absolute co-ordinate system, Relative co-ordinate system – Direct distance method – Saving a drawing: Save & Save As – Closing a drawing – Quitting AutoCAD

GETTING STARTED – II

Opening an existing file – Concept of Object – Object selection methods: Pick by box, Window selection, Crossing Selection, All, Fence, Last, Previous, Add, Remove – Erasing objects: OOPS command, UNDO / REDO commands – ZOOM command – PAN command, Panning in real time – Setting units – Object snap, running object snap mode – Drawing circles

DRAW COMMANDS

ARC command – RECTANG command – ELLIPSE command, elliptical arc – POLYGON command (regular polygon) – PLINE command – DONUT command – POINT command – Construction Line: XLINE command, RAY command – MULTILINE command

EDITING COMMANDS

MOVE command – COPY command – OFFSET command – ROTATE command – SCALE command – STRETCH command – LENGTHEN command –TRIM command – EXTEND command – BREAK command – CHAMFER command – FILLET command – ARRAY command – MIRROR command –MEASURE command – DIVIDE command – EXPLODE command – MATCHPROP command – Editing with grips: PEDIT

DRAWING AIDS

Layers – Layer Properties Manager dialog box – Object Properties: Object property toolbar, Properties Window – LTSCALE Factor – Auto Tracking – REDRAW command, REGEN command

CREATING TEXT

Creating single line text – Drawing special characters – Creating multiline text – Editing text – Text style

BASIC DIMENSIONING

Fundamental dimensioning terms: Dimension lines, dimension text, arrowheads, extension lines, leaders, centre marks and centrelines, alternate units – Associative dimensions – Dimensioning methods – Drawing leader

INQUIRY COMMANDS

AREA – DIST – ID – LIST – DBLIST – STATUS – DWGPROPS

EDITING DIMENSIONS

Editing dimensions by stretching – Editing dimensions by trimming & extending – Editing dimensions: DIMEDIT command – Editing dimension text: DIMTEDIT command – Updating dimensions – Editing dimensions using the properties window – Creating and restoring Dimension styles: DIMSTYLE

HATCHING

BHATCH, HATCH commands – Boundary Hatch Options: Quick tab, Advance tab – Hatching around Text, Traces, Attributes, Shapes and Solids – Editing Hatch Boundary – BOUNDARY command

BLOCKS

The concept of Blocks – Converting objects into a Block: BLOCK, _BLOCK commands – Nesting of Blocks – Inserting Blocks: INSERT, MINSERT commands – Creating drawing files: WBLOCK command – Defining Block Attributes – Inserting Blocks with Attributes – Editing Attributes

PLOTTING DRAWINGS IN AUTOCAD

PLOT command – Plot Configuration – Pen Assignments – Paper Size & Orientation Area – Plot Rotation & Origin – Plotting Area – Scale

PRACTICE WITH COMPLETE DRAWING

Each student is required to prepare a set of orthographic projections of a building designed by himself / herself in the First Year Second Semester in the subject "BASIC DESIGN" or of any other design approved by the teacher-in-charge.

Q U A N T I T Y S U R V E Y I N G

(DCE-306S) (S E S S I O N A L) Total Marks : 100, Credit : 2 , CPW :4

D E T A I L C O U R S E C O N T E N T

ESTIMATE OF DIFFERENT ITEMS OF WORKS INVOLVED IN A TWO-STORED RESIDENTIAL BUILDING

Discuss only difference of writing items with single storied building (Details Estimate included in project work.)

ESTIMATE OF SLAB CULVERT ,BOX CULVERT & HUME PIPE CULVERT

For estimate of slab culvert ,box culvert & Hume pipe same dimension may be taken from C.E Drawing Sessional work.

ESTIMATE OF A MANHOLE

A manhole according to BIS-411 or Tripura PWD /CPWD standard.

ESTIMATE OF DOORS & WINDOWS

Details estimate of wooden, glass and aluminium doors and windows.

ESTIMATE OF A PLINTH PROTECTION & SURFACE DRAIN WORKS

Estimate of suitable plinth protection of a building including surface drain.

WRITING OF SPECIFICATION

Writing of specification in a simple way of the following items of work with P.W.D schedule background: —

(i) Earth work in excavation, (ii) Foundation concrete, (iii) Brick work in foundation and superstructure, (iv) Damp-proof course, (v) R.C.C. Roof, (vi) Plastering and pointing, (vii) Flooring, (viii) Door/window shutters and frame, (ix) Painting to wood work and steel work, (x) White washing.

RATE ANALYSIS

Define purpose of rate – factor affecting the rate analysis procedure of rate analysis, schedules of rate, prepare analysis of rates of the following: —

(i) Earth work, (ii) Brick work, (iii) Flooring, (iv) Roofing, (v) Plastering and pointing, (vi) Timber doors and windows, (vii) White wash, colour wash, painting and distempering, (viii) Cement concrete and R.C.C. work, (ix) Sanitary and plumbing, (x) Structural steel work and grills, (xi) Roads (pre-mix chipping carpets, seal coat).

C I V I L E N G I N E E R I N G D R A W I N G – I(DCE-307S)

Total Marks : 100, Credit : 2 , CPW :4

(sessional)

D E T A I L C O U R S E C O N T E N T

BRICKS & BRICK BONDING

DIFFERENT TYPES OF BRICKS**:** Traditional & Modular
DIFFERENT TYPES OF CLOSERS & BATS**:** King Closer — Queen Closer — Bevelled Closer —— Metered Closer — Bull nose Closer — ½ Bat — ¾ Bat,squint brick.
ENGLISH & FLEMISH BOND WITH TRADITIONAL OR MODULAR BRICKS: Corner Walls (1½ brick main with 1½ brick main) — T- Junctions (1½ brick main with 1 brick partition) — Square Pillars (1, 1½, 2 & 2½, brick side) — Half-Brick Thick Wall (stretching bond)
RAKING BOND*:* Diagonal bond — Herring bone bond — Zig-zag bond (1200 mm – 1600 mm wide)

CULVERT

Single span box culvert
Single span Hume pipe culvert showing abutment wing, return wall, parapet, kerb and other accessories. Half sectional top view, half sectional front & side view.

SLOPED ROOF WITH WOODEN ROOF TRUSS

King post
Queen post

Note: Half elevation to be shown with Asbestos / G.C.I. sheet & tiled roofing. Full span line diagram for each truss must be shown. Details of junctions are to be shown in larger scale.

SINGLE STORIED RESIDENTIAL BUILDING

Plan, elevation and section of a single storied small residential building from given sketch (line diagram). The building should have bathroom, latrine, veranda.
Details of foundation plan (layout), roof plan, connection of roof & parapet, lintel & foundation are to be shown.

C I V I L E N G I N E E R I N G L A B – I (DCE-308S)

Total Marks : 100, Credit : 2 , CPW :3

D E T A I L C O U R S E C O N T E N T

MATERIALS TESTING LABORATORY *

Test on bricks: size, shape, colour, hardness, density, percentage water absorption, efflorescence and compressive strength.
Sieve analysis for coarse & fine aggregate.
Test for normal consistency and initial setting time of cement.
Test for compressive strength of cement sand mortar.
Determination of unit weight, bulking factor and percentage void in sand.
Fineness and soundness of cement.
Brick bonding: English bond – Pillars, corner wall, tee-junction & simple Flemish bond.

- *At least 6 laboratory jobs are to be performed in this semester.*

F I E L D S U R V E Y I N G P R A C T I C E - I (DCE-309S)

Total Marks : 100, Credit : 2 , CPW :4

D E T A I L C O U R S E C O N T E N T

CHAIN SURVEYING

Reconnaissance & Preparation of index map.
Selection of stations & finalisation of Traverse.
Ranging a line; chaining a line, taking offsets with tape, setting out right angles with tape, chaining a line across obstacle.
Preparation of chain survey map of a small area available within the campus/vicinity of the institute.

COMPASS SURVEYING

Study of Prismatic compass, setting the compass and measuring bearing of lines. Determining angle between two lines.
Prismatic compass traversing including plotting the traverse and showing graphical adjustment.

PLANE TABLE SURVEYING

Demonstration of accessories and other functions**:** centering, levelling & orientation of plane table
Traversing by plane table and adjustment of closing error graphically.
Plane table surveying of a small area including filling in details by radiation and intersection methods.

LEVELLING

Temporary adjustment of level, taking staff readings.
Longitudinal section including plotting of Profile levelling.

DRAWING PLATES

Chain surveying map
Prismatic compass traversing
Plane table surveying map
Longitudinal section including road alignment.

HYDRAULICS LABORATORY (DCE-310S)

(sessional)

Total Marks : 100, Credit : 2 , CPW :3

D E T A I L C O U R S E C O N T E N T

- To measure pressure of liquid by simple U-tube, manometer and differential manometer.
- To determine the coefficient of discharge through V-notch / rectangular notch.
- To determine the frictional coefficient of circular G.I. pipes.
- To determine the Reynold's number
- To verify Bernoulli's theorem.
- To determine velocity of flow by pittot tube.
- To determine discharge by orificemeter.

(ANY FIVE JOBS)

4th Semester

Sl. No	Theoretical Paper					Sessional / Practical paper			
	1st half (50mark)	2nd half (50 mark)	Mark	CPW	Credit	Name of Sessional / Lab	Mark	CPW	Credit
i	Irrigation engineering (DCE-401)		100	4	4	High way Material Testing laboratory (DCE-405S)	100	4	2
ii	STRENGTH OF MATERIALS & THEORY OF STRUCTURES (DCE-402)		100	3	3	Concrete Testing laboratory (DCE-406S)	100	4	2
iii	Water & Waste Water Engineering (DCE-403)		100	4	4	Industrial/field visit – I (DCE-407S)	100	3	2
iv	Costing, contract & valuation (DCE-404)		100	3	3	Civil Engineering Drawing -II (DCE-408S)	100	4	2
v						Public Helth Engineering Laboratory. (DCE-409S)	100	4	2
vi						Communication Skill (DCE-410S)	100	3	2
			400	14	14		600	22	12

IRRIGATION ENGINEERING(DCE-401)

Total Marks : 100, Credit : 4 , CPW :4

DETAIL COURSE CONTENT

First half

INTRODUCTION

Definition of irrigation, necessity of irrigation, benefits of irrigation, ill effects of irrigation.

Types of irrigation system – general principles of flow, lift, perennial inundation, tank and well irrigation.

Methods of irrigation – surface irrigation, sprinkler irrigation and sub-surface irrigation.

HYDROLOGY

Hydrological cycle – precipitation; evaporation and transpiration losses.

Measurement of rainfall – Symon's rain gauge. Average rainfall over an area. Arithmetical mean method, Thiessen's polygon method and isohytel method, unit hydro graph.

Run off and run off co-efficient, factors affecting run off, rational method of measurement of run off indirectly.

WATER REQUIREMENT OF CROPS

Definition of duty, delta and base period; crop period, crop seasons, crops in India; factors affecting duty; methods of improving duty; relation between duty, delta and base period; rotation of crops, duty for *kharif* and *rabi* crops.

Commanded area, intensity of irrigation, cumecs, capacity factor, time factor, outlet factor, crop ratio, overlap allowance; numerical problems.

CANAL IRRIGATION

Different types of canals; classification of irrigation canal based on – (i) source of supply, (ii) function, (iii) discharge, (iv) alignment.

Different parts of an irrigation canal and their functions, canal sections in cutting, in filling and partly in cutting and partly in filling.

Losses of water in canals – percolation, evaporation and absorption in losses; canal lining – definition, types and advantages of lining, considerations for canal alignment; selection of site for canal off take point.

WELL IRRIGATION

Shallow and deep wells; yield from a well, advantages and disadvantages of well irrigation, simple numerical problems.

2^{nd} half

CANAL HEAD WORKS

Definition, object, general layout and functions of each port.

Weir and barrage – Definition, different between two, general principles of design, various types of weirs, profile of weir wall, up stream apron, down stream talus. Principles governing design and construction of barrages.

Silt and scour – silt analysis, Kennedy's theory of critical velocity, Lacey's theory of uniform flow in canals, application; methods of prevention of silt deposition in canals and reservoirs; scour and its effect & protection, silt excluders and ejectors.

FLOOD CONTROL

Definition of flood, causes of flood, effects of flood.

Methods of flood control – flood control reservoirs, flood walls, channel improvement, flood ways.

WATER LOGGING

Introduction – ill effects of water logging, causes of water logging, factors responsible for water logging.

Anti water-logging measures – preventive measure – names of the different measures with short description; curative measures – names of the different measures with short description.

LAND RECLAMATION

Definition necessity, characteristics of affecting fertility of soils.

Purposes of land reclamation processes; methods of land reclamation – name the methods with brief description.

Land drainage – methods of drainage with brief description mentioning location, construction and cost.

MAJOR IRRIGATION PROJECTS IN INDIA

Name of the different projects with salient points regarding their purpose, object, capacity, components, etc.

STRENGTH OF MATERIALS & THEORY OF STRUCTURES(DCE-402)

Total Marks : 100, Credit : 3 , CPW :3

DETAIL COURSE CONTENT

First half

STRENGTH OF MATERIALS

B.M. & S.F. IN BEAMS

S.F. and B.M. diagrams for beams with an intermediate couple having hinged support at one end and free support at the other end.

BENDING STRESS IN BEAMS

Bending stress in unsymmetrical sections – unequal flanges – I-section, T-section only.

Strength of a section – beam of uniform strength. Simple problems.

SHEARING STRESSES IN BEAMS

Introduction – horizontal sheer stress in beams.

Distribution of shear stress in rectangular section, solid circular section, symmetrical rolled I-section.

Relation between maximum shear stress and average shear stress for rectangular and solid circular section – simple problems.

COLUMNS & STRUTS

Problems for finding critical load by Euler's formula for various kinds of end conditions for columns of: rectangular, circular, symmetrical and asymmetrical steel sections

Rankine–Gordon formula for critical load for various end conditions (no proof) – Related problems — Solution of problems

COMBINED BENDING & DIRECT STRESS

Introduction – direct stress and bending stress, combined direct and bending stress, load eccentricity about one axis and two axis for rectangular section, limit of eccentricity and core of solid and hollow rectangular and circular sections – solution of numerical problems.

Vertical structure subjected to wind pressure – masonry boundary wall – related problems.

COMPOUND & COMPLEX STRESS

Concepts, definition of principal planes and principal stresses. Equation of principal stress on principal planes. Mohr's circle diagram.

STRAIN ENERGY & IMPACT LOADING

Introduction – resilience, proof resilience and modulus of resilience, strain energy in bars in tension and compression for**:** (a) gradually applied load, (b) sudden load, and, (c) impact load.

2nd half

THEORY OF STRUCTURES

DEFINITIONS & GENERAL PRINCIPLES

Introduction, classification of structures, factor of safety and load factor, frame works, criterion for frame works – perfect, redundant and deficient frames. Different types of end supports of frames, concept of statically determinate and indeterminate structures, reactive forces, primary and secondary stresses, self-straining.

PRIMARY STRESS ANALYSIS FOR STATICALLY DETERMINATE PIN JOINTED STRUCTURES

Assumptions made in finding the forces in the members of a perfect frame.

Different methods of finding the forces in the members of a perfect frame – cantilever and simply supported, subjected to loading by**:** (a) graphical method, (b) method of joints, (c) method of sections.

Numerical problems with solutions.

FIXED & CONTINUOUS BEAMS, PROPPED CANTILEVER

FIXED BEAMS**:** To draw Shear Force and Bending Moment diagrams for – (a) uniformly distributed load over whole span, and, (b) point load at any intermediate point within the span — Effect of sinking of a support.

TWO SPAN CONTINUOUS BEAMS**:** To draw Shear Force and Bending Moment diagrams for two equal spans carrying – (a) uniformly distributed load over whole span, and, (b) equal point load at centre of each span; using Clapeyron's Theorem of Three Moments and Slope deflection method.

PROPPED CANTILEVER**:** To find out prop reaction for rigid and elastic prop . To draw Shear Force and Bending Moment diagrams for – (a) uniformly distributed load (partly and fully throughout the span), and, (b) point load at any intermediate position in the span.

MOMENT DISTRIBUTION METHOD

Introduction, stiffness of a member – freely supported or ringed at either end, fixed at one end and freely supported at the other end, distribution factor, carry over factor, relative stiffness.

Application to continuous beams with point load and U.D.L. – S.F. and B.M. diagrams, application to stiff jointed frame – one bay portal frame with hinged and fixed base for vertical load only without sway.

RETAINING WALLS (EARTH RETAINING STRUCTURES)

Introduction – Pressure due to earth, Rankine's theory (statement only), line of resultant thrust, stability check, maximum and minimum, stress intensity at back, nature of stress diagram, minimum base width.

Numerical problems for finding pressure intensity at the base, checking stability for**:**

(a) wall with vertical back and earth surface horizontal and level with top of wall,
(b) in addition to (a) it carries a uniformly distributed super imposed load on top of back fill.

Problems for finding minimum base width.

W A T E R & W A S T E W A T E R E N G I N E E R I N G (DCE-403)

Total Marks : 100, Credit : 4 , CPW :4

D E T A I L C O U R S E C O N T E N T

First half

(Total Period 68 hours)

INTRODUCTION

Hydrological cycle; sources of water; selection of source for a water supply scheme.

GROUND WATER

Ground water table, formation of springs, infiltration galleries and wells. Wells-shallow and deep wells. Tube well – different methods of boring; cutters and strainers-tube well assembly; erection, development of tube well; **QUANTITY OF WATER**

Types of demand – domestic, industrial, fire; variation of demand; population forecast; per capita demand, simple numerical problems.

INTAKE WORKS & TRANSPORTATION OF WATER

Types of intake, type of pipes used for conveyance of water-cast iron, PVC, steel, concrete, prestressed concrete and GI pipes, laying of pipes and their joints.

QUALITY OF WATER

Common impurities in water and their effect; water for human consumption – wholesomeness and platability, water for industrial use; physical, chemical and biological tests of water; water quality standard; water borne diseases.

TREATMENT OF WATER (IN BRIEF)

General flow diagrams of treatment of water, principles of plain sedimentation, coagulation and flocculation, coagulants and chemical equations involved in chemical coagulation, clari-flocculator. Filtration – principle, construction and operation of slow and rapid sand filter. Head loss in filter, negative head, air binding, mud ball formation and remedies. Disinfections – objective, disinfectants, chlorine dose, chlorine demand and residual chlorine, pre and post-chlorination, super chlorination, break point chlorination and chlorination technology in rural water supply. Miscellaneous treatment – removal of taste, odour, color, iron, manganese and hardness.

DISTRIBUTION OF WATER

Gravity system, direct pumping, pumping with overhead storage, layout of distribution system.

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2nd half

Wastewater classification, necessity of systematic collection and disposal of wastewater, separate and combined system of sewerage.

Sewers and sewer appurtenances

Types of sewer – stoneware, cast iron, concrete, masonry sewers – suitability, sizes and standard joints. Appurtenances – manhole, lamp hole, drop manhole, street inlets, catch basin, ventilating shaft – their location, functions and constructions, wastewater pumps and pumping stations. Sewer laying – setting out alignment, excavation, checking gradient, preparation of bed; handling, lowering, laying, jointing and testing of sewers and back filling, storm and sanitary sewers with appurtenances including joints.

Quantity of wastewater

Estimation of sanitary wastewater, variability of flow, estimation of storm water-rainfall intensity-frequency-duration curve, time of concentration, run off coefficient, design of sewers.

Wastewater characterisation

Physical, chemical and biological characteristics of wastewater, analysis of wastewater for solids, colour, odour, pH, acidity, alkalinity, biochemical oxygen demand (BOD), chemical oxygen demand (COD), nitrogen, phosphorous, chloride, sulphate, oil and grease, etc.

Wastewater treatment

Treatment objectives, primary treatment – screen, commutator, grit chamber, skimming tank, primary clarifier, secondary treatment – biological treatment, principles, activated sludge process (including aeration tank and air diffusers), trickling filter, oxidation ditch, aerated lagoon, stabilization pond – aerobic, anaerobic and facultative – mechanism and treatment, secondary clarifier, sludge digestion tank, sludge drying bed, septic tank – description, actions and design including soak pit and soak trench; waste farming.

C O S T I N G , C O N T R A C T & V A L U A T I O N (DCE-404)

Total Marks : 100, Credit : 3 , CPW :3

D E T A I L C O U R S E C O N T E N T

First half

QUANTITY & COST ESTIMATE

Preliminary estimate of a double storied residential building (MIG group) by cubical quantity method, plinth area method, etc.
Quantity and cost estimate of a 50 users septic tank with an inspection chamber and soak pit (discuss design).
Quantity and cost estimate of flexible pavements of 1KM length.
Quantity and cost estimates for sinking one 40mm diameter tube well fitted with hand pump.
Quantity and cost estimate of R.C.C. columns with isolated and combined footings.
Quantity and cost estimate of steel truss (up to 10m span).
Quantity and cost estimate of R.C.C. piles and pile cap.

2nd half

CONTRACTS

Definition of tender and contract — Different types of civil engineering contract — Contract documents — Clauses of general conditions of contracts — Prepare one tender paper set.

PWD ACCOUNTS

Master roll, measurement books,Standard Measurement Book (SMB) ,site order book, imprest and temporary advance cash book, bills and vouchers, issue of materials, materials at site account, suspense accounts,T&P account,

ARBITRATION

Different types of disputes arising during execution of a civil engineering project. Methods to reduce disputes and solving disputes by arbitration.

VALUATION

Definition of different terms – (i) valuation, (ii) value and cost, (iii) scrap value and salvage value, (iv) assessed value (v) speculative value, (vi) sinking fund, (vii) depreciation and obsolescence. Qualifications and functions of a valuer and governing factors affecting the value of a property. Methods of valuation – rental and depreciation.

HIGHWAY MATERIALS TESTING LABORATORY (DCE-405S)

Total Marks : 100, Credit : 2 , CPW :4

DETAIL COURSE CONTENT

- Standard penetration test for bitumen.
- Test for softening point of bitumen by ring & ball apparatus.
- Test for flush point of bitumen by Pensky-Mertens apparatus.
- Determination of crushing value of stone aggregate.
- Determination of hardness property of stone aggregate by Los-Angles Abrasion Test/Attrition.
- Determination of impact value of stone.
- Determination of Flakiness Index.

(ANY *FIVE tests are to be performed).*

CONCRETE TESTING LABORATORY (DCE-406S)

Total Marks : 100, Credit : 2 , CPW :4

- Determination of slump of different concrete mixture.
- Determination of compaction factor of concrete.
- Compressive strength by cube/cylinder.
- Non-destructive testing by Rebound Hammer / Pulse Velocity.
- Mix-design.
- Compressive Strength Of Cement.

(ANY *FIVE tests are to be performed).*

Industrial / field Visit – I (DCE-407S)

Total Marks : 100, Credit : 2 , CPW :3

Every students have to undergo at least four local Industrial training / field visits during the semester & submit report thereon & would be evaluated accordingly.

C I V I L E N G I N E E R I N G D R A W I N G – II (DCE-408S)

(sessional) Total Marks : 100, Credit : 2 , CPW :4

D E T A I L C O U R S E C O N T E N T

Sheet – 1 ***Doors & Windows***

i) Ledged, braced and battened windows/door.
ii) 1/3rd panelled & 2/3rd panelled or glazed window.
iii) Panelled (full) door.
iv) 1/3rd glazed and 2/3rd Venetian (fixed) window.
v) Fully glazed window.

Sheet – 2 & 3 ***Two storied residential building***

Sheet – 2 with load bearing wall
Sheet – 3 with framed structure

Plans, elevation and sections through stair, W.C. & bath of two storied residential building showing plumbing layout. (Plans should include site plan, foundation layout plan, ground floor plan, first floor plan, roof plan. The Sheet-III should show the foundation plan, grid plan and sectional elevation of the framed structure only for one / two alignments through the W.C. & bath and stair case longitudinally or transversely, which ever is more important). Application of AutoCAD.

PUBLIC HEALTH ENGINEERING LAB(DCE_409S)

Total Marks : 100, Credit : 2 , CPW :3

D E T A I L C O U R S E C O N T E N T

- To determine the turbidity of water by turbidity meter.
- To determine the solid content of water.
- To determine the electrical conductivity by conductivity bridge.
- To determine the pH of water by pH meter / colour compactor.
- To determine the alkalinity of water.
- To determine the arsenic content of water.
- To determine the iron content of water.
- To determine the chloride content of water.
- To determine the hardness of water.
- To determine the total coliform

[ANY five tests are to be performed,]

COMMUNICATION SKILL LAB(DHU-400S)

Total Marks : 100, Credit : 2 , CPW :3

(sessional)

D E T A I L C O U R S E C O N T E N T

LOOKING FOR A JOB

Identifying Sources — Skimming Newspapers for Information

JOB INTERVIEWS *

Preparing for an interview — Responding Appropriately — Group Discussions — Using Language Effectively for Interaction

* Mock interviews are to be arranged and to be conducted by any suitable person

AT THE WORKPLACE

Preparations of CV, performance testing on the skill of writing business and official letters, memos and tenders etc., presentation skill, preparations of instruction manuals, maintenance of office files and correspondences etc.

TEXT BOOK AND OTHER RECOMMENDED BOOKS

ENGLISH SKILLS for Technical Students – TEACHERS' HANDBOOK / West Bengal State Council of Technical Education in collaboration with THE BRITISH COUNCIL / Orient Longman – Business Correspondence and Report Writing, by Krishna Mohan & C. Sharma – Business Correspondence, by V.G. Natu and C Kaur – Professional Communication Skills, by Pravin Bhatia and A.M. Shaikh – A Guide to Business Correspondence and Communication Skills, by A.N. Kapoor – English Grammer, by Wren & Martin.

Sl. No	Theoretical Paper					Sessional / Practical paper			
	1st Half (50mark)	2nd Half (50 mark)	Mark	CPW	Credit	Name of Sessional / Lab	Mark	CPW	Credit
i	Industrial Management DHU-501	Entrepreneurship Development DHU501	100	4	4	Civil engineering Drawing – III DCE-504S	100	5	2
ii	Soil mechanics DCE- 501		100	3	3	Civil engineering lab – II DCE-505S	100	4	2
iii	Structural design & Detailing-I - DCE-502		100	4	4	PROJECT -I DCE-506S	100	4	2
iv	Transportation engineering DCE-503		100	3	3	Field surveying practice - II DCE-507S	100	4	2
v						Computer aided design & drafting-II DCE – 508S	100	4	2
vi.						Industrial/field visit.-II DCE-509S	100		
			400	14	14		600	22	12

INDUSTRIAL MANAGEMENT

(DHU 501) 1ST HALF , Full Marks: 50, Credit : 2, CPW: 2

Introduction to Management Science

Principles & functions of management — Contributions of F.W. Taylor, Henry Fayol, Max Weber in development of the theories of management science.

Organisational Behaviour

Objectives — Brief introduction to: Motivation– Perception – Leadership & Leadership Styles – Communication – Team Building – Work Culture.

Human Resources Management

Scope & Functions – Human Resources Planning – Selection & Recruitment – Training & Development – Performance Appraisal .

Production & material Management

Production Planning: Routing – Loading – Scheduling — Production Control: Expediting – Dispatching — Materials Handling Inventory Management Inventory Management —Productivity — Quality Management: Tools & Techniques – Quality Management System.:

Financial Management

Financial Ratios — Elements of Costing — Auditing

Marketing & Sales Management

Marketing of products & Services — Advertising & Sales Promotion — Consumer Behaviour

REFERENCE BOOKS

Essentials of Management / Kontz / McGraw-Hill of India
Organization & Behaviour / M. Banerjee / Allied Publishers

Human Behaviour at Work: Organizational Behaviour / Keith Davis & Newstrom / McGraw-Hill of India
Human Resources Management / Mirza Saiyatain / Tata McGraw-Hill
Production Management & Control / Nikhil Bharat / U.N. Dhar & Co.
Production Management / Keith Lockyer / ELBS
Marketing Management / Philip Kolter / Prentice Hall of India
Lectures on Management Accounting / Dr. B.K. Basu / Basusri Bookstall, Kolkata
An Insight into Auditing: A Multi-dimensional Approach / Dr. B.K. Basu / Basusri Bookstall, Kolkata
Business Strategies, Financial Management & Management Accounting / S.K. Poddar / The Association of Engineers (India)

ENTREPRENEURSHIP DEVELOPMENT

(**DHU 501)** , 2ND HALF , Full Marks: 50, Credit : 2, CPW: 2

D E T A I L C O U R S E C O N T E N T

Entrepreneurial Development

Definition of entrepreneurship, Characteristics of entrepreneurship, Factors influencing entrepreneurship, Types and Functions of Entrepreneurs.

Need for promotion of entrepreneurship, Entrepreneurial Environment, Govt. policies for setting-up new small enterprises.

Planning a SSI

What is planning, Types of planning, Importance of planning, Steps in planning.,Steps for starting a small enterprise. ,Commercial Banks and Financial Institutions.

Problems of Small Industries

Power shortages, Project planning, Finance.,Raw materials, Production constraints, Marketing. ,Personal constraints, Regulation., Entrepreneurial Motivation Training, Motivating factors of Entrepreneurs, Achievement Motivation, Institutions assisting entrepreneurs.

R E F E R E N C E B O O K S

Starting your own business, A step-by-step Blue print for the first-time Entrepreneur – Stephen C. Harper, McGraw-Hill
Harward Business Review on Entrepreneurship – Harward Business School Press.
Entrepreneurship Development in small scale – proceedings of National Seminar, DCSSI, New Delhi – Patel, V.G.
Entrepreneurship: Strategies & Resources – Abrams Grant Pass. Oregon: Oasis press.
The Business Planning Guide – David H Bangs, Upstart Publishing Company in Chicago.
Entrepreneurship Development in India – Dr. C.B. Gupta, Dr. N.P. Srinivasan, Sultan Chand & Sons.
Entrepreneurship – Madhurima Lall and Shikha Sahai, Excel Books.

S O I L M E C H A N I C S (DCE-501)

Total Marks-100, CPW-3, Credit -3

DETAIL COURSE CONTENTS

FIRST HALF

Introduction

Definition of soil, soil mechanics, origin and formation of soils and soil categories.
Principles of mechanics applied to soils, importance of soil mechanics.
Application of properties of soils.

Classification of soils

Engineering classification of soil-particle size classification, MIT & BIS classification, textural classification chart.
Measurement of particle size distribution-sieve analysis, pipette method
Particle size distribution curve-characteristics of the curve, uniformity co efficient, co efficient of curvature.

Index properties of soils

Phase diagram for dry, moist and saturated soil.
Definitions- void ratio, porosity, water content, degree of saturation, unit weight, specific gravity, density – bulk density, dry density, submerged density, air content, percentage of air voids.
Inter relation between above properties:-

i) Porosity and void ratio.
ii) Void ratio, water content, degree of saturation and specific gravity.
iii) Unit weight, void ratio, specific gravity, degree of saturation, and unit weight of water.
iv) Dry unit weight, bulk unit weight and moisture content.

Numerical problems on the above properties.

Consistency of soil

Moisture content and volume relationship.
Definition of Atlerborg limits, plasticity index, liquidity index, shrinkage ratio, flow index, toughness index.
Soil classification according to A. Casagradede's plasticity chart.

Permeability of soil

Definition of permeability Darcy's law, co efficient of permeability factors affecting permeability.
Determination of co efficient of permeability by constant head variable head permeameters.

Seepage flow

Concept of seepage flow, flow nets, flow lines, equipotential lines field, flow channel, use of flow net.
Critical hydraulic gradient, quick sand condition and seepage forces.

2ND HALF

Compaction

Definition, determination of optimum moisture content and dry density by proctor's compaction test, importance of compaction and factors influencing compaction.
Field compaction method, field density determination by core cutter method, degree of compaction control.

Consolidation

Definition of consolidation difference between compaction and consolidation.
Principle of consolidation spring analogy, one dimensional consolidation test, time vs. settlement curve; void ratio vs. log p curve; compression index; co efficient of compressibility; coefficient of consolidation.
Utility of consolidation data for calculation of settlement.

Shear strength

Introduction, principal planes and stresses, Mohr's stress circle when an element is subjected to normal stress only.
Definition of shear strength and shear parameters.

Mohr's Coulomb failure theory, relation between major and minor principle stresses, significance of cand ϕ Coulomb's equation.
Field measurement of shear strength.

S T R U C T U R A L D E S I G N & D E T A I L I N G - I(DCE-502)

Total Marks-100, CPW-4, Credit -4

D E T A I L C O U R S E C O N T E N T

FIRST HALF

Introduction

Aim of design
Methods of design-working stress method, ultimate lead method, limit state method.
Durability, workmanship, materials.
Concept of three dimensional structure-determinate type and indeterminate type.

Loads & Forces

General concept of loads on structure
Introduction to IS: 875 (Part-I to Part-V),
Dead load.
Imposed loads, wind load & snow loads
Earthquake forces. – BIS 1893
Shrinkage. Creep and Temperature effect.
Other forces and effects.
Combination of loads
Design load

STRUCTURAL DESIGN BY WORKING STRESS & LIMIT STATE METHODS

Safety & serviceability

General
Limit state of collapse
Limit states of serviceability
Offer limit states

Characteristics and design values and partial safety factors

Characteristic strength of materials
Characteristic loads
Design values
Partial safety factors

Design of rectangular beam in flexure- by Working Stress & Limit State Methods

Introduction
Behaviour of a beam under load
Assumptions
Analysis and design of singly reinforced rectangular sections – balanced section, under reinforced section, over reinforced section- solution of numerical problems.
Doubly reinforced rectangular section – solution of numerical problems.

Analysis & design of flanged beam in flexure-by Working Stress & Limit State Methods

General
Effective width of flange
Design of T-beam with solutions of problems.

Design of beam for shear

Introduction.
Concept of shear stress in beam
Effect of shear stress.
Design of shear reinforcement –vertical stirrups only.
Requirement of shear reinforcement
Solutions of problems.

Design for bond

Introduction
Average bond and local bond stress.
Concept & design for development length of reinforcing steel.
Curtailment of reinforcement – extension beyond the theoretical cut off point, provision for maintaining the shear capacity at cut off region, provision for curtailment of reinforcement for positive moments, provision for curtailment of reinforcement for negative moment, splicing, lapping & anchoring reinforcement bars- solution of numerical problems.

2^{ND} HALF

Design of lintel

Design of lintel for flexure under triangular load only for brick work above it and for it self weight – typical problem solution.
Design of shear reinforcement for lintel – typical problem solution.

Design of slab-by Working Stress & Limit State Methods

Introduction
Design of one way slab – simply supported on either ends and cantilever for flexure with numerical solution of each type.
Design of two way slab (a) with the edges not held down, (b) with the edges held down by using moments coefficient as per table 26 & 27 of IS: 456-2000 with solution of problems for each type.

Design of two flight stair cases

Introduction
Simply supported on edges at landing levels with solution of problem
Supported on landing panels which spans transversely to the flight with solution of problems.

Design of R.C.C. column – by Working Stress & Limit State Methods

Introduction
Design of square. Rectangular and circular sections with concentric axial load.

Design of column foundation – by Working Stress & Limit State Methods

Introduction
Design of isolated column foundation under axial load resting directly on bearing soil, for uniform thickness of the footing slab, with solution.

Prestressed concrete

Introduction to prestressed concrete.
Analysis and design of prestressed rectangular section –simple problem.

T R A N S P O R T A T I O N E N G I N E E R I N G(DCE-503)

Total Marks-100, CPW-3, Credit -3

Course Contents

FIRST HALF

(HIGHWAY ENGG.)

Introduction

History of roads & road development in India
Classification of rural (non-urban) roads as per IRC
Classification of urban roads as per IRC
Terrain classification as per IRC
IRC specification for roads.

Road geometric

Road cross sections in embankment and in cutting.
Cross sectional elements – right-of-way, boundary line, building line, control line, carriage way, shoulder, berm.
Recommended land width for different classes of roads.
Recommended standards for building lines and control lines.
Recommended speeds.
Width of roadway for single lane and two lane roads in – (a) Plain and rolling terrain, and (b) mountainous & Steep terrain.
Width of carriage way.
Pavement camber or cross fall (objects and methods), recommended values of camber for different types of roads.
Gradient, classification of gradients, gradients for roads in different terrain, grade compensation at curves in hill roads.
Super elevation – objects, derivation of formula and related problems.
Transition curve, objects of providing transition curves, types of curves used, factors affecting length of transition curve.
Widening of pavement on curve – its necessity and method of providing it.
Vertical curve-summit curve and valley curve.
Sight distance, perception time, brake reaction time, lag time, lag distance, braking distance. Types of sight distance – stopping site distance, intermediate sight distance and overtaking sight distance.

Alignment and surveys of roads

Highway surveys – different types, objects, instruments used.
Road alignment, road location, controlling points, ribbon development and its disadvantages, requirements of an ideal road alignment.
Drawing and report.

Hill roads

Hill road alignment
Sections of hill roads
Terms related to hill roads – retaining walls, breast wall, weep holes, catch water drain, parapet wall, hairpin bend, cliff gallery.

City roads

Terms related to city roads – footpath, kerb and channel, pedestrian crossing, Guide Island, refuse island, traffic lane.
Traffic rotary – advantages, disadvantages and limitations.
Road junction – types.

Traffic signs – classification, objects and types.

Road aggregates

Types of road aggregates
Requirements of good road aggregates

Testing of road aggregates (only the names of tests with objective)

Highway constructions

Road structure – cross sections, component parts and their functions.
Soil stabilisation – definition and methods
Earth road, gravel road & soil stabilised roads – short notes.
Water bound macadam roads – definition, materials, procedure of construction advantages & disadvantages, quality estimate.
Bituminous materials – (i) bitumen, asphalt & tar, (ii) sources of bitumen, (iii) types of bitumen –straight run, oxidised, cut back, emulsion & primer, (iv) Types of tar.
Bituminous road construction – types – (i) surface dressing (single coat & two coats) – functions, materials, construction, quantities of materials, (ii) grouting (semi grout & full grout) – functions, materials, construction and quantities of materials, (iii) premix type (premix chipping carpet, premix macadam and premix concrete) -– function, materials, construction and quantities of materials, related machineries and plants.

Cement concrete roads – (i) advantages & disadvantages, (ii) comparison between bituminous and cement concrete pavements, (iii) pavements joints – necessity, types, joint sealer, joint filler, dowel bar, tie bar, mud pumping.

2ND HALF
RAILWAY ENGG.

Introduction

Brief history of Indian Railways

Projects & profiles

Survey works for a new line
Choice of alignment, requirements of a good alignment.
Cutting and embankments, cut & cover.
Tunnels – section in rock & clay.

Permanent way

Definition
Component parts of a permanent way
Requirements of an ideal permanent way.
Gauge-types of gauges in India, factors affecting adoption of a particular gauge, standard gauge, standard dimensions.
Rails- function of rails, types of rails, weight of rails, length of rails; rail joints – requirements of a good rail joint, types of rail joint; expansion of rails, rail supports, impact effect and anti impact plates, cutting of rails; coming of wheels and its advantages; tilting of rails and its advantages; roaring of rails; creep of rails & causes of creep, effect of creep, prevention of creep; wear of rails – different types of rail wear, methods to reduce wear of rails; hogged rails – buckling of rails and welding of rails.
Sleepers – functions, requirements of good sleepers, types of sleepers, advantages and disadvantages of each type, sleeper density.
Ballast – functions of ballast, characteristics of good ballast, types of ballast, advantages and disadvantages of each type, size and section of ballast, quantity of ballast.
Fixtures and fastening – functions of fixtures and fastenings, types of fixtures and fastenings, fish plate, bearing plate, spikes, bolts, keys anti creepers.

Track geometrics

Cross section of single line and double line B.G. track in embankment and in cutting.
Permanent land or right of way, formation, formation width, side slopes, side drains.
Gradient, purpose of providing gradient, factors affecting selection of gradient, types of gradient, grade compensation on curves.
Curves- horizontal, vertical and transition, layout of curves, curve resistance, effect of curves on tyres and rails, realignment of curves by string line method.
Super elevation – objects of providing super elevation, relation of super elevation with gauge, speed and radius of the curve; limits of super elevation, methods of providing super elevation.
Cant deficiencies, negative cant.

Winding of gauge on curves.

Points & crossings

Necessity of points and crossings.
Important technical terms in points and crossings.
Turnout – sketch, component parts and functions.
Points of switches – components parts, types.
Crossings- requirements of an ideal crossings and component parts of a crossing.
Track junctions – types of truck junctions – turnout, acute angle crossing, diamond crossings, square crossing, cross over, scissors cross over, triangle, level crossing.

Stations & yards

Purpose, location, site, general equipment and layout in consideration of traffic.
Classification of stations, layout of a wayside station showing the location of necessary signals.
Railway yard – different types of yard and their functions.
Platform, engine shed, train examination pits, turn tables, water columns and tank houses- layout details with short description of each mentioning functions, necessity, etc.

C I V I L E N G I N E E R I N G D R A W I N G – I I I (DCE-504S)

Total Marks-100, CPW-5, Credit -2

D E T A I L C O U R S E C O N T E N T S

Sheet – 1 ***Septic tank***

Details of septic tank showing longitudinal sectional elevation & plan passing through double storied W.C. & bath block (showing details of bathroom fittings & anti-siphonage pipe), inspection pit and soak pit. Sectional plan & elevation of master trap.

Sheet – 2 ***Steel connections***

6.1 Plan elevation and side view of stanchion connected with base plate in concrete foundation. (Riveted connection).
6.2 Connection of main beam with secondary beam (riveted connection).
6.3 Connection of beam with column (riveted connection).
6.4 Equal beam & column splicing (riveted connection).
6.5 Column bracket connection (riveted connection).

Sheet – 3 ***Sloped roof using steel trusses***

7.1 Details of a fink truss having 9-12m span with welded joints and details of column connection (fillet weld).
7.2 Do with riveted connection.

C I V I L E N G I N E E R I N G L A B – I I I (DCE-505S)

Total Marks-100, CPW-4, Credit -2

FULL MARKS:-100

D E T A I L C O U R S E C O N T E N T

MODULE 1: SOIL MECHANICS

1.1 Grain size analysis of soils – mechanical & wet analysis.
1.2 To determine the liquid limit & plastic limit of soil.
1.3 To determine the permeability of oil (by constant head / falling head method).
1.4 Soil sampling and to determine the field density of soil (by core cutter / sand replacement method).

CIVIL ENGINEERING PROJECT WORK–I (DCE-506S)

Total Marks-100, CPW-4, Credit -2

D E T A I L C O U R S E C O N T E N T

O B J E C T I V E

Project Work **is intended to provide opportunity for students to develop understanding of the interrelationship between different courses learnt in the entire diploma programme and to apply the knowledge gained in a way that enables them to develop & demonstrate higher order skills. The basic objective of a project class would be to ignite the potential of students' creative ability by enabling them to develop something which has social relevance, again, it should provide a taste of real life problem that a diploma-holder may encounter as a professional. It will be appreciated if the polytechnics develop interaction with local industry and local developmental agencies viz. different *Panchayet* bodies, the municipalities etc. for choosing topics of projects and / or for case study. The course further includes preparation of a Project Report which, among other things, consists of technical description of the project. The Report should be submitted in two copies, one to be retained in the library of the institute. The Report needs to be prepared in computer using Word and CADD software wherever necessary.**

T H E P R O J E C T

Each group has to undertake a single project which has to be executed in Part – III First & Second Semesters.

Construction of a housing complex for MIG / HIG group for providing accommodation of say 100 families, each family has five members, is proposed as a topic for project. The relevant data and instructions are given below. However, other topics of equivalent weightage may be selected by the students in consultation with the Project Guide.

a) *Land Available:* Introduction of *mouza* map prepared by the settlement department and mark the portion of project site by red ink as required. The existing G.L. of the land is 0.6m or (change year to year) below the crest of near by national highway/state highway to be filled up.

b) *Covered Area:* It should not exceed 40 to 45% of the open area.

c) *Buildings:* Three storied comprising six flats in each building unit. Masonry structure with 200mm thick brick masonry work. The plinth area of each unit is according to MIG / HIG norms. (Line plan of the building for each group may be finalised from the students of that group under guidance of teacher as per local municipal rules).

d) The complex has a primary school inside. The school building is of three storied R.C.C. with a provision for another floor for future extension. (A line plan may be given for development).

e) *Roads:* The main trunk road within the complex is 10m wide and cross roads are 6m wide. The building entry roads are brick pavement of 2m wide.

f) *Additional Infrastructure:* At least one play ground for children, provision for one community centre and one library for the whole complex (only space for the same is to be shown in the layout plan).

Students' Job for Part – III First Semester

i) To develop and to prepare a site location plan for the complex showing building units, roads with culverts, if any, water supply from tube well and reservoir, septic tank with connecting pipe lines arrangement, drainage of waste and boundary walls, etc.
ii) To prepare drawings (plan, elevation, short and long sections of a building unit).
iii) To prepare drawing for septic tank, internal roads, tube well and water reservoir (including design).

Seminar on Project Work is intended to provide opportunity for students to present the Project Work in front of a technical gathering with the help of different oral, aural and visual communication aids which they learnt through different courses in the Parts – I & II of the diploma course. In the Seminar, students are not only expected to present their Project Work, but also to defend the same while answering questions arising out of their presentation.

F I E L D S U R V E Y P R A C T I C E - I I(DCE-507S)

Total Marks-100, CPW-4, Credit -2

D E T A I L C O U R S E C O N T E N T

FULL MARKS -100

Plate-1 Road Project – One plate including longitudinal section and cross section with side slope.
Plate-2 Direct and indirect contouring in two separate sheets including sectional views.
Plate-3 Theodolite Traversing including detailing by plane table.
Plate-4 Setting out curve in field by linear (chain tape method) & angular (instrument methods).
Plate-5 Layout of residential building.

C O M P U T E R A I D E D D E S I G N & D R A F T I N G – II(DCE-508S)

Total Marks-100, CPW-4, Credit -2

D E T A I L C O U R S E C O N T E N T

Introduction To Creating Three Dimensional Drawings .

Practical Project Drawing (Any Two)

- Civil & Archetectural Drawing.
- Telephone & Fibre Optics
- Electrical Drawings
- Mechanical Drawings.

INDUSTRIAL /FIELD VISIT-II(DCE-509S)

Total Marks-100, CPW-4, Credit -2

D E T A I L C O U R S E C O N T E N T

Every students have to undergo at least four local Industrial training / field visits during summer vacation after 4th semester and the semester & submit report thereon & would be evaluated accordingly.

6th Semester

Sl. No	Theoretical Paper					Sessional / Practical paper			
	1st half (50mark)	2nd half (50 mark)	Mark	CPW	Credit	Name of Sessional / practical	Mark	CPW	Credit
i	Professional ethics & values DHU-601	Optimisation Technique - DHU-601	100	4	4	Civil engineering drawing – IV DCE-604S	100	4	2
ii	Structural design & Detailing –II DCE-601		100	4	4				
iii	Concrete Technology DCE-602		100	3	3	Civil engineering laboratory – III DCE-605S	100	4	2
						PROJECT -II DCE-606S	200	7	4
iv	Elective DCE-603 Opt. any one of the following • Foundation engineering-DCE-603/1 • Advanced Transportation Engineering – DCE-603/2		100	3	3	Foundation engineering Laboratory – DCE 607/ 1 S Advanced Transportation Engineering Laboratory -DCE-607/2S	100	4	2
v						Generic Skill	50	2	1
vi						Final Viva DCE-610S	50	-	1
	Total		400	14	14		600	22	12

PROFESSIONAL ETHICS & VALUES (DHU-601) 1st half

Total Marks: 50, Credit: 2 , CPW : 2

DETAIL COURSE CONTENT

Effects of Technological Growth:

Rapid Technological growth and depletion of resources. Reports of the Club of Rome. Limits to growth; sustainable development. Energy Crisis; Renewable Energy Resources.

Environmental degradation and pollution. Eco-friendly Technologies. Environmental Regulations. Environmental Ethics. Appropriate Technology Movement of Schumacher: later developments. Technology and developing nations. Problems of Technology transfer. Technology assessment/ impact analysis; Industrial hazards and safety, safety regulations safety engineering. Politics and technology, authorization versus democratic control of technology; Human Operator in Engineering projects and industries. Problems of man machine interaction. Impact of assembly line and automation. Human centered Technology

Ethics of Profession:

Engineering profession: Ethical issues in engineering practice. Conflicts between business demands and professional ideals. Social and ethical Responsibilities of Technologists. Codes of professional ethics. Whistle blowing and beyond. Case studies.

Profession and Human Values :
Value Crisis in contemporary society. Nature of values: Value Spectrum of a 'good' life
Psychological values: Integrated personality; mental health. Societal values: The modern search for a 'good' society, justice, democracy, secularism, rule of law; values in Indian Constitution. Aesthetic values: Perception and enjoyment of beauty, simplicity, clarity
Moral and ethical values: Nature of moral judgments; canons of ethics; Ethics of virtue; ethics of duty; ethics of responsibility. Work ethics, professional ethics.

REFERENCE BOOKS:
1.Blending the best of the East & West, Dr. Subir Chowdhury, EXCEL
2.Ethics & Mgmt. & Indian Ethos, Ghosh, VIKAS
3.Business Ethics,Pherwani,EPH
4.Ethics,Indian Ethos & Mgmt., Balachandran,Raja,Nair, Shroff Publishers
5.Business Ethics: concept and cases, Velasquez, Pearson

OPTIMIZATION TECHNIQUE

(**DHU 601**) 2nd half, Total Marks: 50, Credit: 2 , CPW : 2

Introduction to Operation Research & Optimization technique

Linear Programming :
Introduction to linear programming, Formulation, LPP in the standard form, LPP in canonical form, conversion of LPP in standard for to canonical form, procedure of solving LPP by graphical method.

Introduction to Simplex method, Simplex algorithm.

Shortest path **DJKstra** method.

Project Scheduling :
Project scheduling by PERT/ CPM, Decisions and game theory,

Classical optimization theory, unconstrained External problem.

S T R U C T U R A L D E S I G N & D E T A I L I N G - I I

(**DCE- 601**) , Total Marks: 100, Credit: 4 , CPW : 4

D E T A I L C O U R S E C O N T E N T

D E S I G N O F S T E E L S T R U C T U R E

FIRST HALF

Module 1 ***Introduction to IS:800***

Permissible stresses in flexure shear, direct tension, direct compression, elastic stress. General conception on load as per IS:875(Part-I to Part-V).

Module 2 ***Introduction to SP:6(I)***

Details of structural steel section with their properties; use of built up section from the given tables in SP:6(I).

Module 3 ***Riveted connection***

Different types of riveted joint, failure of riveted joints, design of riveted joint for axial tension, Eccentric riveted connection – application to bracket connected to steel columns with moment in the plane of river and in perpendicular plane, permissible stress in rivet – shearing and bearing.

Module 4 ***Welded connection***

Types of weld and their symbols, permissible stresses, fillet weld – throat thickness, size of weld, length of weld. Design of simple lap and butt joints subjected to axial load. Design of eccentric welded connection with moment in the plane of weld and in perpendicular plane.

Module 5 ***Design of roof truss***

Analysis and design of simple steel roof truss for dead load live load and wind load with combinations.

Module 6 ***Design of steel beams***

Design of rolled steel beams in flexure and shear for a given load with the compression flange fully restrained against lateral bucking and without any restraining; check for deflection, concept of plated beam and plate girder.

2ND HALF

Module 7 ***Design of steel columns***

Slenderness ratio, effective length, permissible stress, design of axially loaded columns using standard I. Section with or without cover plates. Design of column section for axial load and uniaxial bending with compression flange partially of fully restrained against lateral buckling.

Module 8 ***Design Steel column base***

Design of axially loaded column base (i) slab base, (ii) gusseted base design of steel column base subjected to axial load and uniaxial bending all connection shall be welded, design of foundation anchor bolt.

DESIGN OF TIMBER STRUCTURE

Module 9 **Permissible stress in various species of timber.**

Module 10 **Design of timber beams and posts using IS: Code.**

CONCRETE TECHNOLOGY

(**DCE- 602**) , Total Marks: 100, Credit: 3 , CPW : 3

First half

Introduction

General, definition of concrete, utility of the subject job opportunity.

Materials for cement concrete

Cement: Manufacture & chemical composition, different types of cement, their physical and chemical properties & uses; test as per BIS for fineness, normal consistency of standard cement paste, initial and final setting time, soundness test, compressive strength test, modulus of rupture test.

Aggregate – classification, sampling, specification for mechanical and physical properties of fine and coarse aggregates, standard tests as per BIS – sieve analysis of coarse and fine aggregate, specific gravity, water absorption, moisture content of coarse and fine aggregate, bulk density, loose and compacted, grading of aggregate, size of aggregates used for different purposes, proportioning of aggregates, deleterious materials in aggregates and their effect.

Water – quality of gauging and curing water, chemical properties, function, sources.

Use of chemicals and admixtures with properties and use.

2nd half

Preparation of concrete

Introduction – object of concrete preparation.
Stages involved in preparation of concrete – batching, mixing, transporting, placing, compacting, finishing – description of each with object, machinery used.
Proportioning and designation of concrete – Nominal mix and design mix, grade of concrete, BIS recommendation relating grade of concrete and nominal mix.
Workability and its measurement – Standard test, segregation and bleeding of concrete, factors influencing workability.
Water/cement ratio – Abraham law, effector strength, durability, workability, impermeability of concrete.
Properties of wet and hardened concrete.
Ordinary concrete and controlled concrete, preliminary test and work test.

Machinery used for concreting work – plant for handling cement and aggregate, machinery for mixing and transporting concrete, concrete mixers with types, machinery for compaction.
Tests on hardened concrete – non destructive test on concrete – general, usefulness of NDT, surface hardness method, rebound method, vibrating method, ultrasonic pulse velocity method, pullout test, analysis of hardened concrete.
Analysis of fresh concrete.

Concrete mix design

Introduction – object of mix design, design parameters.
Factors influencing design of mix.
Methods of mix design – arbitrary proportioning, method of trial mix, minimum void/maximum density method, fineness modulus method, mix design as per recommended guidelines of BIS.

F O U N D A T I O N E N G I N E E R I N G

(**DCE- 603/1**) , Total Marks: 100, Credit: 3, CPW : 3

COURSE CONTENTS

Full –maks –100
First half

1.0 ***Introduction***

1.1 Definition of foundation, functions of foundation, requisites of a good foundation.

2.0 ***General considerations for design of foundations***

2.1 Loads on foundation, stability against siding, overturning.
2.2 Depth of foundation, foundation on made up ground.
2.3 Checking for failure, safety against shear failure.

3.0 ***Types of foundation***

3.1 Shallow and deep foundations and their differences.
3.2 Types of shallow foundation (names only), their specific uses.
3.3 Types of deep foundation (names only), their specific uses.
3.4 Selection of foundation type.

3.5 Foundation in shrinkable soils.

4.0 ***Bearing capacity of soils***

4.1 Introduction, definition of ultimate bearing capacity, safe bearing capacity, allowable bearing capacity, gross and net bearing capacity, factor affecting bearing capacity.

4.2 Terzaghi's bearing capacity theory, assumptions of Terzaghi's theory, general and local shear failure, bearing capacity formula for – isolated square footing, isolated circular footing, continuous strip footing for cohesive, cohesion-less and c-ϕ soi in case of general shear failure, modification required for local shear failure –solution of problems.

4.3 Determination of bearing capacity by plate load test, limitations of plate load test ultimate bearing capacity from standard penetration test results.

4.4 Methods to improve the bearing capacity of soil.

5.0 ***Settlement of foundation***

5.1 Introduction, primary causes of settlement, permissible settlement and differential settlement as per IS:1904.

5.2 Computation of consolidation settlement – (i) when initial void ratio, final void ratio & thickness of the consolidating layer are known, (ii) when increment of pressure, coefficient of volume compressibility & thickness of the consolidating layer are known, (iii) when initial void ratio, initial pressure, increment of pressure, compression index and thickness of consolidating layer are known – simple numerical problems with solution.

6.0 ***Pile foundation***

6.1 Definition of pile foundation, places of application, classification of piles based on functions and materials.

6.2 Formula related to pile foundations – static formula, dynamic-engineering news formula and Hiley's formula, - solution of simple problems.

2^{nd} half

7.0 ***Soil stabilisation***

7.1 General principles of soil stabilisation.

7.2 Different types of soil stabilisation – mechanical stabilisation, water reluctant chemicals, cement stabilisation, line stabilisation, bitumen stabilisation, stabilisation by grounding.

8.0 ***Soil exploration***

8.1 Preliminary work, site reconnaissance, trial pits, boring.

8.2 Excavation and boring methods of subsurface exploration.

8.3 Types of soil samples.

8.4 Procuring and handling of disturbed and undisturbed samples.

8.5 Presentation of soil investigation results.

9.0 ***Stress distribution in soils***

9.1 Introduction

9.2 Approximate methods of determining vertical stress at a depth below the bottom of foundation.

10.0 ***Earth pressure***

10.1 Definition of active and passive earth pressure, coefficient of active and passive earth pressure.

10.2 Rankine's earth pressure theory for cohesive and cohesion-less soil with back fill horizontal at top of the wall, pressure intensity diagrams; resultant thrust, solution of simple problems.

Advance Transportation Engineering.
(**DCE- 603/2**) , Total Marks: 100, Credit: 3, CPW : 3

COURSE CONTENTS

Full –maks –100
First half

D E T A I L C O U R S E C O N T E N T

1.0 ***Road Drainage***

1.1 Necessity of road drainage works and cross drainage works; elements of water way determination.
1.2 Surface and sub-surface drains and storm water drains, location and details of typical side drain and side ditch for surface drainage, drainage of hill roads.

2.0 ***Traffic Engineering***

2.1 Traffic studies, methods of collection and representation of volume count data.
2.2 Traffic control devices – signs, marking and signals; their effectiveness and location, installation of sign, IRC standards.
2.3 Types of road junction and choice of each, traffic islands, pedestrian crossings, grade separation, segregation of traffic.

3.0 ***Highway Maintenance***

3.1 Common types of road failure – their causes and remedies.
3.2 Maintenance of shoulders and road side drainage.
3.3 Maintenance of low cost surfaces.
3.4 Maintenance of bituminous roads – patch work and resurfacing.
3.5 Maintenance of concrete roads – filling cracks, repairing of joints.
3.6 Maintenance of hill roads – causes and prevention of land slides.

4.0 ***Tunnelling***

4.1 Introduction – advantages and disadvantages.
4.2 Drainage and ventilation of tunnels.
4.3 Typical section of tunnels for – (i) a national highway, (ii) single and double line broad gauge railway track.

5.0 ***Bridges***

5.1 Classification of bridges.
5.2 Classification of loading as per IRC.
5.3 Bridge site – investigation and hydrology; selection of site for a bridge; elementary knowledge of water way, linear water way, scour depth, clearance, economical span, afflux, cut water, ease water.
5.4 Bridge foundation – types of foundation .
5.5 Bridge protective works.

2nd half

1.0

1.1 Classification of air ports – International and domestic.
1.2 Airport terminology – aerodrome, airfield and airport, airport capacity, runway, taxiway, hanger, terminal building, apron, control tower, approach zone, obstruction clearance line, landing area, instrument landing system, take off distance.

2.0 ***Airport Layout***
2.1 Planning, selection of site, factors affecting the site selection of airport.
2.2 Development of site, recommendation for airport development.

3.0 ***Runway***
Runway orientation, runway patterns, runway lengths and widths for various airports, correction for runway length.

4.0 ***Airport Pavements***
4.1 Flexible and rigid pavements.
4.2 Application of CBR and westergard method of design of pavement.

5.0 ***Airport Drainage***
5.1 Introduction, necessity of drainage, factors affecting the drainage system & capacity.
5.2 Types of drains – only name with brief description.

C I V I L E N G I N E E R I N G D R A W I N G – I V

(**DCE- 604s**) , Total Marks: 100, Credit: 3, CPW : 3

D E T A I L C O U R S E C O N T E N T S

FULL MARKS -100

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Sheet 1 ***R.C.C. details – I***
Column with footing – plan & sectional elevation.
Lintel with chajja – sectional elevation.
A continuous beam over columns – half long section and two c/s – one near support and one near mid span.
One-way slab reinforcement plan & Sectional elevation.

Sheet-2 ***R.C.C. details – II***
Two-way slab reinforcement plan with corner reinforcement & sectional elevation.
Stair case (dog-legged) sectional plan, cross section of one flight including landing.

Sheet-3 ***R.C.C. details*** **– III**
L/S & C/S views of water tank. (U/G)
Pile & Pile cap (Simple type/inside R.C.C. bored pile)
L/S & C/S views of retaining wall (cantilever type only)

CIVIL ENGINEERING LABORATORY – IV

FULL MARKS -100

DETAIL COURSE CONTENT

- To determine the moisture – density relation using light / heavy compaction (Proctor method).
- To determine the shear strength by direct shear test / triaxial compression test / unconfined compression test.
- Test for consolidation by consolidometer.
- CBR test (laboratory/field)
- Hardness test on M.S. bar / M.S. plate by Rockwell / Brinell hardness testing machine.
- Tension test on M.S. bar / high strength deform bar.

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[At least four tests are to be performed,]

CIVIL ENGINEERING PROJECT WORK & SEMINAR – II

FULL MARKS:-100

DETAIL COURSE CONTENT

Students' Job for Part – III Second Semester

i) To prepare drawings for school building as above with R.C.C. framed structures (Ref. may be made from SP-16 and other relevant publications of BIS).

ii) Quantity calculation of proposed building, earth filling & campus development, sanitary works, water supply works and internal roads of proposed project.

iii) To prepare an abstract of an estimated cost from item (i) above referring P.W.D. schedule of rates or local rates of the year. The electrical installation cost may be added to total cost in current cost percentage basis.

iv) To prepare construction schedule using bar chart technique.

v) To develop and analyse a critical path method network for the job. Compute total float for the job activities, identifying the critical path and determine the time of completion of the job.

vi) To write a report for the work done above with an introduction mentioning a short history of the work from start to finish. It will also include an index page and student's comments on the work. Report sheet and drawings are to be arranged as per working sequence and represent in a binding form.

Application of some of the recommendations of CBRI and NBO in using non-conventional constructional materials and low cost techniques are desirable

Seminar on Project Work is intended to provide opportunity for students to present the Project Work in front of a technical gathering with the help of different oral, aural and visual communication aids which they learnt through different courses in the Parts – I & II of the diploma course. In the Seminar, students are not only expected to present their Project Work, but also to defend the same while answering questions arising out of their presentation.

ADVANCED TRANSPORTION ENGGINEERIG. LAB

FULL MARKS:-100

DETAIL COURSE CONTENT

At least *any six* of the following experiments are to be undertaken:—

1. California Bearing Ratio (CBR) Test.
2. Aggregate Crushing Test.
3. Abrasion Tests (Los Angeles Abrasion Test).
4. Impact Test.

5. Flakiness Index / Elongation Index.
6. Aggregate Water Absorption Test.
7. Penetration Tests of Bitumen.
8. Softening Point Tests of Bitumen.
9. Ductility Test of Bitumen.
10. Flash & Fire Point Test.

FOUNDATION ENGINEERING . LAB

FULL MARKS:-100

D E T A I L C O U R S E C O N T E N T

(At least five tests are to be performed)

1. **CBR test.**
2. **Direct shear test of soil.**
3. **Triaxial shear test of soil.**
4. **Plate load test .**
5. **Proctor compection test.**
6. **Consolidation test.**
7. **Permeability test.**
8. **Proctor penetration test.**
9. **Field density test of siol.**
10. **SPT(standard penetration test).**

GENERIC SKILL(DCE-610S)

Total Marks : 50, Credit : 1, CPW : 2

Each class may be divided into two groups. Each group may meet once a week and discuss topics mentioned below under.

Professionalism: Professional characteristics, professional education, professional development in Industry.

Values and Ethics in Profession: Value system- goodness, means and ends; Ethics- ethical premises, expectations, conflicts and practices; Moral and ego, Ethics and morality.

Right, virtue, ethics and justice, utility and justice; Privacy, Challenges to privacy, Privacy on the Internet.

Professional Competence: Important technical topics covered in Semesters II-V as well as topics of current professional interest.

Books:

1. Ethics and Engineering ----by Martin and Schinizger, TMC.

2. Issues and Ethics—by Correy G.Correy , Brooks & Cole Pub.
3. Ethics and Professionalism ---by John Kultgen
4. Ethics and the conduct of business-- by John R.Boatright, PE.

FINAL V I V A (DCE-610)
Total Marks : 50 , credit :1

C O U R S E C O N T E N T

The syllabi of all the theoretical and Sessional subjects taught in the 3years/ 6(six) Semesters of diploma education.

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