Diploma in Civil Engineering (2013-2016)

DIPLOMA

Semester - I (Common for all Branches)

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MVN University, Haryana
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Note: Survey camp will be held after 4th semester for minimum 7 days in a sub mountainous area away from university preferably in camp conditions.
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**Electives (Any one of the following):**

1. Repair and Maintenance of Buildings
2. Pre-stressed Concrete Structures
Syllabus

MVN University

Diploma in Civil Engineering

Syllabus of 3rd Semester

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Theory

Class Work: 50 Marks
Exam: 100 Marks
Total: 150 Marks
Duration of Exam: 3 Hrs

Lab

Class Work: 20 Marks
Exam: 30 Marks
Total: 50 Marks
Duration of Exam: 3Hrs

Unit 1. 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.

UNIT 2. Bending Stress In Beams

UNIT 3. Shearing Stresses In Beams

UNIT 4. 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, B.I.S. code formula – statement with elementary problems.

UNIT 5. 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.

UNIT 6. Strain Energy & Impact Loading

Introduction – resilience, proof resilience and modulus of resilience, strain energy in bars in tension and compression for: gradually applied load.

Books:

Section A

Unit 1. Properties of Fluids:

Fluids: Real and ideal fluids, Fluid Mechanics, Hydrostatics, Hydrodynamics, Hydraulics, Mass density, specific weight, specific gravity, viscosity, surface tension - cohesion, adhesion and, capillarity, vapour pressure and compressibility, Units of measurement.

Unit 2. Hydrostatic Pressure:
Pressure, intensity of pressure, pressure head, Pascal's law and its applications, Total pressure, resultant pressure, and centre of pressure, Total pressure and centre of pressure on vertical and inclined plane surface: Rectangular, triangular, and trapezoidal

Section B

Unit 3. Measurement of Pressure:

Atmospheric pressure, gauge pressure, vacuum pressure and absolute pressure, Piezometer, simple manometer, differential manometer and Bourden gauge.

Unit 4. Fundamentals of Fluid Flow and flow measurement:

Types of Flow: Steady and unsteady flow, laminar and turbulent flow, uniform and non-uniform flow, Discharge and continuity equation (flow equation), Types of hydraulic energy, Potential energy, kinetic energy, pressure energy, Bernoulli's theorem; statement and description (without proof of theorem), Venturimeter (horizontal and inclined, Venturimeter, Orificemeter, Plot tube, Mouthpiece, Notches and wears, Current meters.

Section C

Unit 5. Flow through Pipes:

Definition of pipe flow; laminar and turbulent flow - explained through Reynold’s experiment, Reynolds number, critical velocity and velocity distributions in a pipe for laminar and turbulent flows, Head loss in pipe lines due to friction, sudden expansion and sudden contraction, entrance, exit, obstruction and change of direction (No derivation of formula), Hydraulic gradient line and total energy line, Flow from one reservoir to another through a long pipe of uniform cross section (simple problems), Pipes in series and parallel, Water hammer phenomenon and its effects (only definition and description).

Section D

Unit 6. Flow through open channels:

Definition of an open channel, uniform flow and non-uniform flow, Discharge through channels using, Chezy’s formula (no derivation), Manning’s formula (no derivation), Most economical channel sections, Rectangular, Trapezoidal, Head loss in open channel into friction, transition losses due to graded expansion and contraction, obstruction and change of direction (no derivation)
NAME OF EXPERIMENTS:

i) To verify Bernoulli's Theorem

ii) To find out venturimeter coefficient

iii) To determine coefficient of velocity ($C_v$), Coefficient of discharge ($C_d$) Coefficient of contraction ($C_c$) of an orifice and verify the relation between them

iv) To perform Reynold's experiment

v) To verify loss of head in pipe flow due to

a) Sudden enlargement

b) Sudden Contraction

vi) To determine velocity of flow of an open channel by using a current meter

vii) To determine coefficient of discharge of a rectangular notch/triangular notch.

Books:

Hydraulic and Fluid Mechanic by P.N.Modi & S.M.Seth

Introduction to Fluid Mechanics by Robert W.Fox & Alan T.McDonald

Fluid Mechanics Through Problems by R.J.Garde

Engineering Fluid Mechanics by R.J.Garde & A.G.Mirajgaoker
Theory

Class Work: 50 Marks

Exam: 100 Marks

Total: 150 Marks

Duration of Exam: 3 Hrs

Section A

Unit 1. Bricks, stone 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.

Section B

Unit 2. Sand, Cement, Lime and Mortar

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.


Classification of lime — Properties and specific uses — Slaking and setting of lime
Field test for cement — Stacking and storing of cement — Precautionary measures, 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

Section C

UNIT 3 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.

Section D

UNIT 4. 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

UNIT 5 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

UNIT 6 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
Books:
1. Building Material, Rangawala

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Theory
- Class Work: 50 Marks
- Exam: 100 Marks

Lab
- Class Work: 20 Marks
- Exam: 30 Marks
Section A

Unit 1 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

Unit 2 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

Section B

Unit 3 Chain and Compass surveying

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 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

Section C

Unit 4 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, Three point problem and its solution, Errors in plane table surveying

Unit 5 Computation of areas

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

Section D
Unit 6 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, Numerical Problems

Books:
Surveying by C. L. Koachhar
Surveying Vol.I by B.C.Punmia
Surveying Vol.I by T.P.Kanitkar

LIST OF EXPERIMENTS

1. Chain surveying: chaining and chain traversing
2. Compass Traversing
3. Plane tabling: methods of plane table surveying, Two point Problem & Three point problem
4. Leveling: profile leveling and plotting of longitudinal section and cross sections, Fly leveling
5. Use of tangent Clinometer.
6. Contours: Block and radial contours
7. Use of Total Station, Measurement; Linear measurement, angle; vertical and horizontal
8. Traversing: different poles and alignment
9. Study of Theodolite
1. Bricks & brick bonding

1.1 Different types of bricks: Traditional & Modular

1.2 Different types of closers & bats: King Closer — Queen Closer — Bevelled Closer — Quoin Closer — Metered Closer — Bull nose Closer — ½ Bat — ¾ Bat

1.3 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)

1.4 Raking bond: Diagonal bond — Herring bone bond — Zig-zag bond (1200 mm – 1600 mm wide)

2. Culvert

2.1 Single span slab culvert

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

3. Sloped roof with wooden roof truss

3.1 King post

3.2 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.

4. Single storied residential building

4.1 Plan, elevation and section of a single storied small residential building from given sketch (line diagram). The building should have bathroom, latrine, veranda.

4.2 Details of foundation plan (layout), roof plan, connection of roof & parapet, lintel & foundation are to be shown.

MVN University

Diploma in Civil Engineering

Syllabus of 4th Semester

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Class Work: 50 Marks
Total: 150 Marks
Duration of Exam: 3 Hrs

Section A

UNIT-I

Introduction: Definition of concrete, brief introduction to properties of concrete, advantages of concrete, uses of concrete in comparison to other building materials, Cement: physical properties of cement; different types of cement.

UNIT-II Classification of aggregates according to size and shape, Characteristics of aggregates: Particle size and shape, surface texture, specific gravity of aggregate; bulk density, water absorption, surface
Section B

UNIT-III Properties of Concrete;

Properties in plastic state, Workability, Segregation, Bleeding and Hardness, Properties in hardened state: Strength, Durability, Impermeability, Dimensional changes, Water Cement Ratio, Definition of strength of concrete, relation between water cement ratio and strength of concrete

Section C

UNIT-IV

Workability, Definition, phenomenon of workability, concept of internal friction, segregation and harshness; factors affecting workability, Measurement of workability: slump test, compacting factor and vee bee .consist meter; recommended slumps for placement in various conditions as per IS:456-2000 and SPECIFICATIONS-23-1982, Proportioning for Normal Concrete, Objectives of mix design, introduction to various grades as per IS: 456-2000; proportioning for normal mix as prescribed by IS"456-2000, Adjustment on site for: Bulking of fine aggregate, water absorption of aggregate, Admixtures,

Section D

UNIT-V

Special Concretes, Cold weather concreting, Hot weather concreting, Fiber reinforced concrete, Fly ash concrete, Silica fume concrete, Polymer concrete.

UNIT-VI

Batching of Cement, Batching of aggregate by; Volume, using gauge box selection of proper gauge box, Weight spring balances and by batching machines, Mixing, Compaction, Curing, Defects in concrete: Identification of and methods of repair.

PRACTICAL EXERCISES:

1) Determine the normal consistency of concrete.

2) Determine the Initial and Final setting time of cement.
3) To determine flakiness and elongation index of coarse aggregates.

4) Determination of specific gravity and water absorption of aggregates

5) Determination of particle size distribution of fine, coarse and all in aggregate by sieve analysis (grading of aggregate)

6) To determine necessary adjustment for bulking of fine aggregate

7) To determine workability by slump test:

8) Compaction factor test for workability.

9) Rebound Hammer Test

10) Ultrasonic Pulse Velocity Test

RECOMMENDED BOOKS

i) Sood, Hemant, Mittal LN and Kulkarni PD; "Laboratory Manual on Concrete Technology", CBS Publishers, New Delhi, 2002


iii) Krishnamurthy, KT; Rao, A Kasundra and Khandekar, AA; "Concrete Technology"; Delhi, Dhanpat Rai and Sons.

iv) Gupta BL; "Text Book of Concrete Technology"; Standard Publishers Distributors

v) Varshney, RS; "Concrete Technology"; New Delhi, Oxford and IBH Publishing

vi) Neville, AM; "Properties of Concrete" London, Pitman (ELBS Edition available)

vii) Orchard; "Concrete Technology"; Vol I, II, and III

viii) Handoo, BL and Puri, LD; "Concrete Technology"; New Delhi, Satya Prakashan

100

ix) Vazirani, VN; and Chandola, SP; "Concrete Technology"; Delhi, Khanna Publishers

x) Gambhir, ML; "Concrete Technology"; New Delhi, MacMillan India Ltd.
Section A

UNIT-I Introduction:

Water as a natural resource importance of hydrological cycle, significance of water quality and various components of public water supply scheme, Quantity of Water, Per capita demand.

UNIT-II Sources of Water Supply:

Intakes and Conveyance of Water, Joints in various types of pipes, Quality of Water, Joints in various types of pipes, BIS standards of potable water,

Section B

UNIT-III Treatment of Water:
Objectives of water treatment and various types of treatment processes, Purpose and types of screening, aeration, straining and sedimentation, Coagulation and flocculation: common coagulants, optimum dose and feeding devices,

UNIT-IV Filteration and Disinfection:

Filtration: significance and theory of filtration; types, working, suitability and operational problems of filters, Disinfection: necessity, types of disinfectants, and requirements of a good disinfectant, chlorination: practices of chlorination, break point chlorination, residual chlorine and chlorine demand, application of chlorine, Flow diagram of various treatment processes,

Section C

UNIT-V Storage and Distribution of Water:

Laying of Pipes. Plumbing and Water Supply Installations,

Section D

UNIT-VI Waste water engineering:


PRACTICAL EXERCISES

1) To determining pH value, conductivity and turbidity of water sample along with their field applications of water sample and their field applications.

2) To determine optimum alum dose for coagulation of raw water.

3) To determine residual chlorine and chloride demand of water

4) Threading/Joining of GI, CI, and plastic pipes.

5) Water supply connection to bathrooms, bath tubs, showers and geysers

6) To determine total, dissolved and suspended solids in a given waste water sample

7) To determine chemical oxygen demand (COD)

8) To determine Biochemical oxygen demand (BOD)

9) Laying and testing of sewers

10) Assembling parts of a septic tank
SECTION-A

Unit-I: Introduction:
Hydrologic cycle, scope and application of hydrology to engineering problems, drainage basins and its characteristics, stream geometry, hypsometric curves.

Unit-II: Precipitation:
Forms and types of precipitation, characteristics of precipitation in India, measurement of precipitation, recording and non recording raingages, raingage station, raingage network, estimation of missing data, presentation of rainfall data, mean precipitation, depth-area-duration relationship, frequency of point rainfall, intensity-duration-frequency curves, probable max. precipitation.

SECTION-B

Unit-III: Evaporation & Transpiration:
Process, evaporimeters and empirical relationships, analytical method, reservoir evaporation and methods of its control, transpiration, evapo-transpiration and its measurement, Penman’s equation and potential evapo-transpiration.

Unit-IV: Infiltration and Runoff:
Infiltration process, initial loss, infiltration capacity and measurement of infiltration, infiltration indices, factor affecting run-off, estimation of runoff, rainfall-run off relationships, measurement of stage-staff gauge, wire gauge, automatic stage recorder and stage hydrograph, measurement of velocity-current meters, floats, area velocity method, moving boat and slope area method, electromagnetic, ultrasonic and dilution methods of stream flow measurement, stage discharge relationship.

SECTION-C

Unit-V: Hydrograph:
Discharge hydrograph, components and factors affecting shape of hydrograph, effective rainfall, unit hydrograph and its derivation, unit hydrograph of different durations, use and limitations of UH, triangular UH, Snyder’s synthetic UH, floods, rational methods, empirical formulae, UH method, flood frequency methods, Gumbel’s method, graphical method, design flood.
SECTION-D

Unit-VI: Ground Water and Well Hydraulics:

Occurrence, types of aquifers, compressibility of aquifers, water table and its effects on fluctuations wells and springs, movement of ground water, Darcy's law, permeability and its determination, porosity, specific yield and specific retention, storage coefficient, transmissibility. Steady state flow to wells in unconfined and confined aquifers.

Books Recommended:

1 Engineering Hydrology by K.Subramanya.
2 Hydrology by H.M.Raghunath.
3 Hydrology for Engineers by Linsely, Kohler, Paulhus.
4 Elementary Hydrology by V.P.Singh.

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Theory
Class Work: 50 Marks
Total: 150 Marks
Duration of Exam: 3Hrs

Lab
Total: 50 Marks
Duration of Exam: 3 Hrs
Class Work: 20 Marks

Section A
UNIT-I Contouring:
Concept of contours, purpose of contouring, contour interval and horizontal equivalent, factors effecting contour interval, characteristics of contours, methods of contouring: Direct and indirect, use of stadia measurements in contour survey, interpolation of contours; use of contour map, Drawing cross section from a contour map; marking alignment of a road, railway and a canal on a contour map, computation of earth work and reservoir capacity from a contour map

UNIT-II Theodolite:

Working of a transit vernier theodolite, axes of a theodolite and their relation; temporary adjustments of a transit theodolite; concept of transiting, swinging, face left, face right and changing face; measurement of horizontal and vertical angles.

Section B

UNIT-III Theodolite traversing:

Prolonging a line (forward and backward) measurement of bearing of a line; traversing by included angles and deflection angle method; traversing by stadia measurement, theodolite triangulation, plotting a traverse; concept of coordinate and solution of omitted measurements (one side affected), errors in theodolite survey and precautions taken to minimize them; limits of precision in theodolite traversing.

Section C

UNIT-IV Tachometric surveying:

Tachometry, Instruments to be used in tachometry, methods of tachometry, stadia system of tachometry, general principles of stadia tachometry, examples of stadia tachometry.

UNIT-V Curves:

Simple Circular Curve, Transition Curve, Vertical curve, Minor Instruments.

Section D

UNIT-VI Advance surveying instrument:

Abney level, Tangent clinometers, Ceylon Ghat Tracer, Pentagraph, Planimeter, Auto level, Digital theodolite, EDM, Total station.

PRACTICAL EXERCISES

I. Contouring:

i) Preparing a contour plan by radial line method by the use of a Tangent Clinometers/Tachometer

ii) Preparing a contour plan by method of squares
iii) Preparing a contour plan of a Road/Railway track/Canal by taking cross

II. Theodolite:

i) Taking out the Theodolite, mounting on the tripod and placing it back in the box

ii) Study of a transit venire theodolite; temporary adjustments of theodolite

iii) Reading the venire and working out the least count, measurement of horizontal angles by repetition and reiteration methods

iv) Measurement of vertical angles and use of tachometric tables

v) Measurement of magnetic bearing of a line

vi) Running a closed traverse with a theodolite (at least five sides) and its plotting

III. Curves

i) Setting out of a simple circular curve with given data by the following methods

a) Offsets from the chords produced

b) One theodolite method

ii) Setting out a circular curve with transition length by linear measurements

IV. Demonstration of digital instruments like Autolevel, digital Planimeter, microoptic theodolite, digital theodolite

RECOMMENDED BOOKS


ii) Hussain, SK and Nagraj, MS; "Text Book of Surveying"; New Delhi, S Chand and Co Ltd.

iii) Deshpande, RS; "A Text Book Surveying and Levelling"; Poona, United Book Corporation

iv) Kocher, CL; "A Text Book of Surveying"; Ludhiana, Katson Publishing House

v) Kanetkar, TP and Kulkarni, SV., "Surveying and Leveling", Poona, AVG

vi) Kanetkar, TP; and Kulkarni, SV; "Surveying and Leveling-Vol.2" Poona, AVG Prakashan


UNIT-II

Earthwork, Surface excavation, definition, setting out, cutting, filling and blasting, Excavation of foundation, trenches, shoring, timbering and de-watering.

Section B

UNIT-III

Walls, Purpose of walls, Classification of walls—load bearing, non-load bearing, dwarf, retaining, breast walls and dhaji walls. Classification of walls as per materials of construction: brick, stone, reinforced brick, reinforced concrete, precast, hollow and solid concrete block and composite masonry walls, Partition walls: Constructional details, suitability and uses of brick and wooden partition walls, Mortars: types, selection of mortar and its preparation, Scaffolding, construction details and suitability of mason’s brick layers and tubular scaffolding, shoring, underpinning

UNIT-IV

Masonry, Brick Masonry: Definition of terms, bond, facing, backing, hearting, column pillar, jambs, reveals soffit, plinth masonry, header, stretcher, bed of bricks bat, queen closer, king closer, frog and quoin, Bond—meaning and necessity; English and Flemish bond, Construction of brick walls—methods
of laying bricks in walls, precautions observed in the construction of walls, methods of bonding new brick work with old (tooting, racking, back and block bonding), Expansion and contraction joints, Stone Masonry, Glossary of terms – natural bed, bedding planes, string course, corbel, cornice, block in course grouting, moulding, templates throating, through stone parapet, coping, plaster and buttress, Types of stone masonry, rubble masonry, random and coursed ashlar masonry, principles to be observed in construction of stone masonry walls

Section C

UNIT-V

Arches and Lintels, Meaning and use of arches and lintels: Glossary of terms used in arches and lintels - abutment, pier, arch ring, intrados, soffit, extrados, voussoiers, Springer, springing line, crown, key stone, skew back, span, rise, depth of an arch, haunch, spandrel, jambs, bearing, thickness of lintel, effective span, Damp Proofing and Water Proofing.

Section D

UNIT-VI

Floors, Roofs, Ceilings, Stairs, Various types of layout - straight flight, dog legged, open well, quarter turn, half turn (newel and geometrical stairs), bifurcated stair, spiral stair, Surface Finishes, Plastering, Pointing, Painting, Building Planning.

C. DRAWINGS.

1. Typical drawings of:
   a) Cavity Wall
   b) Bonds in brick work
   c) Grillage foundation

2. Preparation of building drawing mentioning its salient features including the following details:
   a) Ground floor plan
   b) Two Sectional Elevations
   c) Front and Side Elevations
   d) Plan and Sectional Elevation of stair case, doors/ windows/ ventilators, floor and roof.
RECOMMENDED BOOKS


3. Rangwala, SC; "Building Construction"; Anand, Charotar Book Stall


5. Arora, SP and Bindra, SP; "A Text Book of Building Construction"; New Delhi Dhanpnt Rai and Sons.


7. Sushil Kumar; "Building Construction"; Standard Publishers Distributors, Delhi


9. SP – 62 Hand Book of BIS


11. B.I.S. – 6313 Part 1, 2, 3
Duration of Exam: 3Hrs

**LIST OF PRACTICALS**

1. Introduction : Importance of Autocad, Basic Commands of Autocad
2. Geometry Preparation: Circle, rectangle, Line, etc
3. To draw the general arrangement drawing of a three storied Building.
4. To draw the sectional elevation of a three storied Building.
5. To draw the typical floor plan of a three storied Building.
6. To draw the reinforcement detailing of a Beam.
7. To draw the reinforcement detailing of a Column.
8. To draw the reinforcement detailing of a slab.
9. To draw the reinforcement detailing of a Isolated footing.
10. To draw the reinforcement detailing of a Staircase.
## Syllabus of V<sup>th</sup> Semester

<table>
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- **Theory**
- **Lab**
Section A

Unit 1. Introduction: Concept of Reinforced Cement Concrete :

Reinforcement Materials, Various types of reinforcing materials , Suitability of steel as reinforcing material, Properties of different types of steel (mild steel, medium tensile steel, and deformed bars)

Unit 2. Reinforced Concrete Beam:

Loads and loading standards as per IS:875 (Part I-V), Design of singly reinforced concrete beam as per BIS-456 code of practice from the given data such as span, load and properties of materials used. Design of a main/secondary beam for RCC roof and floor ,Design of a cantilever beam/slab , Doubly Reinforced Concrete Beams , Design of a doubly reinforced concrete beam

Section B

Unit 3. RCC Slabs:

Structural behaviour of slabs under UDL, Type of Boundary conditions ,Design of one way slab , Design of two way slab with the help of tables of IS:456

Section C

Unit 4. RCC Stairs:

Types of stairs, Generator principles for design of RCC stairs , Design of horizontally spanning stairs, Design of dog legged RCC stairs

Section D

Unit 5. Columns and Isolated Footings:

Concept of long and short columns, IS specifications for main and lateral reinforcement including spiral reinforcement, Behaviour of RCC columns under axial load, Design of Axially loaded short and long columns with different end Condition, Design of isolated footings to determine depth and width of foundation

Unit 6. Prestressed concrete:
Introduction to pre and post tensioning methods

**Lab Experiments:**

Design of G+1 R.C.C. Building with its entire component (beam, slabs, column and footing).

**RECOMMENDED TEXT BOOKS**

1. Punmia, BC; "Reinforced Concrete Structure Vol I", Delhi Standard Publishers Distributors

**REFERENCE BOOKS**

1. Mallick, SK; and Gupta, AP; "Reinforced Concrete", New Delhi, Oxford and IBH Publishing Co
2. Gambhir, M.L., "Reinforced Concrete Design", Macmillan India Limited
3. Verghese “Reinforced Concrete Design”

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**Theory**

Class Work: 50 Marks

Exam: 50 Marks

Total: 100 Marks

Duration of Exam: 3 Hrs
Unit 1. Introduction:

Brief history of railways, advantages of railways, Indian railways and its salient features, Railway surveys, Factors influencing the railways route, brief description of various types of railway survey

Rail & Rail Gauge: Definition, types, practice in various countries and India, Uniformity of gauge, uni-gauge project of Indian Railways permanent way and its requirements, types of rails, steel for rails, corrugation, corrosion of rails, welding of rails, wear, methods to reduce wear, failure, coning of wheels, hogged rails, buckling, their cause and remedies creep: definition, causes, effects and remedies

Unit 2. Sleepers & Ballast:

Functions of sleepers, types of sleepers, requirements of an ideal material for sleepers. Brief idea of timber and steel sleepers, concrete and pre-stress type sleepers: their salient features and advantages Function of ballast, requirements of an ideal material for ballast, various methods used, size and quantity of ballast

Unit 3. Introduction Bridge:

Its function and component parts, difference between a bridge and a culvert.

Classification of bridge their structural elements and suitability: According to life-permanent and temporary, According to road way level – Deck, through and semi-through, According to material – wooden, steel, RCC, pre-stressed and masonry, According to structural form; Beam type –RCC, T-Beam, steel girder bridges, plate girder and box girder, balanced cantilever.

Unit 4. Trussed bridges:

N and warren, Arch type – open spandrel and filled spandrel barrel and rib type, Suspension type – unstiffened sling type, its description with sketches, According to the position of highest flood level submersible and non submersible

Unit 5. Site Selection and Collection of Data:

Factors affecting the selection of site for a bridge, data to be collected Definition and necessity of tunnels,. Typical section of tunnels for a national highway and single and double broad, gauge railway track , Transfer of centre line of tunnel by shaft method, Method of construction of tunnels in soft rock by needle beam method, Method of construction of tunnels in hard rock with full face method and safety precaution to be taken, other methods of tunneling (names only)

Unit 6. Lining, Ventilation Drainage and Lighting of tunnels:

Necessity and methods of ventilation, by combination of blowing and exhaust , method of draining water in tunnels of tunnels, lightning of tunnels.

Notes:
Field visits may be organized to Bridge construction site or a bridge/Tunnel construction site/Railways tracks to explain the various components.

RECOMMENDED TEXT BOOKS

1. Ketki, Rangwala; ‘Railway Bridges and Tunnel Engineering’, Anand, Charotar Book Stall

REFERENCE BOOKS

1. S.P. Bindra, Bridge Engineering
2. Deshpande, R: “A Text Book of Railway Engineering”, Poonam United Book Corporation
3. Vaswani, NK; “Railway Engineering”, Roorkee Publishing House
7. IRC Bridge Codes
8. MOST drawings for various types of bridges
9. MOST pocket books for bridge Engineers, 2000 (First Revision)

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<th>CEL065</th>
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Theory
Class Work: 50 Marks

Lab
Class Work: 20 Marks
Section A

Unit 1. Introduction and Physical Properties of Soils:

Importance of soil studies in civil engineering, Geological origin of soils with special reference to soil profiles in India, Residual and transported soil, Alluvial deposits, lake deposits, dunes and Loess, glacial deposits, conditions in which above deposits are formed and Their engineering characteristics. Names of organizations dealing with soil engineering work in India, soil Map of India

Constituents of soil and representation by a phase diagram, Definitions and meaning of void ratio, porosity, degree of saturation, Water content, specific gravity, unit weight, dry unit weight of soil grains, Simple numerical problems with the help of phase diagrams

Section B

Unit 2. Soils Classification and Identification: Particle size, shape and their effect on engineering properties of soil, Gradation and its influence on engineering properties, Relative density and its use in describing cohesion-less soils, Behaviour of cohesive soils with change in water content, Atterberg Limits-definitions, use and practical significance Field identification tests for soils BIS soil classification system as per IS 1498; basis, symbol, major Divisions and sub divisions, groups, plasticity chart; procedure to be Followed in classifying a given soil into a group Black cotton soils: Properties and their effect on construction of buildings And other structures

Unit 3. Effective Stress:

Stresses in subsoil, Definition and meaning of total stress, effective stress and neutral stress, Principle of effective stress, Importance of effective stress in engineering problems

Section C

Unit 4. Soil Compaction:

Various terms used to discuss degree of compaction and necessity of Compaction, Laboratory compaction test (standard and modified as per BIS) definition And importance of optimum water content, maximum dry density; Moisture dry density relations for typical soils with different compactive Efforts, Field compaction; methods and equipment, choice of equipment Compaction control

Unit 5. Bearing Capacity: Concept of bearing capacity, Definition and significance of ultimate bearing capacity, net safe bearing Capacity and allowable bearing pressure, Bearing capacity from building BIS
codes (IS 6403), Factors affecting bearing capacity, Concept of vertical stress distribution in soils due to foundation loads, Pressure bulb, Plate load test (no procedure details) and interpretation of its results.

Section D

Unit 6. Foundation Engineering:

Concept of shallow and deep foundation; types of shallow foundations and their Suitability. Factors affecting the depth of shallow foundations, deep foundations, type of piles and their suitability; constructional features of pile foundations, pile classification on the basis of material, method of load transmission, method of installation.

PRACTICAL EXERCISES

I) Determination of water content by ovendrying method and rapid moisture meter
II) Field Density Measurement (Sand replacement and core cutter method)
III) Liquid Limit and Plastic Limit Determination:
IV) Specific gravity of soil solids by pycnometer
V) Laboratory Compaction Tests
VI) Unconfined Compression Test
VII) Direct shear test on sandy soil samples
VIII) Conduct of standard penetration test
IX) Vane shear test on cohesive soils

RECOMMENDED TEXT BOOKS


REFERENCE BOOKS

ii) Sehgal, SB; "A Text Book of Soil Mechanics"; Delhi, CBS Publishers and Distributors


iv) Gulati, SK; "Engineering Properties of Soils", Tata McGraw Hill

vi) Khan, Iqbal H, “A Text Book of Geotechnical Engineering”, Delhi, Prentice Hall of India


x) BIS Codes IS 6403 (latest edition) and IS 1498 (latest edition)

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Section A

Unit 1. Introduction:

Introduction to quantity surveying and its importance, Duties of quantity surveyor Preliminary estimates, Plinth area estimate, Cubic rate estimate, Estimate per unit base, Detailed estimates, Definition, Stages of preparation, details of measurement and calculation of quantities and abstract.

Unit 2. Measurement and Abstract:

Units of measurement for various items of work as per BIS:1200, Rules for measurements, Different methods of taking out quantities – centre line method and long wall and short wall method.

Preparation of Detailed and Abstract Estimates from Drawings for- A small residential building with a flat roof and pitched roof building comprising of two rooms with W.C., bath, kitchen and verandah, Earthwork for unlined channel, WBM road and pre-mix carpeting, Single span RCC slab culvert, Earthwork for plain and hill roads, RCC work in beams, slab, column and lintel, foundations, users septic tank 10 to 50 users.

Section B

Unit 3. Calculation of quantities.
Cement mortars of different proportion, Cement concrete of different proportion, Brick/stone masonry in cement mortar, Plastering and pointing, White washing, painting, R.C.C. work in slab, beams.

**Unit 4 Analysis of Rates:**
Steps involved in the analysis of rates, Requirement of material, labour, sundries, contractor’s profit and overheads, Analysis of rates for finished items when data regarding labour, rates of material and labour is given:
- Earthwork in excavation in hard/ordinary soil and filling with a concept of lead and lift
- RCC in roof slab/beam lintels/columns
- Brick masonry in cement mortar
- Cement Plaster
- White washing, painting
- Stone masonry in cement mortar

**Section C**
**Unit 5 Contractorship**
- Meaning of contract
- Qualities of a good contractor and their qualifications
- Essentials of a contract
- Types of contracts, their advantages, dis-advantages and suitability, system of payment
- Single and two cover-bids; tender, tender forms and documents, tender notice, submission of tender and deposit of earnest money, security deposit, retention money, maintenance period
- Classification and types of contracting firms/construction companies.

**Section D**
**Unit 6 Preparation of Tender Document based on Common Schedule:**
- Introduction to CSR and calculation of cost based on premium on CSR
- Exercises on writing detailed specifications of different types of building works from excavation to foundations, superstructure and finishing operation
- Exercises on preparing tender documents for the following
a) Earth work
b) Construction of a small house as per given drawing
c) RCC works
d) Pointing, plastering and flooring
e) White-washing, distempering and painting
f) Wood work including polishing
g) Sanitary and water supply installations
h) False ceiling, aluminum (glazed) partitioning
i) Tile flooring including base course
j) Construction of W.B.M/Concrete road

RECOMMENDED TEXT BOOKS:

REFERENCE BOOKS
Section A

Unit 1. INTRODUCTION, HIGHWAY PLANS, HIGHWAY ALIGNMENT AND SURVEYS:


Unit 2. CROSS SECTION ELEMENTS AND SIGHT DISTANCE CONSIDERATIONS:


Section B

Unit 3. DESIGN OF HORIZONTAL AND VERTICAL ALIGNMENT:


Unit 4. TRAFFIC CHARACTERISTICS, SURVEYS and CONTROL DEVICES:

Section C

Unit 5. HIGHWAY MATERIALS: SOIL AND AGGREGATES:


Section D

Unit 6. BITUMINOUS MATERIALS AND BITUMINOUS MIXES:


Lab Experiment:

1. Aggregates impact test.
2. loss –angles abrasion test on aggregates.
3. Deval attrition test on aggregates.
4. crushing strength test on aggregates.
5. Penetration test on bitumen.
6. Ductility test on bitumen.
7. Viscosity test on Bituminous materials
8. softening point test on Bitumen

TEXT BOOK


REFERENCE BOOKS

PRACTICAL EXERCISES

1. Introduction and use of AutoCAD

2. Development of various drawing elements e.g. line, rectangle, circle, surfaces etc.

3. Develop plan, elevation, section of single storey building by using AutoCAD

4. Development of 3D view of building

5. Development of various layouts like electrical, sanitary, water filling using layers

Concept
Diploma in Civil Engineering

Syllabus of VI<sup>th</sup> Semester

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Theory

Class Work: 50 Marks

Exam: 100 Marks

Total: 150 Marks

Duration of Exam: 3 Hrs

Section A

Unit 1. Introduction:

Definition of irrigation, Necessity of irrigation, History of development of irrigation in India, Major, medium and minor irrigation projects

Unit 2. Water Requirement of Crops:
Principal crops in India and their water requirements, Crop seasons – Kharif and Rabi, Soil water, soil crop and water relationships, duty, delta and base period, their relationship, Gross commanded area (GCA), culturable commanded area (CCA), intensity of irrigation, irrigable area

Section B

Unit 3 Methods of Irrigation:

Flow irrigation - its advantages and limitations, Lift Irrigation – Tube well and open well irrigation, their advantages and disadvantages, Sprinkler irrigation conditions favourable and essential requirements for sprinkler irrigation, sprinkler system – classification and component parts, Drip irrigation, suitability of drip irrigation, layout, component parts, advantages

Unit 4. Canals:

Classification, apurtenances of a canal and their functions, sketches of different canal cross-sections (unlined) Various types of canal lining - their related advantages and disadvantages, sketches of different lined canal x-sections, Breaches and their control, Maintenance of lined and unlined canals

Section C

Unit 5. Tube Well Irrigation:

Introduction, occurrence of ground water, location and command, advantages and disadvantages, comparison with canal irrigation, Tube wells, explanation of terms: water table, radius of influence, depression head, cone of depression, confined and unconfined aquifers, Yield of a well and methods of determining yield of well, Types of tube wells, cavity, strainer and slotted type; Method of boring, installation of well assembly, development of well, pump selection and installation and maintenance, Water Harvesting Techniques: Need and requirement of various methods, Run-off from roof top and ground surface, construction of recharge pits, and recharge wells and their maintenance.

Section D

Unit 6. Dams

Classification of dams; earthen dams - types, causes of failure; crosssection of zoned earthen dams, method of construction, gravity dams –types, cross-sections of a dam, method of construction, Concept of small and micro dams, Concept of spillways and energy dissipators

RECOMMENDED BOOKS


2. Garg, Santosh Kumar, ‘Irrigation Engineering and Hydraulics Structures’, Khanna Publishers, Delhi,
3. Punmia, BC; and Pande Brij Bansi Lal, ‘Irrigation and Water Power Engineering’, Delhi, Standard Publishers Distributors, Delhi,


5. Sharma, SK; ‘Principles and Practice of Irrigation Engineering’, Prentice Hall of India Pvt. Ltd., New Delhi,


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Theory                                                                                                                Lab

Class Work: 50 Marks                                                                 Class Work: 20 Marks
Exam: 100 Marks                                                                                                           Exam: 30 Marks
Total: 150 Marks                                                                                                          Total: 50 Marks
Duration of Exam: 3 Hrs                                                                                                    Duration of Exam: 3 Hrs

Section A

Unit 1. INTRODUCTION:
Connections; Importance, various types of connections, simple and moment resistant, riveted, bolted and welded connections.

Unit 2. DESIGN OF TENSION MEMBERS:
Introduction, types of tension members, net sectional areas, design of tension members, lug angles and splices design problems.
**Unit 3. DESIGN OF COMPRESSION MEMBERS:**

Introduction, effective length and slenderness ratio, various types of sections used for columns, built up columns, necessity, introduction to built up columns, lacing and battening.

**Section B**

**Unit 4. COLUMN BASES AND FOOTINGS:**

Introduction, types of column bases, design of slab base and gusseted base, design of gusseted base subjected to eccentrically loading, design of grillage foundations design problems.

**Section C**

**Unit 5. DESIGN OF BEAMS:**

Introduction, types of sections, general design criteria for beams, design of laterally supported and unsupported beams, design of built up beams, web buckling, web crippling and diagonal buckling design problems.

**Section D**

**Unit 6. GANTRY GIRDERS AND PLATE GIRDER:**

Introduction, various loads, specifications, design of gantry girder, Introduction, elements of plate girder, design steps of a plate girder, necessity of stiffeners in plate girder, various types of stiffeners, web and flange splices (brief introduction), Curtailment of flange plates, design beam to column connections: Introduction, design of framed and seat connection.

**STEEL STRUCTURE DRAWINGS LAB**

(1) Drawing of Rivets and types of welds. Structural drawings of various types of welded connections.

Beam to column connections (framed & seat connections)

Column bases; slab base, gusseted base and grillage foundation, Plate girder, Roof truss.

**TEXT BOOK**


**REFERENCE BOOKS**


<table>
<thead>
<tr>
<th>CEL066</th>
<th>Foundation Engineering</th>
<th>L</th>
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Theory

Class Work: 50 Marks

Exam: 100 Marks

Total: 150 Marks

Duration of Exam: 3 Hrs

Section – A

Unit 1. Site Investigation:

Need to investigate, investigation methodologies such as Geophysical & Remote sensing, Drilling technologies, Pits-trenches & shafts, In-situ & laboratory testing, Sampling Techniques, Presentation of results of site investigation.

Unit 2. Analytical Techniques:

Failure mechanism in shallow and deep foundations, Terzaghi’s theory & generalized Bearing capacity equation (No derivation) Use of the equation for strip, square & rectangular footings. Determination of bearing capacity from field tests by using N-values, Using qc values, plate load test & its limitations, Standard Penetration Test (SPT), Factors affecting bearing capacity of foundation bed.

Section – B

Unit 3 Earth Pressure Analysis:

Lateral earth pressure, States of failure, Rankine’s Theory, Coulomb's Theory,( No derivation), Culmann’s method, and various factors affecting Lateral Earth pressure.
Calculation of earth pressures under drained and un-drained conditions. Tension cracks & height of unsupported cut.

Section – C

Unit 4. In-situ Densification of soils:

Response of sands & clays to externally applied stress, compaction piles in sands, Impact compaction of sands, vibratory compaction in sands, vibroflotation.

Section – D

Unit 5. Foundations on Black Cotton Soil:

Characteristics of B. C. soils, problems of foundations in B.C. soils, foundation techniques in B.C. soils. (3 hours)

Unit 6. Geosynthetics:

Why geosynthetics, types of geosynthetics, functions, properties & functional requirements, Designing with Geosynthehtics.

Text Books :


Reference Books

1. Foundation Design by W.C. Ten
2. Foundation Engineering by Dr. B.J. Kasmalkar.

<table>
<thead>
<tr>
<th>CEL068</th>
<th>Pre-stress concrete Structures(Elective)</th>
<th>L</th>
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Theory

Class Work: 50 Marks

Exam: 100 Marks
Total: 150 Marks
Duration of Exam: 3 Hrs

Section A

Unit 1.
Application of limit state method of design of pre-stressed concrete elements.

Unit 2.
Design of section for tension, compression, by limit state method.

Section B

Unit 3.
Design of section for flexure and shear by limit state method.

Unit 4.
Design of section for bond, by limit state method.

Section C

Unit 5
Design off end blocks by different methods.

Section D

Unit 6
Linear transformation and concordant cables.
Theory

Class Work: 50 Marks

Exam: 50 Marks

Total: 100 Marks

Duration of Exam: 3 Hrs

Section A

1. Introduction to Seismic Design Parameters: Introduction to Earthquakes, Causes of earthquakes, Epicenter, Hypocenter, Earthquake waves: Primary waves, secondary waves, long waves, Seismic Region: Seismic zones in India, Intensity and isoseismal of an earthquake, Magnitude and energy of earthquake


Section B

3. Introduction to ductile detailing provisions of IS:13920 for Reinforced Concrete Buildings

4. Introduction to IS:4326 for construction of earthquake resistant masonry buildings

Section C

5. Special construction methodologies, tips and precautions to be observed while planning, designing and construction of earthquake resistant buildings

Section D

6. Disaster Management: Disaster rescue, psychology of rescue, rescue workers, rescue plan, rescue by steps, rescue equipment, safety in rescue operations, debris clearance and casualty management.

RECOMMENDED BOOKS

1. Elements of Earthquake Engineering by Jai Krishana and AR Chandersekar; Sarita Parkashan, Meerut.

2. Building Construction by BL Gupta and NL Arora, Satya Prakashan, New Delhi
3. Manual Published by Earthquake Engineering department, IIT Roorkee

4. IS 1893-2002

5. IS 13920

6. IS 4326