

Teaching Scheme	Examination Scheme
Theory : 3 lecture per week	CT- 20
Tutorial: Nil	Attendance, Assignment & Quiz -10
Practical: Nil	End Semester Exam(ESE) - 70
Credit :- 3	Total Marks 100

Aim:-

1. Developing the surveying skill required for civil engineering.

Objective :-Students will be able to:

1. Use the survey instruments.
2. Take linear and angular measurements.
3. Measure the area of land.
4. Prepare layouts and maps.
5. Set out alignments for roads, railways, canals, pipelines, tunnels etc.
6. Prepare contour map.
7. Compute area and volume from given contour map.

Pre-Requisite :-

Student should be perfect in drawing and sketching.

Sl No	Topic	Contact period	Maximum Marks
1	Unit -1 Types Of Survey	2	6
2	Unit -2 Measurement of horizontal distance	9	12
3	Unit – 3 Compass Survey	9	14
4	Unit – 4 Levelling	14	14
5	Unit – 5 Contouring	4	8
6	Unit – 6 Area measurements	4	10
7	Unit – 7 Plane Table Surveying	6	6
	TOTAL =	48	70

Contents: Theory (Surveying) 3Hrs/week

Unit -1Types of Survey

Definition, objects of surveying, principles of surveying, uses of survey, classification of surveying - primary – plain, geodetic, secondary – based on instruments, method, object, nature of field.

Unit -2 Measurement of horizontal distance

2.1Introduction

2.2 Methods of measuring horizontal distance – pacing, odometer reading, tacheometry, electronic distance measurement, chaining and taping

2.3 Principles of chain surveying and accessories for chaining and taping - chain, tape, ranging rod, arrows, pegs, cross staff, optical square, ranging rod, plumb bob, object rod

2.4 Measurement by chain – on level ground and on sloping ground, reduction to measurement in slope, ranging – direct and indirect ranging

2.5 Systematic errors in linear measurement by chain or tape – incorrect length, tape or chain not horizontal, fluctuation in temperature, incorrect tension or pull, sag and incorrect alignments and chain or tape not straight, necessary corrections, **numerical problems**

2.6 Chain and tape survey of a field - survey lines, check lines, tie lines, base line. taking offsets – perpendicular and oblique offset, long and short offset, degree of offset, error in offset, limiting length of offset, points to be considered in selecting station

2.7 Setting out right angles – a. by instruments (cross staff, optical square, their working methodology and specific use in field) b. by chain or tape

2.8 Obstacles in chaining – obstacles to ranging but not chaining, obstacles to chaining but not ranging, obstacles to both chaining and ranging, **numerical problems**

2.9 chain & cross staff survey for finding area of a field (**numerical problems**)

2.10 Field work for chain survey, booking the field work, conventional signs related to survey, degree of accuracy of chaining

Unit – 3 Compass Survey

3.1 Brief introduction to different types of horizontal angles and directions, Principle of compass survey, bearing of lines – meridian – true, magnetic, and arbitrary bearing, fore bearing, back bearing, whole circle bearing, quadrantal bearing system and reduced bearing, conversion of bearings, finding included angles from bearings, declinations, dip of the magnetic needle. (**Numerical problems**)

3.2 Prismatic compass, and trough compass – component, construction and use.

3.3 Local attraction, causes, precautions to be taken to avoid local attraction and correction of bearings affected due to local attraction, calculation of included angles.

3.4 Traversing – open traverse, closed traverse, check on open and closed traverse, Graphical adjustment for closing error.

3.5 **Numerical problems** on calculation of bearings, angles and local attraction.

3.6 Error in compass surveying – instrumental error, personal error and natural error, permissible value of error

Unit – 4 Levelling

4.1 Definitions – level surface, level line, horizontal line, vertical line, datum surface, mean sea level, reduced level, bench mark and its types.

4.2 Study and use Engineers' level – a. dumpy level – components, construction b. tilting level and c. automatic level or self levelling level

4.3 Terms used in levelling - line of sight, line of collimation, bubble tube axis, leveling staff – telescopic and folding type, foresight, back sight, intermediate sight, change point, height of collimation, fundamental axes and their relationship, recording in level book, temporary adjustments of dumpy level, procedure for permanent adjustment

4.4 Method of reduction of levels – height of instrument method and rise and fall method- relative merit and demerits, arithmetical checks, numerical problems, computation of missing readings.

4.5 Classifications of leveling - simple, differential, profile, cross sectional, fly and check levelling (**numerical problems**)

4.6 Sources of errors in levelling – instrumental error, personal error and natural error, precautions and reducing errors and eliminating mistakes in levelling, error adjustment, permissible error in levelling, difficulties faced in levelling.

Unit – 5 Contouring

5.1 Definitions – contour, contour interval, horizontal equivalent.

5.2 Characteristics of contours (e.g. pond, cliff, overhanging cliff, etc) method of locating contours – indirect method of contouring (interpolation of contours), direct contouring methods, establishing grade contours.

5.3 Uses of contour maps, interpretation of typical contour sheets.

Unit – 6 Area measurements

6.1 Introduction

6.2 Methods of measuring areas

6.2.1 Area of a tract with irregular boundaries – graphical method, mid ordinate rule, average ordinate rule, trapezoidal rule, Simpson's rule (only formula and their applications) – **numerical problems**

6.2.2 Use of planimeter for measurement of area

Unit – 7 Plane Table Surveying

7.1 Introduction – principle of plane table surveying

7.2 Equipment and accessories in plane table surveying, their use

7.3 Working with plane table – fixing, levelling, centering, orientation – by trough compass and by back sighting

7.4 Different methods of plane tabling work: a. radiation, b. intersection, c. traversing and d. resection – three point problem

7.5 Advantage and disadvantage of plane table survey, errors in plane table survey – instrumental, in plotting and due to manipulation and sighting.

Assignment shall consist of record of all practical and projects in field book and drawing of Project work on full imperial size drawing sheets.

- 1) Measurement of distances with chain & tape on ground with direct or indirect ranging.
- 2) Construction and use of optical square and open cross staff for setting out perpendicular and running a survey line for locating details .
- 3) Measurement of area by chain and cross staff survey.
- 4) Use of prismatic compass and observing fore bearing and back bearing.
- 5) Measuring fore bearing and back bearing of 5-6 side closed polygon. Identifying stations affected by local attraction and calculation of corrected f.b. & b.b.
- 6) Measuring fore bearing and back bearing for an open traverse (5 to 6 sided). Calculate direct angles between successive lines.
- 7) Use of dumpy level, temporary adjustments and taking reading on levelling staff. Recording readings in field book.
- 8) Differential levelling practice, reduction of level by h.i. method.
- 9) Differential levelling practice, reduction of level by rise & fall method.
- 10) Carrying bench mark from one point to another point about 200 m by fly levelling with dumpy level/tilting Level.
- 11) Use of auto level and taking observation.
- 12) Measurement of area of irregular figure by polar planimeter/Measuring area enclosed by closed contours on contour map prepared earlier, by simple digital Planimeter
- 12) Using accessories carry out temporary adjustments of plane table. Locating details by method of radiation.
- 13) Locating details with plane table by method of intersection.

Note: during initial phase of implementation of curricula number and nature of jobs within the assignment work may be compromised. However lacuna should be rectified at the earliest.

Text books:

Name	Authors	Publisher	Editions
Surveying and Levelling	R. Subramanian	Oxford University Press	
Fundamental of surveying	S.K.Roy	PHI	

Plane surveying	A.M.Chandra	New age international	
Surveying and Levelling vol. I and II	S. K. Duggal	TATA MC GRAW-HILL	
Surveying and Levelling vol. I and II	Dr. B. C. Punmia	Laxmi Publication	

WBSCCTE

Teaching Scheme	Examination Scheme
Theory : 3 lecture per week	CT- 20
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Practical: Nil	End Semester Exam(ESE) - 70
Credit :- 3	Total Marks 100

Aim:-Developing the conceptual knowledge in building material, construction, problems and its remedies.

Objective:-

1. Identify various components of buildings and their functions.
2. Mark layout of building on ground.
3. Know the procedure for execution of various constructions activities.
4. Check line, level and plumb of various construction activities.
5. Prepare checklist of operations for supervision of various construction activities.
6. Identify & suggest rectification the various defects in civil engineering works.

Pre-Requisite:-

1. Student should be able to read the building plans.
2. Student should be able to think over the construction problems and their remedies.
3. Student should know the basic properties of material being used in the construction of the building.

Sl No	Topic	Contact period	Maximum Marks
Unit-1	Building components and materials	8	14
	1.1 Building components and types of structure		
	1.2 Masonry materials		
Unit 2	Construction of substructure	8	12
Unit 3	Construction of superstructure	12	14
Unit 4.	Building finishes	11	14
Unit 5	Wall Finishes	3	8
Unit 6	Building maintenance	6	8
	TOTAL =	48	70

Contents: Theory (Building Materials &Construction) 3Hrs/week

Unit -1 Building components and materials

1.1 Building components and types of structure

Building components & their function, Substructure – foundation, plinth, Superstructure – walls, sill, lintel, doors & windows, floor, roof, parapet, beams, columns; Types of structures – load bearing structures, framed Structures, composite structures.

1.2 Masonry materials

Building stones- classification of rocks (physical, chemical), requirement of good building stone, dressing of stones, quarrying of stones, artificial or cast Stones

Bricks – conventional bricks, standard bricks, composition of clay brick, strength of bricks, proportions of burnt clay bricks, testing of bricks, special bricks (fire clay brick, refractory brick, hollow blocks, fly ash bricks).

Mortars – classifications, lime mortar, cement mortar, composite mortar, special mortars, functions of mortar, proportions, properties of mortar and tests for mortar.

Timber & Timber based material - Use of timber, characteristics of good timber, defects in timber, plywood, particle board, veneer, sun mica, artificial timber, rubber wood.

Miscellaneous materials - Glass, plastic, fibers, aluminum, steel, galvanized iron, asphalt bitumen etc, micro silica, pvc, cpvc, ppf, waterproofing and termite proofing materials, admixtures in concrete, bonding agents, epoxy resins, polishing materials etc

Unit 2. Construction of substructure:

2.1 Job layout

Site clearance, preparing job layout, layout for load bearing structure and framed structure by center line, precautions while marking layout on ground.

2.2 Earthwork

Excavation for foundation, Shoring and strutting, earthwork for embankment, material for plinth filling, tools and plants used for earthwork.

2.3 Foundation

Types of foundation – open foundations, shallow foundation, stepped foundation, isolated and combined column footing, raft foundation, deep foundation and pile foundation; Pumping method of dewatering, cofferdams, bearing capacity of foundation soil, under reamed pile foundation.

Unit 3 Construction of superstructure

3.1 Stone masonry - Terms used in stone masonry – facing, backing, hearting, through stone, Corner stone, uncoursed rubble masonry, coursed rubble masonry, point to be observed in construction of stone masonry, mortars for stone masonry, tools and plants used for stone masonry, col-grout masonry.

3.2 Brick masonry - Common terms used in brick masonry, requirements of good brickwork, bonds in brick masonry (English, flemish, stretcher and header bonds, junction of wall – main wall to main wall and main wall to partition wall only), brick laying, line level and plumb of brickwork, striking and raking of Joints, lead and lift, precautions in brick masonry, tools and plants used in brick masonry, pointing, comparison between brick and stone masonry. Hollow concrete block Masonry, composite masonry, Cavity wall- purpose and construction.

3.3 Doors and windows

Doors -components and construction of panelled doors, battened doors, flush doors, collapsible doors, rolling shutters, revolving doors, glazed doors, sizes of door, PVC door

Windows - component and construction of fully panelled, partly panelled and glazed, glazed wooden, steel, aluminum windows, sliding windows, louvered window, ventilators, cement grills, protective treatment for doors and windows, fixtures and fastenings for doors and window, sill, lintel and weather shed - functions, types and construction.

3.4 Vertical communication - Means of vertical communication – stair case, elevator, ramp, requirement of good staircase, types of staircase, fabricated stair.

3.5 Scaffolding and shoring- Purpose, types of scaffolding, process of erection and dismantling; purpose and types of shoring, underpinning, safety precautions.

Unit 4 Building finishes

4.1 Floors and roofs - floor finishes - shahabad, kota, marble, granite, kadappa, ceramic tiles, vitrified, mosaic tiles, chequered tiles, glazed tiles, pavement blocks, concrete floors, tremix floor, skirting and dado, terrazzo flooring, IPS flooring; Process of laying - process of laying and construction, finishing and polishing of floors.

4.2 Roofing materials – ac sheets, G.I sheets, plastic sheets, fibre sheets, mangalore tiles etc. Steel trusses. Timber trusses, R.c.c. slab

4.3 Water Proofing Treatment

Introduction, material required for water proofing and its specification, Water proofing of water closet and bath room, procedure & Cross section, Terrace and basement water proofing, Precautions to be taken while water proofing.

4.4 Termite Proofing

Introduction, general principles of termite proofing, Methods of termite proofing, Material used in termite proofing treatment.

4.5 Damp Proofing

Sources of dampness & its effects, Material used for damp proofing, Methods of damp – proofing. Damp proofing treatment, in building such as basement, floors, walls.

Unit 5 Wall finishes

5.1 **Plastering** – necessity of plastering, single coat plaster double coat plaster, neeru finishing and pop, special plasters stucco plaster, Plaster board and wall claddings. Precaution to be taken while, Plastering. Defects in plaster.

5.2 **Pointing** – necessity, types and procedure of pointing.

5.3 **Painting** – necessity, surface preparation, method of application, selecting suitable painting material, white wash and colour wash.

Unit 6. Building maintenance

6.1 **Cracks** - causes and types of cracks, identification and repair of cracks, guniting and grouting, use of epoxy and crack fills, remedial measures

6.2 **Settlement** - causes and remedial measures; Plinth protection – necessity and materials used.

6.3 **Demolition** - Necessity, method of demolition-hand demolition, machine demolition, Controlled blasting demolition, precautions during demolition.

6.4 **Rebaring techniques** - Necessity and equipment for rebaring techniques

List of assignment:

1. Preparing foundation plan and marking on ground layout of load bearing structure by face line method from the given plan of the building.
2. Preparing foundations plan and marking on ground layout of framed structure by face line method from the given plan of the building.
3. Checking and transferring line and level of plinth, sill, lintel, flooring, slab level of a building and writing report of the process.
4. Checking verticality (plumb line) of formwork for column, beam and wall at construction site and writing report of the process.
5. Laying and constructing the process of construction of brickwork and report writing of the process.
6. Observing the process of painting in residential / public building and writing a report with reference to process and type of paint selected.
7. Observing and writing report of the process of plastering.
8. Observing and writing report of the process of water proofing of terrace or basement.

Observing the models, specimen of building materials kept in the model room for few building items and writing a report for any five models/materials.

Text books:-

Titles of the book	Name of authors	Edition	Name of the publisher
Construction Materials	D.N. Ghose		Tata Mcgraw-Hill
Building construction Engg	Gurcharan Singh		
Building Construction Vol. I to IV	W. B. Mackay		Pearson
Building Materials	S. K. Duggal		New Age International

Engineering Materials	Sharma		Phi Publication
Building Construction	S. P. Arora And Bindra		Dhanpat Rai Publication
Building Construction	B. C. Punmia		Laxmi Publication
Building Construction	S.K. Sharma		Tata Mcgraw-Hill
Building Construction	Sushil Kumar		Standard Publication
Building materials			NITTTR
A to z of BuildingConstruction	Mantri Construction		Mantri Publication

WBSCCTE

Teaching Scheme	Examination Scheme
Theory : 3 lecture per week	Mid Semester Exam- 20
Tutorial: NIL	Assignment & Quiz - 10
Practical : NIL	End Semester Exam(ESE) - 70
Credit :- 3	Total Marks - 100

Aim:-

1. Study of cement and concrete.

Objective:-The Students will be able to

- 1 Determine the properties of concrete ingredients i.e. cement. sand. coarse aggregate by conducting different tests.
- 2 Use different types of cement as per their properties for different fields applications.
- 3 Design economic mix proportion for different exposure conditions and intended purposes.
- 4 Supervise various concreting operations.
- 5 Carry out field and laboratory tests on concrete in plastic and hardened stage.
- 6 Use different types of admixtures to improve the properties of concrete for different field applications.
- 7 Describe different types of concrete.
- 8 Infer the test results as per relevant I.S. Provisions.

Pre-Requisite:-

1. Student should take survey of different types of materials used in building construction.

Sl No / unit no	Topic	Contact period	Marks
Unit 1	Cement	2	4
Unit 2	Types, Properties and Testing of cement	5	8
Unit 3	Properties of Aggregates and Testing	5	8
Unit 4	Water	2	5
unit 5	Admixtures and Construction Chemicals	3	6
Unit 6	Properties of Concrete	5	8
Unit 7	Concrete Mix Design	9	8
Unit 8	Quality Control of Concrete	10	10
UNIT 9	Concreting under special circumstances	3	5
Unit 10	Properties of Special Concrete	4	8

Contents: Theory (Concrete Technology) 3 Hrs/week

Unit-1 Cement:

- 1.1 Chemical composition, hydration of cement, heat of hydration, cement compounds.

Unit-2. Types, Properties and Testing of cement:

2.1 Physical properties, specifications as per relevant IS codes & field application of the following types of cement:

(i) Ordinary Portland cement (OPC), (ii) Rapid Hardening Portland cement (RHPC), (iii) Low Heat Cement, (iv) Portland Pozzolana Cement (PPC), (v) Blast furnace slag cement, (vi) Sulphate resisting cement, (vii) White cement, (viii) Quick setting Cement, (ix) Hydrophobic Cement

2.2 Testing of cement: (i) Fineness test (ii) Standard Consistency test (iii) Setting Time test (initial & final setting times) (iv) Compressive Strength test (v) Soundness test. Different grades of OPC 33, 43, 53 & their specifications of physical properties as per relevant I. S. codes. Adulteration of cement (field test), storing of cement at site, effect of storage of cement on properties of cement / concrete.

2.3 Field testing of cement

Unit -3 Properties of Aggregates and Testing:

3.1 Properties of fine aggregates:

Classification, Concept of size, shape, surface texture, strength, specific gravity, bulk density, water absorption, surface moisture, soundness, bulking impurities, alkali-aggregate reaction, source.

3.2 Determination of fineness modulus & grading zone of sand by sieve analysis, determination of silt content in sand & their specification as per IS 383 (**simple problems on fineness modulus**)

3.3 Bulking of sand, phenomenon of bulking, its effect on concrete mix proportion.

3.4 Properties of coarse aggregates :

Classification, Concept of size, shape, surface texture, water absorption, soundness, specific gravity & bulk density

3.5 Determination of fineness modulus of coarse aggregate by sieve analysis, grading of Coarse Aggregates and its effect on concrete mix proportion.

3.6 Determination of crushing value, impact value & abrasion value of coarse aggregate, flakiness index & elongation index of coarse aggregate and their specification.

Unit - 4 Water:

4.1 Qualities of water and its use as per IS:456-2000.

Unit - 5 Admixtures and Construction Chemicals

5.1 General, Types of admixtures and its effect on properties of concrete.

Unit - 6 Properties of Concrete:

6.1 Introduction to concrete: Definition of concrete, necessity of supervision for concreting operation, different grades of concrete (ordinary concrete, standard concrete & high strength concrete as per provisions of IS:456- 2000), minimum grade of concrete for different exposure conditions, minimum grade of concrete for R.C.C., water retaining structure & in sea water construction, durability of concrete.

6.2 Water cement ratio

Definition of w/c ratio, Duff Abraham w/c law, significance of w/c ratio

6.3 Properties of fresh concrete

Definition of workability, factors affecting workability of concrete. Determination of workability of concrete by slump cone test, compaction factor test, vee bee consistometer & flow table tests. Range values of workability requirement for different types of concrete works, cohesiveness, segregation, harshness, bleeding.

6.4 Properties of hardened concrete

Definition of compressive strength, durability, impermeability, elastic properties of concrete, modulus of elasticity of concrete. Creep, factors affecting creep, shrinkage, factors affecting shrinkage

Unit – 7 Concrete Mix Design

Definition, Objectives of mix design, list of different methods of mix design ,study of mix design procedure by I.S. method as per IS:10262-2009, determination of design mix proportion by mass for M20 grade of concrete using I.S. Method for given data (such as grading zone of sand, proportion of 20 mm & 10 mm aggregates, specific gravities of cement, sand & aggregates , water absorption , surface moisture of fine & coarse aggregate, compacting factor and exposure condition).

Unit – 8 Quality Control of Concrete:

8.1 Selection of ingredients of concrete, Batching, Volume & weigh batching, volume batching for nominal mixes & weigh batching for design mix concrete, Different Types of Mixers(tilting & non-tilting type). Different types of vibrators - needle vibrator, surface vibrator, table vibrator, principle & application of each type of vibrator.

8.2 Transportation, placing, compaction & finishing of concrete:

Modes of transportation of concrete , precautions to be taken during transportation and placing of concrete in formwork compaction of concrete, methods of compaction, care to be taken during compaction, purpose of finishing, types of finishing & methods of application (surface treatment, expose aggregate finish, applied finish, coloured finish), requirement of good finish.

8.3 Curing of concrete:

Definition of curing, necessity of curing, different methods of curing and their application (spraying water, membrane curing, steam curing, curing by infra red radiations, curing by wet gunny bags, ponding methods).

8.4 Testing of concrete

Significance of testing, determination of compressive strength of concrete cubes at different ages, interpretation & co-relation of test results

8.5 Non- destructive testing of concrete

Importance of NDT, methods of NDT - rebound hammer test & ultrasonic pulse velocity test, working principle of rebound hammer and factors affecting the rebound index, specification for deciding the quality of concrete by ultrasonic pulse velocity as per I.S. 13311 (part 1 & 2). Determination of rebound index & compressive strength of concrete by rebound hammer test as per I.S. 13311, determination of quality of concrete by ultrasonic pulse velocity test

8.6 Waterproofing of concrete & joints in concrete construction:

Importance & need of waterproofing, methods of waterproofing & materials used for waterproofing, types of joints, joining old & new concrete, methods of joining, materials used for filling joints.

8.7 Repair materials and rehabilitation of concrete structures.

Unit – 9 Concreting under special circumstances

9.1 Extreme weather concreting

Effect of cold weather on concrete, effect of hot weather on concrete, precautions to be taken while concreting in hot & cold weather condition.

9.2 Under water concreting

Unit – 10 Properties of Special Concrete:

Properties, Advantages & Limitations of the following types of Special concrete:-

- i) Ready mix Concrete
- ii) Steel-fibre reinforced Concrete
- iii) Prestressed Concrete
- iv) Precast Concrete
- vi) Light –weight concrete

vii) High performance Concrete

viii) High strength concrete

ix) Polymer concrete

Text Books:-

Name of Authors	Titles of the Book	Edition	Name of the Publisher
A.R.Santhakumar	Concrete Technology		Oxford Univ.Press
M. S. Shetty	Concrete Technology		S. Chand Publication
M. L. Gambhir	ConcreteTechnology		Tata Mc Graw . Hill Publishing Co. Ltd. New Delhi
P. D. Kulkarni	Text book of Concrete technology		M. H. Ghosh and Phull publication
H.R. Rixom	Chemical Admixtures for concrete		Powells' Books
Reference Books A. M. Neville & J J Brooks	Concrete Technology		Pearson Education (Singapore) Pyt. Ltd. New Delhi

Reference I.S. Codes:

A. 1. I.S.4031- (Part 1 to Part 6) Indian standard method of physical tests for hydraulic cement, BIS, New Delhi.

2. I.S.4031(Part 1) - 1996 Part 1 – Determination of fineness by dry sieving.

3. I.S.4031(Part 2) -1999 Part 2 – Determination of fineness by air permeability method.

4. I.S.4031(Part 3) -1988 (reaffirmed 2000) Part 3– Determination of soundness

5. I.S.4031(Part 4) - 1988 (reaffirmed 1995) Part 4 - Determination of consistency of standard cement paste.

6. I.S.4031(Part 5) – 1988, (reaffirmed 2000) Part 5 - Determination of initial and final setting times

7. I.S:4031(Part 6) – 1988, (reaffirmed 2000) Part 6 - Determination of compressive strength of hydraulic cement other than masonry cement

B. I.S.:2386 (Part i to Part vi) – 1963 Indian standard methods of test for aggregate for concrete. BIS,New Delhi.

• Part i - Particle size and shape. (reaffirmed 1997)

• Part ii - Estimation of deleterious materials and organic impurities. (reaffirmed 2002)

• Part iii - Specific gravity, density, voids, absorption & bulking. (reaffirmed 1997)

• Part iv - Mechanical properties (reaffirmed 1997)

• Part v - Soundness. (reaffirmed 1997)

• Part vi - Measuring mortar making properties of fine aggregate. (reaffirmed 2002

C.I.S. : 383 – 1970 Indian standard specification for coarse & fine aggregates from natural sources for concrete. B.I.S., New Delhi.

D. I.S.:1911- 1959 (reaffirmed) Indian Standard methods of sampling and analysis of concrete), B.I.S., New Delhi.

E. I.S. : 456 - 2000 Indian standard , plain and reinforced concrete – code of practice.

(fourth revision), B.I.S., New Delhi.

F. I.S. : 516 – 1959 Indian standard methods of tests for strength of concrete (xii reprint December 1987), B.I.S., New Delhi.

G. I.S. : 8112- 1989 Indian standard - 43 grade ordinary portland cement Specification

H. I.S. : 12269 – 1987 (reaffirmed 1999) Indian standard specification for 53 grade O.P.C..

I.I.S. : 9103 – 1999 Indian standard –concrete admixtures specification

J. I.S. : 455- - 1989 (reaffirmed 1995) –Indian standard – Portland slag cement specification

K. I.S. : 1489 (part 1) 1991 – Portland – Pozzolana Cement – specification part 1 fly ash based

L. I.S. : 7861 (part 1) 1975 (reaffirmed 1997) – Indian standard of practice for extreme weather concreting part 1 recommended practice for hot weather concreting

M. I.S.: 7861 (part 2) – 1981 (reaffirmed 1997) – Indian standard of practice for extreme weather concreting part 2 – recommended practice for cold weather concreting

N. I.S. : 8041 – 1990 – Indian standard – rapid hardening Portland Cementspecification BIS- New Delhi

O. I.S. : 12330 – 1988 (reaffirmed 1995) – Indian standard specification for sulphate resisting Portland cement

P. I.S. : 12600 - 1989 (reaffirmed 1995) - Portland cement, low heat Specification

Q. I.S. : 10262 – 2009 Indian standard recommended guidelines for concrete mix Design

R. SP 23 handbook on concrete mixes (based on Indian standards)

S.I.S. 13311 (part-1 & 2)- 1992 methods of non-destructive testing of concrete.(part-1 ultrasonic pulse velocity, part-2 rebound hammer

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Aim:-

Study of mechanics of the structures.

Objective: - The students will be able to:

1. Calculate stresses in simple and composite sections.
2. Calculate deformations of the specimen subjected to uni-axial, bi-axial &
3. Tri-axial stress system.
4. Analyse the truss by using different methods.
5. Draw shear force and bending moment diagrams.
6. Calculate moment of Inertia of standard plane section & their composites
7. Calculate shear stress & bending stress in beam cross section.

Pre-Requisite:-

1. Student should be perfect in basic concepts of engineering mechanics and mathematical analysis.
2. Student should be sound in curricula of 'Strength of Materials' pursued in semester 2.

Unit no	Topic	Contact period	Marks
1	Elastic Constants & Principal Stresses	6	5
2	Shear Force And Bending Moment	4	8
3	Stresses In Beams	6	8
4	Analysis of Trusses	4	9
5	Strain Energy	2	4
6	Direct and Bending Stresses	4	7
7	Slope And Deflection	4	8
8	Beams with one or both end fixed	8	8
9	Continuous Beam	8	8
10	Column	2	5

Contents : *Theory* (Mechanics of Structures) 4 Hrs/week

Unit -1: **Elastic Constants & Principal Stresses**

- 1.1 Volumetric strain due to uni-axial force and change in volume
- 1.2 Biaxial and tri-axial stresses and volumetric strain & change in volume
- 1.3 Definition of bulk modulus, volumetric strain.
- 1.4 Relation between modulus of elasticity, modulus of rigidity and bulk modulus.
- 1.5 Definition of principal planes & principal stresses
- 1.6 Principal planes & stress due to bi-axial stress system & due to state of simple shear. (Analytical method and by Mohr's circle diagram)[simple numerical problems]

Unit – 2 **Shear Force And Bending Moment**

2.1 Shear force and bending moment diagrams for simply supported beams, overhanging beams and cantilever subjected to couples and uniformly varying load point of contra flexure (simple numerical problem)

Unit – 3 **Stresses In Beams**

3.1 Bending Stresses in Beams: Concept of pure bending, theory of simple bending, assumptions in theory of bending, neutral axis, neutral plane bending stresses and their nature, bending stress distribution diagram, moment of resistance.

3.2 Application of theory of bending to symmetrical and unsymmetrical sections. (rectangular, circular, T-section and I-section)[**simple numerical problems**]

3.3 Shear stresses in beams: Shear stress equation(no deduction), meaning of terms in equation, shear stress distribution for rectangular, hollow rectangular, circular and hollow circular sections, T-section and I-section[**Stresses In Beams**]

3.4 Relation between max. shear stress and average shear stress. [**simple numerical problems**]

3.5 Introduction to concept of torsion, its formula (no deduction)and signification of notation used, some practical application [**simple numerical problems**]

Unit- 4: **Analysis of Trusses**

4.1 Definition frames, classification of frames, perfect, imperfect, redundant and deficient frame, relation between members and joints, assumption in analysis. Method of joint, method of section and graphical method to find nature of forces

Unit 5: **Strain Energy**

5.1 Types of loading – gradual, suddenly applied load & Impact load

5.2 Definition of strain energy, modulus of resilience and proof resilience.

5.3 Comparison of stresses due to gradual load, sudden load and impact load.

Unit -6: **Direct and Bending Stresses**

6.1 Concept of direct and eccentric loads, eccentricity about one principal axis, nature of stresses, maximum and minimum stresses, resultant stress distribution diagram.

6.2 Condition for no tension or zero stress at extreme fiber, limit of eccentricity, core of section for rectangular and circular cross sections.

6.3 Columns, pillars and chimneys of uniform section subject to lateral wind pressure, coefficient of wind resistance, stress distribution at bases

Unit -7 **Slope and Deflection**

7.1 Concept of slope and deflection, stiffness of beam

7.2 Relation between slope, deflection and radius of curvature, differential equation (no derivation), double integration method to find slope and deflection of simply supported and cantilever beam

7.3 Application of 'Moment area theorem' for determining the slope and deflection at a particular point of a simply supported and cantilever beam for point loading, UDL and moment.

Unit –8 **Beams with one or both end fixed**

8.1 Concept of fixity, effect of fixity, advantages and disadvantages of fixed beam.

8.2 Principle of superposition and its application in finding fixed end moments for beam subjected to UDL over entire span, point load and moment at any point, drawing SF and BM diagram

Unit – 9 **Continuous Beams**

9.1 Definition, effect of continuity practical example, nature of moments induced due to continuity, concept of deflected shape

9.2 Clapeyron's theorem of three moment (no derivation)- its application maximum up to two spans (one end may be fixed and with one overhanging span) and one unknown support moment only, Support at same level, spans having same moment of inertia subjected to concentrated loads and uniformly distributed loads over entire span

9.3 Introduction to moment distribution methods, sign convention, Carry over factor, stiffness factor, distribution factor - its application maximum up to two spans (one end may be fixed and with one overhanging span) and one unknown support moment only, Support at same level, spans having same moment of inertia subjected to concentrated loads and uniformly distributed loads over entire span

9.4 Drawing SF and BM diagrams for continuous beams.

9.5 Application of moment distribution method to single storey single bay symmetrical portal frames, SF and BM diagrams

Unit – 10 Columns

10.1 Application of Rankin's and Euler theory, designing solid circular or hollow circular sections

List of assignment

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

Name of Authors	Titles of the Book	Edition	Name of the Publisher
T.S. Thandavamoorthy	Analysis of Structures		Oxford University Press
Debabrata Nag and Abhijit Chanda	Strength of Materials		Wiley - India
Ramamrutham	Strength of Materials		Dhanpat Rai
I. B.Prasad	Strength of Materials		
Timoshenko	Strength of Materials		
S. B. Junarkar	Mechanics of Structures- vol I		
Vazirani & Ratwani,	Analysis of Structures- Vol I		Khanna Publishers
M. Chakraborty	Strength of Materials		
R.S. Khurmi	Strength of Materials		S.Chand & Company Ltd, New Delhi

Reference books: - Nil

Suggested List of Laboratory Experiments :- Nil

Suggested List of Assignments/Tutorial :- Nil

Teaching Scheme	Examination Scheme
Theory : 3 lecture per week	Mid Semester Exam- 20
Tutorial: NIL	Assignment & Quiz - 10
Practical : NIL	End Semester Exam(ESE) -70
Credit :- 3	Total Marks - 100

Aim:-

1. Study of hydraulics.

Objective:-

The student will able to:

1. Compute the total hydro static pressure & center of pressure.
2. Describe the principle of pressure measuring devices.
3. Identify the concept of fluid flow.
4. Compute the loss of water flowing through pipes.
5. Design most economical channel section.
6. Describe working of the velocity measuring devices.

Pre-Requisite:-

Student should know the basic properties of fluid

Unit No	Topic	Contact period	Marks
1	Properties of Fluid	4	6
2	Hydrostatic Pressure	8	10
3	Fundamentals Of Fluid Flow	6	8
4	Flow Of Liquid Through Pipes	11	16
5	Flow Through Open Channel	7	14
6	Flow Measuring Devices	8	10
7	Hydraulic Machines	4	6

Contents: Theory (Hydraulics)3 Hrs/week

Unit -1 Properties of Fluid

1.1 Definition of fluid, Difference in behavior of fluid with respect to solids. Introduction to fluid mechanics and hydraulics, Historical background of development of the subject Fluid mechanics and hydraulics, Branches of hydraulics- Hydrostatics and hydrodynamics, Importance of Hydraulics with respect to Irrigation and Environmental engineering.

1.2 Physical properties of fluid Mass density, Weight density, Specific volume, Specific gravity, Surface tension and capillarity, capillary rise, Compressibility, Viscosity, Newton's law of viscosity – Dynamic and kinematics viscosity., classification of different types of fluid with respect to its viscosity, concept of adhesion and cohesion and related physical phenomenon, Ideal and Real liquids

Unit -2 Hydrostatic Pressure

2.1 Free liquid surface, Definition of pressure and its SI unit, Hydrostatic pressure at point, Pascal's law Variation of pressure in horizontal and vertical direction in static liquid, Pressure diagram, concept of pressure prism and its use in determination of force developed on the immersed surface or surface in contact with the liquid

2.2 Concept of pressure head and its unit, concept of gauge pressure, atmospheric pressure and absolute pressure, Conversion of pressure head of one liquid in to other, devices for pressure measurements in pipes – Piezometer, U-tube manometer, Bourdon's pressure gauge, their principle of working and limitations, Measurement of pressure difference using differential manometer – U-tube differential manometer and inverted U-tube differential manometer. Numerical Problems.

2.3 Total hydrostatic pressure and center of pressure, Determination of total pressure & center of pressure on vertical & inclined faces of dams, sluice gates, sides and bottom of water tanks, determination of total hydrostatics pressure & center of pressure on sides and bottom of tank containing two liquids, determination of net hydrostatic pressure and center of pressure on vertical surface in contact with liquid on either side. Numerical Problems.

Unit – 3 Fundamentals Of Fluid Flow

3.1 Concept of flow, Gravity flow and pressure flow. Types of flow – steady and Unsteady, uniform and non-uniform and their combination with practical example, Laminar and turbulent. various combinations of flow with practical examples, Reynolds number and its application, one, two and three dimensional flow, description of flow pattern - stream line, pathline, stream tube, streak line

3.2 Basic principles of fluid flow – principle of conservation of mass, principles of conservation of energy and conservation of momentum, concept of control volume, discharge and its units, Continuity equation for fluid flow, Datum head, pressure head, velocity head and total head, Bernoulli's theorem (no deduction, statement only), Loss of head and modified Bernoulli's theorem, limitation of bernoulli's theorem, Impulse momentum theorem, Numerical Problems based on the above principles.

3.3 Concept of flow net and its properties, stream line and equipotential line and their salient features and practical use of flow net

Unit – 4 Flow Of Liquid Through Pipes

4.1 Loss of head due to friction, Darcy-Weisbach Equation, Friction factor, relative roughness. Moody's diagram and its use. Common range of friction factor for different types of pipe material.

4.2 Minor loss of head in pipe flow- loss of head due to sudden contraction, sudden expansion, gradual contraction & expansion (no deduction), at entrance and exit of pipe, in various pipe fittings, pipes in series and parallel equivalent pipe – Dupuit's equation, numerical problems

4.3 Hydraulic gradient line and Energy gradient line, Siphon, Water hammer in pipes – cause effects and remedial measures, Use of Nomograms for design of water distribution system, Numerical

Unit – 5 Flow Through Open Channel

5.1 Types of channels- artificial & natural, purposes of artificial channel, Different shapes of artificial channels, Geometrical properties of channel section – wetted area, wetted perimeter, hydraulics radius, Prismatic channel sections, steady- uniform flow through prismatic channel section.

5.2 Chezy's equation and Manning's equation for calculation of discharge through an open channel, common range of values of Chezy's constants and Manning's constant of different types of channel surfaces, Most economical channel section, conditions for most economical channel sections – for rectangular and trapezoidal section.

5.3 Concept of specific energy, Froude's number and its significance. Alternate depth, expression for critical depth, critical velocity and minimum specific energy, Critical, sub-critical and supercritical flow in channel, physical phenomenon, numerical problems, hydraulic jump its occurrence in field, uses of hydraulic jump, equation for sequent depth, simple numerical problems.

Unit – 6 Flow Measuring Devices

6.1 Velocity measuring devices for open channels, Floats-surface, subsurface and float rod Pitot tube – principle, expression for velocity, Current meter-cup type & propeller type (simple numerical problems)

6.2 Discharge measuring devices for channels Notches -Types of notches, expression for discharge. Francis formula, end contraction and velocity of approach Weirs - Broad crested weir, ogee spillway and expression for discharge. Flumes - Venturi flume, standing, wave flume, expression for discharge.

Velocity area method for measurement of discharge through open channels. Discharge measuring devices for pipes. (simple numerical problems)

6.3 Venturimeter – Component parts, principle of working, Study and use of venturi meter, Flow through orifice Orifice- Definition and use, Types of orifice - based on various criteria. Coefficient of contraction, coefficient of velocity and coefficient of discharge, Relationship between them. Discharge through small sharp-edged circular orifice and large orifice (discharging free condition), Determination of hydraulic coefficient of orifice, Orificemeter – component parts, working principles, study and use of orificemeter, Numerical.

Unit – 7 Hydraulic Machines

Pumps - Definition and types, Suction head, delivery head, static head and manometric head, Centrifugal pump - component parts and their functions, principle of working, priming, Reciprocating pump - component parts and working. Submersible pump and Jet pump, Selection and choice of pump, Computation of power required for pumps.

Turbines - Definition and types.

Text Books:-

Name of Authors	Titles of the Book	Edition	Name of the Publisher
C.S.P. Ojha & others	Fluid Mechanics and Machinery		Oxford University Press
Dr. P.N.Modi & Dr. S.M.Seth	Hydraulics & Fluids Mechanics		Standard Book House, Dehli
A. K. Upadhyaya	Hydraulics		
S.Ramamrutham	Hydraulics & Fluids Mechanics		Dhanpat Rai & Sons, Delhi
Dr. Jagdish Lal	Fluids Mechanics Hydraulics		Metropolitan Book Co. Private Ltd.
R.S.Khurmi	A Text Book of Hydraulics, Fluids Mechanics Hydraulics Machines		S.Chand & Company Ltd. New Delhi
R.K.Rajput	A Text Book of Fluids Mechanics Hydraulics Machines		S.Chand & Company Ltd. New Delhi
S.K.Likhi	Hydarulics Laboratory Manual		T.T.T.I. Chandhigrah

Reference books :-

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Streter & Willey	Fluid Mechanics		McGraw Hill Co.
Messy	Fluid Mechanics		
Daugherty	Fluid Mechanics		McGraw Hill Co

Suggested List of Laboratory Experiments :- Nil

Suggested List of Assignments/Tutorial :- Nil

Teaching Scheme	Examination Scheme
Theory : Nil	CT- 20
Tutorial: Nil	Attendance, Assignment & Quiz: 10
Practical : Nil	End Semester Exam(ESE) : 70
Credit :- Nil	Total Marks – 100

Aim :-

1. To develop the ideas, vision and its practical reality through engineering graphics.
2. Developing the approach of visualization, drafting, modeling and analysis.
3. To develop the concept and applicability of engineering graphics to construction sector.

Objective :-

The students will be able to

1. Read, interpret and draw the building drawings.
2. Prepare submission drawings for the building.
3. Prepare working drawings for the building.
4. Plan various types of buildings considering the functional requirements.
5. Apply the building rules, regulations and byelaws.

Pre-Requisite :-

1. Perfection in geometry and sketching.
2. The students should be perfect in plotting the geometrical shapes and skill of reading the geometrical designs.
3. Students should be conversant with content in 'Drawing' of semester 1 and semester 2

Unit No	Topic	Marks
1	Introduction	4
2	Planning of Building	12
3	Culverts	18
4	Steel connections	18
5	Steel Roof truss	18

Contents: Theory (Civil Engineering Drawing) NILHrs/week Marks

Unit 1 Introduction

Recapitulation of previous semester

Unit -2 Planning of Building

Note: single storeyed building shall comprise of two rooms, bath, WC, kitchen, front verandah with a provision of staircase and mummy for utilisation of roof space. Same plan used in subject 'Estimating and Costing' is to be used.

- 2.1 Principles of planning of Residential and Public building.
- 2.2 Space requirements and norms for various units of Residential and Public building. Rules and byelaws of local governing authorities for construction.
- 2.3 Drawing of line plans for Residential and Public building.

- 2.4 Development of line plan – ground floor plan and roof plan with provision for drainage layout
- 2.5 Elevation (front elevation)
- 2.6 Two Sectional elevation (section must pass through stair-case, bath WC, kitchen and front verandah)
- 2.7 Site plan (to be developed from a Mouza map for conception of location plan)
- 2.8 Foundation details (trench plan, section of main wall and a partition wall/ isolated footing with tie beam if provided)

Unit – 3 Culverts

- 3.1 Introduction to culvert & its different components and types and specific use along with demonstration of a model
- 3.2 Half sectional plan and half sectional elevation and side view of a single span slab culvert
- 3.3 Half sectional elevation of a single span two hume-pipe culvert

Unit – 4 Steel connections

- 4.1 Plan elevation and side view of stanchion connected with base plate with gusset plate in concrete foundation
- 4.2 Connection of main beam with secondary beam in one side
- 4.3 Connection of beam with column
- 4.4 Unequal column splicing
- 4.5 Equal beam splicing
- 4.6 Column bracket

Unit – 5 Steel Roof truss

- 5.1 Introduction to truss – wooden (king post and queen post), steel (with angles and tubular truss) along with demonstration of model
- 5.2 Details of a fink truss with welded/riveted joints and details of column connection

Assignments: Following exercises should be drawn:

- 1 Drawing various types of doors and windows etc. used in construction
- 2 Measured Drawing of an his/her residential building (Load bearing/ Framed structure Type), showing Plan , Elevation, Sections, Construction notes, Schedule of openings, Site Plan,
- 3. Area statement and other details of building drawing in sheet 1
- 4 Working Drawing of building drawing in sheet 1
- 5. drawing of a wooden king post and queen post truss of the buiding drawing in sheet

Teaching Scheme	Examination Scheme
Theory : Nil	Term Work (TW)- 25
Tutorial: Nil	Practical (PR) - 25
Practical : 6	
Credit :- 3	Total marks in the semester - 50

Aim:-

1. To develop the ideas, vision and its practical reality through engineering graphics.
2. Developing the approach of visualization, drafting, modeling and analysis.
3. To develop the concept and applicability of engineering graphics to construction sector.

Objective:-

The students will be able to

1. Read, interpret and draw the building drawings.
2. Prepare submission drawings for the building.
3. Prepare working drawings for the building.
4. Plan various types of buildings considering the functional requirements.
5. Apply the building rules, regulations and byelaws.

Pre-Requisite:-

1. Perfection in geometry and sketching.
2. The students should be perfect in plotting the geometrical shapes and skill of reading the geometrical designs.
3. Students should be conversant with content in 'Drawing' of semester 1 and semester 2

Unit no	Topic	Contact period	Marks
1	Introduction	3	----
2	Planning of building	24	12.5
3	Culvers	24	12.5
4	Steel Connections	21	12.5
5	Steel roof truss	24	12.5

Contents: Practical/Sessional (Civil Engineering Drawing) 6 Hrs/week Marks

Unit 1 Introduction

Recapitulation of previous semester

Unit -2 Planning of Building (PLATE 1)

Note: single storeyed building shall comprise of two rooms, bath, WC, kitchen, front verandah with a provision of staircase and mummy for utilisation of roof space. Same plan used in subject 'Estimating and Costing' is to be used.

- 2.1 Principles of planning of Residential and Public building.
- 2.2 Space requirements and norms for various units of Residential and Public building. Rules and byelaws of local governing authorities for construction.
- 2.3 Drawing of line plans for Residential and Public building.

- 2.4 Development of line plan – ground floor plan and roof plan with provision for drainage layout
- 2.5 Elevation (front elevation)
- 2.6 Two Sectional elevation (section must pass through stair-case, bath WC, kitchen and front verandah)
- 2.7 Site plan (to be developed from a Mouza map for conception of location plan)
- 2.8 Foundation details (trench plan, section of main wall and a partition wall/ isolated footing with tie beam if provided)

Unit – 3 Culverts (Plate no 2) (problems to be supplied by the subject teacher(s))

- 3.1 Introduction to culvert & its different components and types and specific use along with demonstration of a model
- 3.2 Half sectional plan and half sectional elevation and side view of a single span slab culvert
- 3.3 Half sectional elevation of a single span two hume-pipe culvert

Unit – 4 Steel connections (Plate no 3) [riveted or welded] (problems to be supplied by the subject teacher(s))

- 4.1 Plan elevation and side view of stanchion connected with base plate with gusset plate in concrete foundation
- 4.2 Connection of main beam with secondary beam in one side
- 4.3 Connection of beam with column
- 4.4 Unequal column splicing
- 4.5 Equal beam splicing
- 4.6 Column bracket

Unit – 5 Steel Roof truss (Plate no 4) (problems to be supplied by the subject teacher(s))

- 5.1 Introduction to truss – wooden (king post and queen post), steel (with angles and tubular truss) along with demonstration of model
- 5.2 Details of a fink truss with welded/riveted joints and details of column connection

Practical:

Skills to be developed:

Intellectual Skills:

1. Read and interpret the building drawings
2. Plan residential and public buildings
3. Apply the building rules, regulations and byelaws.

Motor Skills:

1. Prepare line plans of Residential and Public Buildings
2. Prepare Detailed Plans, Elevations, Sections and other working drawings for the buildings.

➤ **Plate 1 to 4 are to be submitted as 'Term Work' during semester**

Text Books:-

Titles of the Book	Name of Authors	Edition	Name of the Publisher
Text Book of Building Drawing	Shah, Kale,		Patki --
Elements of Building Drawing	D. M. Mahajan		
Planning and Design of Building.	Y. S. Sane --		
Civil Engineering Drawing	Malik & Mayo		New Asian Publishers New Delhi

Teaching Scheme	Examination Scheme
Theory : NIL	Term work (TW) – 50
Tutorial: NIL	Practical (PR) - 50
Practical : 6	Total marks - 100
Credit :- 3	

Practical:

Skill to be developed:

Intellectual Skills:

1. Analyze the given data
2. Select proper method for analysis
3. Interpret the results

Motor Skills :

1. Measure the quantities accurately
2. Handle instruments properly

Group I – Physical tests on ordinary Portland cement:

- Determination of fineness of cement preferably by Blaine's air permeability apparatus or by sieving.
- Determination of standard consistency of OPC/PPC
- Determination of initial & final setting times of OPC/PPC.
- Determination of compressive strength of OPC/PPC
- Determination of soundness of OPC/PPC

Group II – Physical tests on fine aggregate and coarse aggregate:

Fine aggregate:

- Determination of silt content in sand by volume
- Determination of maximum % of bulking of sand of a given sample
- Determination of grading zone of a given sample of a
- Determination of moisture content of a given sample of sand
- Determination of specific gravity of sand

Coarse aggregate:

- Determination of aggregate impact value.
- Determination of aggregate abrasion value.
- Determination of aggregate crushing value.
- Determination of bulk density & specific gravity of a given sample of coarse aggregate.
- Determination of flakiness index and elongation index of a given sample of coarse aggregate
- Determination of surface moisture and water absorption of a given sample of coarse aggregate
- Determination of grading zone of a given sample of coarse aggregate

Group III - Physical tests on Concrete

- Determination of workability of concrete – a. slump test b. compacting factor test and c. Vee-Bee consistometer test
- Compressive strength of concrete – a. cylinder and b. cube mould

Group IV - Physical test of Bricks

- Determination of physical properties of bricks – a. size b. shape c. weight d. colour e. water absorption f. efflorescence test g. crushing strength test

Group V - Brick bonding –

1. Laying [1,3,5, ... & 2,4,6,...] to form
 - a. English bond (1 brick and 1 and half brick thick)
 - b. Flemish bond ((1 brick and 1 and half brick thick) including corner joint;
2. Laying of conventional brick to form a 200 mm thick wall; header and stretcher bond; connection between a main wall and partition & partition wall & partition wall

Teaching Scheme	Examination Scheme
Theory : NIL	Term work (TW) – 25
Tutorial: NIL	Practical (PR) - 25
Practical : 3	Total marks - 50
Credit :- 2	

Aim :-

- Development and evaluation of individual skills
- Enhancement in soft skills through innovation.

Objective: Student will be able to:

1. Acquire information from different sources.
2. Prepare notes for given topic.
3. Present given topic in a seminar.
4. Interact with peers to share thoughts.
5. Prepare a report on industrial visit, expert lecture.

Pre-Requisite :- Communication skill must be perfect.

Contents 3Hrs/week

Unit -1 Industrial Visits

Structured industrial visits be arranged and report of the same should be submitted by the individual student, to form a part of the term work. Industrial visits may be arranged in the following areas / industries:

- Building construction site

Unit -2 Lectures by Professional / Industrial Expert be organized from **ANY THREE** of the following areas:

- Batching plant
- Different types of construction machineries and equipment

Unit – 3 Individual Assignments:

Any two from the list suggested OR Conduct **ANY ONE** of the following activities through active participation of students and write report

- Preparation of drawing of an existing structure
- Plot measurement
- Study of building rules – in panchayat, municipality and corporation areas
- Study of different fitting and fixtures and components of different types of shuttering

Unit – 4 Modular courses (Optional):

A course module should be designed in the following areas for max. 12 hrs. Batch size – min. 15 students. Course may be organized internally or with the help of external organizations.

- Erection of shuttering

Total 48 Hrs.

Text Books:- Nil

Reference books :- Nil

Suggested List of Laboratory Experiments :- Nil

Suggested List of Assignments/Tutorial :- Nil