

1051 – STRUCTURAL ENGINEERING

7 Hours / Week

14 Weeks
Hours

98

PART – A : Reinforced Concrete Structures

UNIT 1

16 Hours

1.1 GENERAL

Reinforced Cement Concrete – Concept of Composite material – Purpose of providing reinforcement – materials used in R.C.C and their requirements – different grades of cement and steel – Characteristic strength and grades of concrete – modular ratio of R.C.C – types of loads on structures as per (IS: 875)

1.2 INTRODUCTION TO WORKING STRESS METHOD

Assumptions made in the working stress method – Permissible stresses (IS: 456-2000) – Flexural members – singly reinforced rectangular sections – strain and stress distribution due to bending – actual and critical neutral axes – under /over reinforced sections- balanced sections – lever arm – moment of resistance of singly reinforced rectangular sections (simple problems).

1.3 INTRODUCTION TO LIMIT STATE METHOD

Concept – different limit states- Characteristic strength and design strength of materials – Characteristic loads and design loads - partial safety factors for loads and material strength Limit state of collapse in flexure – assumptions – stress strain curves for concrete and steel – Stress block – maximum strain in concrete – limiting values of neutral axis for different grades of steel – moment of resistance of singly/doubly reinforced rectangular sections – problems

UNIT 2

20 Hours

2.1 DESIGN OF BEAMS FOR FLEXURE BY L.S.M

Effective span of cantilever, simply supported and continuous beams – breadth and depth requirements of beams – control of deflection – minimum depth requirement for stiffness –minimum concrete cover for durability and fire resistance – minimum and maximum reinforcement, spacing for main reinforcement and side face reinforcement as per IS 456-2000-design bending

moments – Design of singly and doubly reinforced rectangular beams – cantilever, simply supported beams.

2.2 DESIGN OF T-BEAMS AND CONTINUOUS BEAMS BY L.S.M

Design of singly reinforced T-beams – cantilever/ simply supported beams- Design of continuous beams using B.M coeffs (equal spans & u.d.l only) – use of design aids (not for examination).

2.3. DESIGN OF BEAMS FOR SHEAR BY L.S.M

Limit state of collapse in shear – design shear strength of concrete – design strengths of vertical / inclined stirrups and bent up bars in shear – principle of shear design – critical sections for shear – nominal shear stress – design of vertical stirrups, inclined stirrups and bent up bars for rectangular beams using limit state method – simple problems- use of design aids (not for exam).

UNIT 3

20 Hours

3.1 DESIGN OF ONEWAY SLABS BY L.S.M

Classification of slabs – Effective spans - Imposed loads on slabs (IS: 875) – strength and stiffness requirements – minimum and maximum permitted size, spacing and area of main and secondary reinforcement as per IS 456 -2000 Design of cantilever, simply supported, slabs and sunshades by limit state method – Design of continuous slabs using B.M coefficients- check for shear and stiffness – curtailment of tension reinforcement – use of design aids (not for exam).

3.2 DESIGN OF TOWAY SLABS BY L.S.M

Introduction – Effective span – thickness of slab for strength and stiffness requirements Middle and edge strips – B.M coefficients – design B.Ms. – simply supported and restrained slabs – tension and torsion reinforcement requirement– design of two way slabs using B.M. coeffs – curtailment of reinforcement – check for stiffness..

3.3 DESIGN OF STAIRCASES BY L.S.M

Types of stairs according to geometry and structural behavior planning a staircase – effective span of stairs – effective breadth of flight slab-

distribution of loads on flights – design of cantilever steps – design of doglegged and open well stairs spanning parallel to the flight.

UNIT 4

16 Hours

4.1 DESIGN OF COLUMNS BY L.S.M

Limit state of collapse in compression – assumptions - limiting strength of short axially loaded compression members - effective length of compression members – slenderness limits for columns – classification of column-minimum eccentricity for column loads – longitudinal and transverse reinforcement as per I S 456-2000-Design of axially loaded short columns with lateral ties / helical reinforcement – Use of design aid (not for exam).

4.2 DESIGN OF COLUMN FOOTINGS

Types of footings – Footings with uniform thickness and sloped footings – minimum thickness – critical sections – minimum reinforcement ,distribution of reinforcement, development length, anchorage, cover, minimum edge thickness requirements as per IS 456-2000 – Design of isolated footing (square and rectangular) with uniform/ varying thickness by limit state method.

PART B - Steel Structures

UNIT 5

17

Hours

5.1 DESIGN OF SIMPLE BEAMS

Classification of beams – lateral buckling of beams – assumptions – permissible bending and shear stresses (Is: 800) – minimum thickness of elements – limiting deflection of beams – Design of laterally supported beams using single / double rolled steel sections (symmetrical cross sections only).

5.2 DESIGN OF TENSION MEMBERS

General – Permissible stress in tension – Net sectional area of tension members– Effective sectional area of Angles/T-sections connected by one leg/

flange (welded connections only) – Design of ties using single/ double angles, T-sections and channels.

5.3 DESIGN OF COMPRESSION MEMBERS

Effective length of compression members – slenderness ratio – Permissible stress – minimum thickness of elements – effective sectional area – Design of single angle and double angle struts – Design of steel columns using rolled steel sections (symmetrical sections only) with or without cover plates. (Lacing and battens not included).

5.4 DESIGN OF WELDED CONNECTIONS

Types of welds – size and effective area of welds – Permissible stresses – strength of fillet/ butt welds – Lap and butt joints for plates and angles – Beam to beam and Beam to column connections - seat angle and web angle connections – Problems on design of welded joints / connections (Moment resistant connections not included).

Revision & Test

9 Hours

Reference Books:

1. Limit state Design by Karve.
2. Limit state Design by P C Varghese
3. Limit State Design by S.Ramachandra
4. Limit State Design by Syal and Goel
5. Reinforced Cement Concrete by Park and Pauley
6. Reinforced Cement Concrete by Mallick and Rangasamy
7. Reinforced Cement Concrete by Sinha and Roy
8. I S 456-2000
9. I S 875
10. I S 800 -1984
11. Explanatory hand book SP 16 & SP 24

1052 - ESTIMATING AND COSTING

7 Hours / Week

14 weeks

98

Hours

UNIT 1

16 Hours

1.1. INTRODUCTION

Estimation – Definition of Estimate – Approximate estimate – Detailed estimate - Revised estimate – Supplementary estimate – Sub estimate – Annual maintenance estimate – Repair estimate – Complete estimate.

1.2 STAGES OF DETAILED ESTIMATE

Taking off Quantities – Systems – Trade system – Group system – Advantages of group system – Methods – Long wall and Short wall method – Centre line method – Preparation of data – Abstract estimate – Lump sum provision and contingencies – Quantity surveyor – Duties – Essential Qualities.

1.3 MEASUREMENTS & MATERIAL REQUIREMENT:

Units of measurements for works and materials – Degree of accuracy in measurements – Deduction for openings in masonry, plastering and white washing area – Painting co-efficient – out turn of works working out of materials requirements – cement, sand, bricks, aggregates etc based on thumb rules for different works.

1.4 SPECIFICATION & REPORT WRITING:

Specification – Necessity – Types of specifications – Essential requirements of specifications – Specifications for various items of works – steps involved in standard specification – Report writing – Points to be considered while writing a report – writing typical reports for works such as

- (i) Buildings – Residential / Hospital / School
- (ii) Laying a village road
- (iii) Construction of a bridge
- (iv) Water supply system for a village

UNIT 2.

18 Hours

2.1. GROUP SYSTEM

Theory – Taking off and Recording Dimensions – Squaring Dimensions – Abstracting or Working up – Billing – Abbreviations.

2.2. PROCESS OF WRITING

Dimension paper – Timesing, Dimension, Squaring, Descriptive column – Cancellation of Dimensions – Descriptions – Spacing of Dimensions – Order of taking off. Squaring the Dimensions, Method of Squaring – Checking the Squaring – Casting up the dimensions.

2.3. ABSTRACTING AND BILLING

Function of the Abstract – Order in the Abstract – Preparing the abstract – Casting and reducing the Abstract – Method of writing Bill – Checking the Bill - Taking off quantities for single roomed building using Group system

2.4. APPROXIMATE ESTIMATES

Approximate estimates – Types – Plinth area method – Cubical content method - Service unit method – Typical bay method – Simple problems on preliminary estimate of a building project.

2.5. AREAS AND VOLUMES:

Areas of irregular figures –
End ordinate rule – Mid ordinate rule – Average ordinate rule – Trapezoidal rule – Simpson's rule – Problems.

Volumes of irregular solids – End area rule – Mid area rule – Mean area rule – Trapezoidal rule – Primoidal rule – Problems on Embankments and cuttings – Cross sectional areas – Level Sections – Two level section.

UNIT 3

16 Hours

Data – Theory – Main and sub data – Observed data – lead statement - Schedule of rates – Standard data book – Sundries – Lump sum provision – Preparation of data using standard data and schedule of rates:

Brick and stone masonry – Lime concrete and cement concrete – Flooring works and weathering course – R.C. works for slab, sunshade, beam and column – Partition wall – Form works for beams and slabs – Road works, WBM and surface dressing – White washing and painting works – A.C. sheet roofing –

Apron and rivetment works in canals – Wall plastering – Ceiling plastering – Pointing – Plumbing and sanitary works in buildings.

UNIT 4

20 Hours

Detailed estimate for buildings using Trade system Taking off quantities for all items of works in the following types of buildings:

- (i) A small residential building with two / three rooms with RCC roof.
- (ii) Two Storied building (framed structure) with RCC roof
- (iii) Cottages with sloped RCC roof
- (iv) Industrial buildings with AC/GI sheet roof with steel trusses.
- (v) Community Hall with columns and T-Beams.

UNIT 5

20 Hours

Detailed estimates for the following works using Trade system. Taking off quantities for all items of works for the following structures.

- (i) Open well with masonry steining
- (ii) Septic tanks with dispersion trench / soak pit
- (iii) R.C.C slab culvert
- (iv) R.C.C. T-beam Bridge
- (v) Pipe culvert
- (vi) Water Bound Macadam Road
- (vii) Rain water harvesting system in buildings – a) Shallow well
b) Percolation Pit with bore.

Revision & Test

8 Hours

Reference ;

1. IS Code of Practice – IS 1200
2. Civil estimating, costing and valuation – Kalson Publication Ludhiyana.
3. Estimating & Costing – Rangawala
4. Quantity surveying & Valuation – N.A.Shaw, Khana Publishers
5. Quality Surveying – PL Bhasir & Co.,
6. Estimating and Costing – L.N.Dutta
7. Estimating and Costing – Bridie
8. Estimating and Costing – Vazirani & Chandolu
9. Quantity Surveying – PL.Bhasin M/s. Chaud Publication.

1053 a – ELEMENTS OF INTERIOR DESIGN
(Elective Theory - I)

6 Hours / Week
Hours

14 Weeks

84

UNIT – 1. Introduction

20 Hours

- 1.1 Concept of interior design – Principles of design and their application for interiors – colours & their application – Form, space & order
- 1.2 Function and Planning
Living spaces – work spaces – Anthropometrics – circulation spaces – storage spaces – dimensions of spaces for human activities with reference to BIS codes – 5533 of 1969. Space requirements of interiors of schools, offices, hostels, hospitals, store rooms, clinics etc. – thematic design.

UNIT – 2. Furniture Selection And Arrangements

20 Hours

- 2.1 Functional and decorative furniture – selection of furniture for living room dining room, bed room kitchen and their arrangement – one room living.
- 2.2 General furniture - Layout for hostels educational institutions offices, restaurant, show rooms, hospitals, waiting halls.

UNIT - 3. Finishes and Furnishings

16 Hours

- 3.1 Natural and Artificial flooring – Granite, marble, Ceramic tiles, mosaic, cuddapah, Carpets – types – Wall to wall carpeting – Rugs – Synthetic mats and tiles.
- 3.2 Wall coverings – glazed tiles – Wall paneling – Timber strip treatment – Laminates – wall papering, curtains and drapery.

UNIT- 4. Painting And Decorative Elements

10 Hours

- 4.1 Choice of paintings – Murals, Sculpture, Plants, Fountains & Wall hangings and their placement.

UNIT- 5. Lighting

10 Hours

- 5.1 General requirements for natural and artificial lighting in interiors – Lighting
Capacity of various lamps – locating light points in residences, show rooms, hospitals, offices etc.,

Revision and Test

8 Hours

REFERENCE BOOKS :

- | | | |
|---|---|----------------------------|
| 1. Home furnishing | - | Anna Hong Rutt |
| 2. Designing and decorating interiors | - | David Van Dommalan |
| 3. Easy steps to successful decorating | - | Barbara Bradford Taylor |
| 4. Art of colour and design | - | Maitland Graves |
| 5. Art of design in home living | - | Frances M Obst |
| 6. Design for you | - | Beitler & Lockchart |
| 7. Colour your home | - | Mary Gilliat |
| 8. IS 5533 – 1969 dimension of spaces
for human activities | - | Bureau of Indian standards |
| 9. National building code of India | | |
| 10. Lighting in architectural design | - | Derek Phillips |
| 11. Architectural graphic standards | - | Ramsey & Sleeper |
| 12. Human dimension and interior space- | | Julius Parcero |
| 13. Interior Design | - | John F. Pile |
| 14. Interior Design Illustrated | - | Francis D.K. Ching |
| 15. Interior Design | - | Ahmed Khasu |

1053.b. ADVANCED CONSTRUCTION TECHNOLOGY
(ELECTIVE THEORY - I)

6Hours/Week

14 WEEKS

84Hours

UNIT- 1

15Hours

1.1 Deep Excavations

Definition-Problems encountered in deep excavations-Timbering-Terms used-sheeting, Ranger or wale, Strut, Bracing-Methods of Timbering-stay bracing, Box sheeting, vertical sheeting, runners and sheet piling-Precaution to be taken during timbering-Dewatering of the foundation trenches-Methods –Pumping, Provision of sumps and side drain cement grouting, freezing process, electro-osmosis process.

1.2 Pile foundations

Definition – uses of piles – types of piles – beaming piles and Friction piles - classification based on material - cement concrete piles cast-in situ-Pile, pre cast piles description, advantages and disadvantages - load bearing piles Purpose - sheet piles-types-description - choice of type of pile - factors to be considered –pile cap and shoe – description - load test on piles – description - Pile driving –equipments - types of hammer - choice of hammer - causes of failure of piles.

UNIT – 2

16 Hours

2.1 Concrete Technology

Fresh Concrete – Factors affecting workability – Water content – Mix proportion – Size of aggregate- Grading of Aggregate-Measurement of workability- slump test- compaction factor test – Segregation – Bleeding –Process of manufacture of concrete – Batching –Mixing –Transporting concrete –Placing of concrete- compaction of concrete – curing of concrete – curing methods.
Admixtures – definition – function – classification - uses of different types - quantity to be used - light weight concrete - light weight aggregate - production of light weight aggregate - shot Crete or guniting - Definition typical arrangement for gunite system - special concrete – Ferro cement-

production process – curing - advantages and limitations - fibre reinforced concrete- production process – uses.

2.2 Pre-stressed concrete

General principle of pre stressing - advantages of pre stressed

Concrete - materials used - methods of pre stressing - pretension method - post tension method - system of pre stressing - freyssinet system - Magnet blaton system - Lee-mc- call system- Losses in pre - stress.

UNIT- 3

15 Hours

3.1 Fire protection in buildings

General-causes and effects of fire-precautionary measures to minimize dangers of fire-limiting fire spread-factors to be considered -Fire- resisting properties of common building material - general rules for fire - resisting buildings-alarm system- protection of openings- common wall – stair - floor fire extinguishing arrangement - fire protection systems-types - strong room construction.

3.2 Earth Quake Proof Construction

Indian Seismicity – Earthquake History- Definition of terms used- Behavior of structures in the past Earth quakes –Seismic forces – Effect of seismic forces on Buildings – Planning of Earth quake resistant Buildings - Roofs and Floors- Articulation joints – Expansion Joints – I.S. code provision – Alterations to Buildings – Foundation – Permissible increase in the allowable Bearing capacity of soils- Seismic coefficient for different zones – Construction of framed buildings in Earthquake zones – Walls – Beams etc.

UNIT – 4

16 Hours

4.1 Pre fabrication

Terms defined - prefabricated building, module, composite members, modular co-ordination, system; Modular coordination - basic module-planning modules grid – modules in horizontal plane for residential buildings-industrial buildings-other consideration - module for

components-flooring scheme, Beams, columns, walls; Staircase-lintel-sunshade; Tolerance on dimensions-length, cross sectional dimension, straightness, squareness, twist, flatness.

4.2 Pre fabrication System

Characteristics to be considered in devising a system - Types of pre fabricated building - load bearing wall type - frame type; Design considerations - bearing for pre cast units, joints; Requirements of an ideal structural joint - manufacture of pre cast concrete elements –place - process - main, auxiliary and subsidiary process; Stages of pre casting – preparation and storage of materials - moulds curing; Pre fabrication methods – individual method - battery form method tilting mould method – Flow line production method- extension method - Handling during transport and storage - Handling arrangement -Transport - inside the factory - stacking yard to erection site, Erection works to be carried out - Equipment required.

UNIT – 5

16 Hours

5.1 Maintenance and rehabilitation of buildings

Rehabilitation of buildings - demolition of buildings - safety aspects – general - precautions during demolitions - sequence of demolition of operation – demolition process of trusses, girders and beams, walls, flooring- catch plat form – lowering removal and disposal of materials - mechanical demolition - Repairs to building – repairing of plastering works - fixing doors in - Making opening in masonry and fixing doors and windows Renewing glass panes with wooden fillets - fixing fan clamps in existing R.C.C slab - repair to terrazzo (mosaic) flooring.

5.2 Precautions to prevent cracks in buildings

Cracks general – Hair crack – Structural crack - Horizontal crack in masonry - vertical diagonal cracks at the bearing R.C.C beams or pillars - transverse cracks in R.C.C slab and sunshade.

Revision and Test

6 Hours

Reference :

1. Concrete Technology – M.S. Shetty

2. Fire Resistant Construction – Building Construction by S.P.Arora and S.P.Bindra
3. Earth quake Proof -Building Construction by Dr.Janardhanjha and Prof.Suresh kunar Sinha
4. IS Code of Practice for Earth quake
5. IS Code of Practice for Fire resistance
6. IS Code of Practice for pre stressing
7. Pile foundation – RD Chellis, MIS
8. Construction and foundation Engg – Sinha & Janatha Shau.
9. Principle Fine safty standards for building Construction – M.Ya Roytman
10. Design concrete structure Vol II – Dr. Ramchandra.

1053 c - SOIL MECHANICS & FOUNDATION ENGINEERING

(Elective Theory I)

6 Hours/Week

14 weeks

84 Hours

UNIT- 1.

15 Hours

1.1 SOIL MECHANICS AND INDEX PROPERTIES

Soil and soil mechanics – definition – Index properties of soil – Texture, porosity void ratio, moisture content, unit weight, specific gravity and Degree of saturation – relation between moisture content, void ratio and specific gravity-Problems.

Unit weights – Bulk density – dry density – unit weight of saturated & submerged soils – unit weight values of soils like coarse grained, sand and silt – specific gravity – laboratory test – Soil as a three phase system – air voids & water voids - Percentage voids – Limits of consistency – Atterberg limits – Liquid limit, plastic limit, shrinkage limit – plasticity index – Liquidity index – Test for determining liquid limit using Casagrande's liquid limit apparatus – Flow curve – test for plastic limit & shrinkage limit – problems to determine plasticity & Liquidity indices.

1.2 HYDRAULIC PROPERTIES OF SOILS

Permeability – Co-efficient of permeability – Definition – Factors affecting permeability – Tests for coarse grained soils, fine sand & silt – Darcey's Law – Determination of Co-efficient of permeability by laboratory method – Constant head & falling head permeability tests – problems to find co-efficient of permeability.

UNIT- 2

15 Hours

2.1. CLASSIFICATION & STRENGTH OF SOILS

General classification – unified classification of soils as per BIS – particle size classification as per BIS – Field identification of soils – Field tests to identify soils – visual examination.

Shearing strength of soils – Introduction – Mohr's stress circle – Mohr's & Coulomb failure theory – measurement of shear strength – Direct shear Test – unconfined compression test – Problems.

2.2 SOIL COMPACTION & CONSOLIDATION

Definition of compaction & consolidation – Comparison between compaction and Consolidation – factors causing consolidation – consolidometer – Lab test – Compaction – objects of compaction – Measurement of compaction – laboratory test – standard Proctor's compaction test – Optimum moisture content & Max. dry density of soil – compaction in the field – methods – equipments used – field density of soils – sand replacement method.

UNIT- 3

15 Hours

3.1 STABILISATION OF SOILS & SUB-SOIL SAMPLING

Stabilisation of soils – definition – objectives – Methods – Mechanical stabilisation – Cement stabilisation – Lime stabilisation – Bitumen stabilisation – Chemical stabilisation – Soil stabilisation by injection of suitable grouts – Grouting – purpose – casing method – Cement grouting.

Soil sampling – types – Disturbed & undisturbed samples – split spoon samples – thin walled samples – Chunk sampling – Profile of chunk sampling – Soil exploration – Definition – purpose – methods of soil exploration – open test pits – boring –tube & auger borings – Depth & spacing of test borings – sub surface soundings.

3.2. SEEPAGE ANALYSIS & SEEPAGE BELOW HYDRAULIC STRUCTURES

Introduction to seepage – Head, gradient and velocity potential – seepage pressure- upward flow – two dimensional flow – Laplace equation – seepage below hydraulic structures – hydraulic gradient – Piping – exit gradient – Khosla's theory.

UNIT- 4 FOUNDATION ENGINEERING

15 Hours

4.1 BEARING CAPACITY & SETTLEMENT OF FOUNDATIONS

Definition – Methods of determining ultimate bearing capacity – Rankine's Analysis – Terzaghi's analysis – effect of water table on bearing capacity – ultimate bearing capacity – allowable bearing capacity – settlement of foundation – effect of settlement on the structure

– differential settlement – Field plate load test to determine permissible settlement of foundation.

4.2 FOUNDATIONS

Foundation – Types of foundation – spread, strip, raft, pile foundations & combined footing – selection criteria for type of foundation – Reference to BIS 1904 – Foundations at different levels – footings in granular & clayey soils – foundation on made up grounds – pile foundations – uses of piles – Types of piles according to materials used and according to installation procedure – Selection of pile – pile driving – load carrying capacity – pile load test – under reamed piles – stages in construction procedure.

UNIT- 5.

15 Hours

5.1. MACHINE FOUNDATION

Introduction – Free vibration – Natural frequency – Barkan & Pauw's methods – Barkan method - co-efficient of elastic uniform compression of soil – Pauw's method – assumptions – modulus of elasticity of soil – Design of machine foundation – types of machines – Reciprocating type – Centrifugal type – Impact type – steps to design each type – Couzen theory – Ratio of weight of foundation to engine weight – seismic method of investigation – Resonance methods – Wave velocity Method – BIS methods – use of vibration and sound absorbing materials - design of foundation for machines – simple problems only.

5.2 EARTH PRESSURE ON RETAINING WALLS

Introduction – Angle of repose of soil – Rankine's Active & passive earth pressures – assumptions – intensity of pressure – Total earth pressure – position of total pressure – problems in retaining walls with vertical back only.

Revision and Test

9 Hours

Reference Books.

1. Soil Mechanics and Foundations by Dr.B.C.Punmia, Published by A. Saurabh & Co.Pvt., Ltd., Chennai.
2. A text book of Soil Mechanics & Foundation Engineering in SI units by V.N.S. Murthy, Published by UBS Publishers & Distributors Ltd., New Delhi – 2

3. Construction and Foundation Engineering by Dr. J. Jha and S.K. Sinha – Khanna Publishers, Delhi – 6
4. Foundation Engineering by S.P. Brahma – Published by Tata Mcgrow – Hill Publishing Company Ltd., New Delhi.
5. Soil Mechanics and foundation Engineering by Hasmukh Pranshanker oza – Charotar Book Ltd – Anand (W.Rly) India.
6. Soil Mechanics – Foundation Engineering by Terzaghi.

6 Hours/Week

14 Weeks

84 Hours

Note :

For all the drawings detailed specifications shall be given.

Designs are not to be included in the examinations.

The drawings must include Layout plans, full plan, sections, details of components, elevation, etc., as applicable to each topic. There are three Groups of drawings that are to be taught. Only one question will have to be answered by the students in the examination out of the two questions. The question paper will include only two questions, one from each Group from the combinations of Groups A & B or from Groups B & C or from Groups A & C.

Group 'A' (PH ENGINEERING DRAWING)

21 Hours

1. Infiltration gallery (with one infiltration well, one straight gallery pipe, one inspection well and one jack well).
2. Rapid Sand Filter.
3. Septic Tank with dispersion Trench/ Soak pit.
4. Bio gas plant. (Floating type)
4. R.C.C square overhead tank supported by four columns.

Group 'B' (BRIDGE DRAWING)

15 Hours

6. R.C.C Slab Culvert with splayed wing walls.
7. Two span Pipe Culvert.
8. Two span Tee Beam Bridge with square returns.

Group 'C' (STRUCTURAL ENGINEERING DRAWING WITH BAR BENDING SCHEDULE)

9. Simply supported one-way slab.
10. Simply supported two-way slab.
11. Restrained two-way slab.
12. Singly reinforced beam.
13. Doubly reinforced beam.
14. Tee Beams supporting continuous slab.
15. Dog-legged staircase.
16. Lintel and Sunshade.
17. R.C.C Column with footings. (square)

36 Hours

Revision and test

12 Hours

REFERENCE BOOKS:

1. Drawing manual - T.T.T.I – Chand & Co.
2. structural Drawing and Detailing - Krishnamoorthy

1055 - COMPUTER APPLICATION IN CIVIL ENGINEERING

6 Hours/Week

14 Weeks

84 Hours

LIST OF EXERCISES

1. Study of operating systems - DOS and Windows - Characteristics of Windows. **3 Hours.**
2. Using Windows OS entering into the Windows Explorer, create a folder, copying files, rename some files and some folders, find a particular file and delete the file, and restore it from the recycle bin. **3 Hours.**
3. Prepare a document report using MS Word properly formatted with tables and charts embedded on it for test report like **10 Hours.**
 - a. Centrifugal pump efficiency
 - b. Sieve analysis results, etc.(The exercise should cover Various font , various font size, bold, underline etc.)
4. Using MS Excel carryout typical problems involving estimation, analysis and design problems. **20 Hours.**
 - a. Prepare the Estimate sheet with Given data (provide all the measurement details) and calculate the Quantity using formula bar.
 - b. Prepare the Abstract Sheet for the given data and Calculate Amount and Total Amount using Formula bar.(use separate column for rates and units)
 - c. Give any tabular values and ask them to prepare Bar chart, pie chart and Linear graph.
 - d. Design and Analysis problems in Excel
 - i.) Given P, L, Diameter, E and Calculate Area and Elongation using Formula bar.
 - ii.) Given b, f_{ck}, F_y, Q_u and M_u then Calculate Effective depth 'd' and Area of Steel ' A_{st} ' using Formula Bar { $d = \text{Sqrt}[M_u/(Q_u b)]$ } and $A_{st} = 0.5 f_{ck} b d / F_y [1 - \text{Sqrt}(1 - k)]$ where $k = 4.6 M_u / (f_{ck} b d^2)$
 - e. Design and Analysis problem in Excel
 - i) Given f_{ek} , Dia & No. of steel rod, size of column find $P_u = (0.4 f_{ck} A_c + 0.6784 A_{sc})$
 - ii) Given b_1, d_1, b_2 & d_2 for L-section find Moment of inertia $x_1 = b_1/2, x_2 = b_1 + b_2/2, y_1 = d_1/2, y_2 = d_2/2$
 $x = (b_1 d_1 x_1 + b_2 d_2 x_2) / (b_1 d_1 + b_2 d_2)$; and
 $y = (b_1 d_1 y_1 + b_2 d_2 y_2) / (b_1 d_1 + b_2 d_2)$

$$I_{xx} = b_1 d_1^3 / 12 + b_1 d_1 (y - y_1)^2 + b_2 d_2^3 / 12 + b_2 d_2 (y - y_2)^2$$

$$I_{yy} = d_1 b_1^3 / 12 + b_1 d_1 (x - x_1)^2 + d_2 b_2^3 / 12 + b_2 d_2 (x - x_2)^2$$

Note : In addition to the above students may be given similar exercises for practice.

5. Develop the drawing using AutoCAD for the following works Preparation of drawing using AUTOCAD **20 Hours.**
 - a. Section showing water service connection to a house.
 - b. Cross section of a Lintel cum Sun Shade.
 - c. Vertical section of a column with square footing.
 - d. Plan and sectional view of One-Way slab.
 - e. Longitudinal Section and cross section of Singly Reinforced Beam.
6. Carry out the analysis and design of RCC/Steel/Timber structures and report the details using available CAD packages. **6 Hours.**
7. Study of Internet, Web Browsing, etc., **6 Hours.**
8. Send an E-mail with attachment and copy marked to others. **6 Hours.**
9. Plot / print the available plan of building drawing suitably brought into an A4 sheet with suitable title block using paper space and model space. **4 Hours.**
10. Develop a 3 D drawing of a building and obtain different views including Perspective view. **6 Hours.**

Reference

1. Windows'98- BPB Publications
2. M.S.Office, Quick Reference - BPB Publications
3. AutoCAD, Quick Reference - BPB Publications
4. Internet, No Expr. Required - BPB Publications

1056 - MATERIAL TESTING LAB PRACTICE II

3 Hours / Week
Hours

14 Weeks

42

Part – A

1. Determination of Specific gravity of soil / sand
2. Determination of Specific gravity of aggregates
3. Attrition test on aggregate
4. Abrasion test on aggregate
5. Aggregate impact test
6. Crushing strength of aggregate
7. Water absorption test on coarse aggregate

Part – B

1. Determination of VOIDS in sand bulk density
2. Determination liquid limit and plastic limit of soil
3. Determination of field density of soil
 - a. Sand pouring cylinder method
 - b. Core cutter method
4. Proctor's compaction test
5. Direct shear test on sand

In the examination the students have to be given either two experiments in Part – A or one experiment in Part – B