



**Maharashtra State Board of Vocational Education Examination Mumbai - 51**

Name of Syllabus	<b>C. C. IN CONSTRUCTION SUPERVISOR (304202)</b>
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Duration	1 year
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Entry Qualification	S.S.C. Pass
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Exam. System	Sr. No.	Paper Code	Name of Subject	TH/PR	Hours	Max. Marks	Mini. Marks
	1	<b>30420211</b>	Construction Material and Practices	TH-1	3 hrs.	100	35
2	<b>30420212</b>	Estimating and Costing	TH-2	3 hrs.	100	35	
3	<b>30420213</b>	Surveying and Leveling	TH-3	3 hrs.	100	35	
4	<b>30420221</b>	Construction Practices	PR-1	6 hrs.	200	100	
5	<b>30420222</b>	Surveying and Leveling	PR-2	3 hrs.	100	50	
			Total			<b>600</b>	<b>255</b>

## **CONSTRUCTION SUPERVISOR**

### **THEORY – I – Construction Material and Practices.**

- (i) Brick work :- Varieties sizes and manufacturing of bricks, Burning of bricks common types of kilns. Special purpose and facing bricks.  
Characteristics of good bricks and methods of testing them on works.  
Terms used in brick work :- Stretched and header, Closer.  
English bond, Flemish bond, Arrangement of bricks in course for half, one, one and half and thicker brick-walls and at intersections.  
Brick-walls :- Relationship between thickness and length and height, practical rules for determining, thickness of external walls cross walls, party walls and partition walls.  
Footing, Brick-piers, Jambs.  
Opening in brick-walls Laptops Relieving Arches Cavity walls, bond, use of ties and arrangement of brick at still top and openings.  
Function of mortar in brick work.  
Characteristics and specifications of first, second third class brick work.  
Shrinkage and settlement in new brick work. Joining old and new brick work and precautions necessary.  
Mode of units of measurement of brick work; number of bricks and quantity of mortar required for walls of different thickness.
- (ii) Masonry :- Building stone, granite, basalt and trap, line-stone, sand-stone, characteristic of good building stone.  
Quarrying, methods, use of drilling and blasting, Explosive.  
Rubble, Khandki, Corners, headers and block stones.  
Rubble Masonry, Random rubble Masonry, Khandki faced Masonry, coursed and uncoursed rubble Masonry, Block-in-course and Ashlar, theory characteristics and general specifications.  
Stone dressing, Face, bed and joints, and secret-key joints.  
Out-stone work and terms used, e.g. Coping, Cornice, String course, String course, Architrave, window still stills, steps, rebate, nosing throttling etc.  
Base and cap for pillars, Jambs, Soffits and Fascia courses.  
Function of mortar in Masonry.  
Mode and units of measurements, quantity of stone stopped mortar required.
- (iii) Lime, Cement and (Mortar) :- Lime-Fat and hydraulic lime properties and uses. Lime burning and slaking.  
Cement :- Portland cement, properties and characteristics.  
Normal and rapid hardening cements. Aluminous cements.  
Sand :- Characteristics of good sand. Function of sand in lime and cement mortar.  
Surkhi :- Manufacture and function when used as an ingredient in mortar.  
Mortar :- Lime mortar, proportion of lime to sand and surkhi.

Grinding in Ghanis and mortar mills.

Strength and test.

Cement :- Proportion of cement of sand and corresponding strength.

Importance of using minimum quantity of water.

Use of surkhi tests.

Gauged mortar-Ingredients, Proportions and advantages.

Plaster of Paris, Gypsum.

Common mixes of mortar used for brick work, Masonary, plaster and pointing.

Shrinkage of mortar joints.

- (iv) Concrete and concrete construction :- (a) Cement concrete – Ingredients, Coarse and fine aggregate cement and water; characteristics and function of each.

Water – Cement ratio and its relationship with strength of concrete.

Quantity of water required.

Bulking of sand.

Grading of aggregates-sieve analysis of aggregates and fineness modulus.

Common mixes of concrete used in constructions.

Maximum size of aggregate depending on type of construction.

Batching by volume and weight.

Mixing by hand and in machines.

Times of mixing.

Concrete mixers, hoist, chutes.

Transporting and placing concrete.

Measurement of slump.

Vibration and compaction, internal and external vibration.

Petrol diesel and electrical vibrators.

Construction joints-bonding new concrete to old concrete.

Sand blasting, green-cutting.

Necessity of curing concrete and methods used.

Segregation, honey-co, bing, beading, harshness, their causes and precautions to avoid them.

Taking samples for testing, wet-screening. Seven and twenty-eight day strength of common mixes of concrete.

Use of admixture and wetting agents.

- (b) Special features of mass concrete and reinforced concrete construction, and pre-cast construction. Nature of cracks in concrete construction and methods of repair them Expansion and construction joints – Water stops Mode and units of measurement in concrete construction. Quantities of aggregate and cement required.

- (c) Temporary-construction-Formwork for reinforced concrete construction, Timber formwork. Method of erection and dismantling. Time for striking shuttering for columns, walls, slabs, beams, etc., Scaffolding. False work for arches.

- (d) Reinforcement – Steel bars fabrics and meshes, binding wire cutting and bending bar, length of hooks, bend and lamps. Welding of bars. Bar bending machines. Trying reinforcement in position. Minimum cover, spacers, chairs etc. Reading bar bending schedulers and an making bar bending sketches and drawings.

- (e) Lime concrete – Ingredient, method of making and use.

- (v) Plaster and pointing – Lime plaster – Characteristics of lime used; necessity of adequate slaking; ingredients and common proportion used.

Methods of Plastering neeru finish.

Cement plaster – common proportions used. Two coat work, rough cast, stucco and other type of types of finishes.

Gauged cement plasters.

Pointing – Proportion of mix. Different types of pointing finishes.

- (vi) Wood work and joinery :- Types of hard and soft woods used in construction with special attention to teak, pine and deodar.

Characteristics of good timber. Defects-knots, shakes, cracks etc. Dry rot, wet rot.

Terms used :- Logs, squares, scantlings, boarding, battens, etc.

Seasoning of timber and control moisture.

Preservation and commonly used preservatives.

Joints used in timber construction and joinery and their details. Timber floors; types and methods of construction, joists, beams, girders. Sections commonly used in timber floor construction; use of tables to determine sections for varying spans and spacing.

Rough rules guiding relationship between span and depth of floor joists.

Timber roads-types of trusses, roofing members and common sizes of scantlings used; use of tables to determine sections for varying spans.

Posts, post-plates, wall-plates, etc.

Use of tables of sections.

Joinery – Frames, door and window shutters, common sizes of scantlings used, hold-fast.

Paneled, glazed, louvered, framed and battened shutters.

Block-board shutters.

Timber partitions and construction details. Paneling and dadoes to walls.

Iron-mongery, Iron, brass, bronze and aluminium fixtures. Oxidizing, chromimum plating, sheradising, etc.

Roof coverings – Country tiles, Mangalore titles. G.I. sheeting, Asbestos cements roofing, methods of fixing. Ridges, valleys and flashings. Construction details and quantities of materials required.

Reconstructed and artificial wood products and their uses; hand board soft, board, Masonite, block boards, veneers, wains slotting.

- (vii) Structural Steel work :- Rolled sections – joists, channels, tees, angles and plates. Compound sections, bolts, rivet and welded connections. Steel trusses, steel purlins and other construction details. Steels columns, girders and beam. Typical connections between columns and beams, columns and beams, columns bases, caps brackets and cleats. Foundation bolts and methods of fixing them into foundations.

Steel roofs in industrial buildings, north light roofing Glazing.

Steel window and their assembly details Steels doors, Rolling and folding stutters.

Rair folding water gutters and down takes.

- (viii) Floors and floor finishing :- Murum floor, natural stone, flags-shahabad. Tandoor Kotah stone, marble.

Cement :- Tarrazzo and Granolithic finishes, Indian patent stone.

Ceramic Title :- Glazed tiles vitreous tiles.

Asphaltic and Bitumen tiles :- Thermoplastics tiles; Rubber flooring.

Acid-resting floors – Fire bricks.

Qualities of good flooring materials and relative merits different types. Special features and details of construction. Polishing floors. Maintenance of floors. Dados an linings to walls.

- (ix) Painting, Varnishing, polishing and surface finishes :- Characteristics, qualities and functions of ingredients used. Techniques of preparation and execution.

Ready-mixed paints, oil-bound distempers, emulsions, plastic paints and special purpose protective paints.

Spraying machines.

Covering capacity of paints on masonry, steel and wood.

Texture of finish and its effect on lighting and acoustics.

Plaster of paris coiling. Asbestos limpet plasters. Proprietary materials for lining walls and ceiling for improving acoustics.

Water proofing and water repelling treatments :- Use of Asphaltic and bituministic products. China mosaic Brick bat jelly etc. for water proofing terraces and flat roots. Proprietary water proofing materials and their uses in treating walls of basement, water-tanks, etc.

Gunning

- (x) Foundation :- Classification of soils into hard and soft soils for excavation slopes for excavation-side slopes for excavation in different soils. Shoring and strutting in soft and water-logged soils and in deep excavation, Dewatering.

Function of footings; column footings.

Raft foundations; Timber piles; R.C.C. piled foundations.

- (xi) Domestic services :- (a) Sanitary fittings; W.Cs. lavatory basins, urinals, etc. latrines and privies.

(b) Internal plumbing :- Traps and anti-syphonage precautions.

Connections of sanitary fittings to soil pipes.

Flushing tanks. Earthen-wire, concrete, C.I., asbestos and lead pipes and their connections.

Wiped joints house drains, connections to sewers, gullies, inspection chambers and man-holes.

Testing of drains.

Water-supply-overhead tanks, service connections; C.I.G.I. water supply pipes and method of joints.

Lead joints, Pipe fittings. Devices to save wastage of water. House meters.

- ( xii) Door And Window

1 Functions of Door, Functions of window

2 Rules for providing Doors & windows

3 Parts of a Door and Window

4 Materials used in making of Door & window

5 Wooden and Steel Door and Window frame

6 Types of Door Shutters

a) Fully paneled Shutter b) Fully glazed shutter c) Flush Door

7 Fixtures & fastenings for Doors

8 Rolling shutter, collapsible shutters, sliding doors

9 Types of Windows Shutter

a) Fully Paneled shutter b) Fully glazed c) Sliding shutters.

d) Lowered window e) Steel Window

f) Aluminum sliding windows

10 Fixtures and Fastening for windows

11 Grills for window

(xiii) Stairs

1) Definitions of Terms used in Stair.

2) Classification of stairs based on shape and materials used for construction.

3) Requirements of good stairs

4) Design of stair Thumb Rules for Design of Dog legged stair

5) Hand Rails Types and Fixing Procedure

## **PAPER – II – THEORY- II – Estimating and Costing**

### **Brief Syllabus :-**

Estimate and its types.  
Calculation of quantities and methods of taking out quantities.  
Calculation of quantities of materials of different items of construction  
Preparation of detailed estimate  
Types of forms used in estimate  
Preparation of Rate Analysis for different items of construction works,  
Tender and Tender documents  
Conditions of contract  
Specifications of different items of the work  
To prepare estimation and costing of a small residential structure.

### **Detailed Theory Syllabus**

Introduction  
Meaning of Term Estimating, costing Types of Estimate  
1.2.1. Approximate Estimate  
1.2.2 Details Estimate

Approximate Estimate  
2.1 Definition of approximate estimate  
2.2 Uses of Approximate Estimate  
2.3 Preparing Approximate Estimate for Building Methods of preparing Approximate Estimate for Buildings  
2.3.1 Plinth Area Method  
2.3.2 Cubical Unit  
2.3.3 Service Unit  
2.3.4 Bay Unit

### **Detail Estimate**

3.1 Definition of Detail Estimate  
3.2 Uses of Detail Estimate  
3.3 Data required to prepare detailed estimate  
3.4 Procedure of preparing detailed estimate of any work  
3.4.1 Taking out quantities and entering the data in measurement sheet and completing abstract sheet.  
3.4.2 Abstracting using Abstract sheet  
3.5 List of items with their unit of measurement.  
3.6 Definition of contingencies, work charge establishment  
3.7 Provisions in details estimate for sanitary, water supply, Electrification.  
3.8 Types of Estimates, Detail Estimate, Revised Estimate, Supplementary Estimate, Annual report and Maintenance Estimate, Special Report Estimate, Additions and Alteration Estimate.  
3.10 Procedure of calculating Quantities for excavation, Foundation concrete, Foundation & plinth Masonry, Super Structure Masonry using  
i) Long wall – Short Wall method  
ii) Center Line Method  
3.11 Rules for Deduction in concrete, Masonry, Pointing & Plastering, Painting,  
3.12 Multiplying factor related to oil painting

### **Chapter No. 4: Working out of quantities of Steel for R.C.C work**

12.1 Division of R.C.C work into concrete Steel and Form work  
12.2 Study of Reinforced steel for Bar diameter, its weight,  
12.3 Calculating Length and weight of steel for  
12.3.1 Straight bar with hook or EL at ends  
12.3.2 Bent up bar with hook or EL at ends  
12.3.3 Stirrups  
12.4 preparing Bar bending schedule and calculating steel for: Footing, Column, Lintel, Beam, Slab, Chajja, Staircase etc



**Chapter No. 5: Modes of Measurements**

- 4.1 Points Considered while fixing unit of measurement
- 4.2 Modes of measurements of item of work as per IS 1200
- 4.3 Desired Accuracy of measurement

**Chapter No. 6: Rate Analysis**

- 5.1 Meaning of Term Rate Analysis
- 5.2 Necessity of Rate Analysis
- 5.3 Factors affecting Rate analysis
- 5.4 Rates of Material and Labor as per DSR.
- 5.5 Definition of Task work and factors affecting it. Task work for Excavation, Brick Masonry, Plastering, Wood work, centering & formwork, Steel work for RCC, Plain Concrete and RCC
- 5.6 Methods of payment to labor.
- 5.7 Transportation of material and its effect on rate analysis, Lead & lift
- 5.8 Preparing Rate Analysis of minimum 10 items, such as Excavation, Brick Masonry, Plastering, Wood work, Centering & formwork, Steel work for RCC, Plain Concrete and RCC
- 5.9 Standard schedule of Rate.

**Chapter 7: Specifications**

- 6.1 Necessity of Specification
- 6.2 Points to be observed while framing specifications
- 6.3 Types of Specifications General, Details, Standard and manufactures Specifications
- 6.4 Writing detailed Specifications of minimum 5 important items of building work
- 6.5 Study of Standard specification Book from organizations such as PWD, MHADA, IDCO etc.

**Chapter 8 : Tender Document & Tender Notice**

- 8.1 List of Tenders document
- 8.2 Necessity of Tender
- 8.3 Points to be observed while framing Tender Notice
- 8.4 Drafting of Tenders Notice
- 8.5 Explanation of Terms: Earned Money, Security Deposit, Validity Period, Right for Rejection of one or all tenders
- 8.6 Corrigendum to Tenders Notice
- 8.7 Procedure of Submitting filled Tender
- 8.8 Opening of Tender, Scrutiny of Tender
- 8.9 Comparative Statement, Finalizing Tender
- 8.10 Work order
- 8.11 Rejection of all tenders
- 8.12 Rejection of Lowest Tenders
- 8.13 Unbalanced Tender, Ring formation, Negotiations
- 8.14 Point to be observed by contractor while filling a tender.

**Chapter 9 : Conditions of Contract**

- 9.1 Contract - Definition, its necessity and types
- 9.2 General Conditions of contract
  - 9.2.1 Special conditions of contract
  - 9.2.2 Contract Drawing
  - 9.2.3 Bill of Quantity
  - 9.2.4 site possession for execution
  - 9.2.5 Inspection of Materials
  - 9.2.6 Inspection of completed item of works
  - 9.2.7 Water charges and Light Charges
  - 9.2.8 Working on Holiday

9.2.9 Extension of Time Limit  
9.2.10 Termination of Contract  
9.2.11 Subletting of work  
9.2.12 Suspension of work  
9.2.13 Extra Item  
9.2.14 Payment to contractor  
9.2.15 Clearance of file & Completion Certificate  
9.2.16 Defects Liability Period  
9.2.17 Price Escalation Clause  
9.2.18 Adherence to labor laws  
9.2.19 Arbitration  
9.3 Reward / Penalty clause

**Chapter 10: Payment to Contractors**

10.1 Modes of Payment to contractor  
10.1.1 Interim payments and its necessity  
10.2 Types of interim payment  
10.2.1 Advance payment  
10.2.2 Secured Advance Payment  
10.2.3 On Account Payment  
10.3 Final Payment  
10.4 First & final Payment  
10.5 Retention Money and its Necessity  
10.6 Reduced Rate Payment  
10.7 Petty advance  
10.8 Mobilization Advance  
10.9 Measurement Book  
10.10 Indent Invoice  
10.11 Recoveries

**Chapter 11: Procedure of Execution of work in P.W.D.**

11.1 Organization set up of PWD  
11.2 PWD procedure of initiating work, Administrative Approval, Technical Sanction, Expenditure section, Budget Provision  
11.3 Methods of Executing work  
11.3.1 Contract Method  
11.3.2 Departmental Method, Nominal Muster Roll  
11.3.3 Rate List Method  
11.3.4 Piece Work Method  
11.3.5 Day Work Method

## PAPER – III – THEORY - III – Surveying and Leveling.

### **Theory Syllabus in Brief :-**

1. Introduction and principles of surveying and leveling.
2. Study of Surveying instruments
3. Study of Leveling instruments
4. Methods of surveying
5. Types of leveling
6. Use of chain and tape for surveying building sites.
7. Leveling and elementary idea of contours.
8. Use of dumpy level and buildings level.
9. Recording leveling observations.
10. Study of chain survey for building site
11. Study and practice of Theodolite
12. Study of Plane table survey

### **Detailed Theory Syllabus**

#### **Chapter : 1 Introduction**

- 1.1) Definition of Surveying
- 1.2) Objects of Surveying
- 1.3) Uses of Surveying
- 1.4) Principles of Surveying
- 1.5) Types of Survey: Plain Survey & Geodetic Surveying.
- 1.6) Scales - its types and uses

#### **Chapter 2: Linear Measurement**

- 2.1) Study of 20m and 30m chains and its parts.
- 2.2) Study of metallic woven tape
- 2.3) Study of steel Tape.
- 2.4) Instruments – peg; arrows; ranging rod.
- 2.5) Fixing of stations; points to be observed in selection of station.
- 2.6) Ranging – Direct, Indirect and reciprocal ranging, to set up intermediate points between stations. use of ranging rod in ranging, use of Line Ranger in ranging.
- 2.7) Procedure of chaining between two stations. Entering in Field Book.
- 2.8) Testing o chain and tape before and after chaining of line.
- 2.9) Error in chain – Meaning of terms - chain is too long and chain to too short.
- 2.10) Correcting of chain.
- 2.11) Correction of length of line of if chain is too long and too short.
- 2.12) Correction of Area, if chain is too long or too short.
- 2.13) Chaining on sloping ground, Method of Stepping only.
- 2.14) Degree of accuracy desired.

#### **Chapter 3: Chain and Cross Staff Surveying**

- 3.1) Study of Cross Staff and Optical Square and their use.
- 3.2) Chain Triangulation
  - 3.2.1) Selection of Stations
  - 3.2.2) Setting up various lines such as Base Line, Check Line, and Tie Line.
  - 3.2.3) Definition of offsets. Its use. Types of offsets : Long offset ; Short offset and oblique offset
  - 3.2.4) How offset is set out and measured from an object. Recording of offset in field book.
- 3.3) Conventional signs used in Survey map:  
Earth work in Cutting and Embankment Road, Railway, Stream, River, Culverts, Bridge, Tunnel, Orchard, Cultivated Land, Temple, Mosque, Church, Electric Lines, Fencing etc.
- 3.4) Chaining across an obstacles: Building ; Pond ; River
- 3.5) Chain and Cross Staff Survey for Calculating area of field or plot.

**Chapter 4 : Chain and compass Survey**

- 4.1) Study of Prismatic Compass. It's Component parts and function
- 4.2) Definition of Bearing; Fore Bearing and back bearing
- 4.3) Setting up of Prismatic compass and observing bearings of a line, Finding included angle using fore and back bearings of a Line, Difference in Fore and Back bearing of a line.
- 4.4) Definition of Open Traverse and Closed Traverse
- 4.5) Definition of local Attraction
- 4.5.1) Causes of local attraction

- 4.5.2) Errors due to local attractions
- 4.5.3) Precautions to be taken to avoid local attraction
- 4.5.4) Correction of bearing of line affected by local attraction
- 4.6) Running a closed Traverse by included angle method
- 4.6.1) Entering bearings of line in Field Book
- 4.6.2) Calculations of Included angle
- 4.6.3) Correction of Included angle
- 4.6.4) Correcting bearings of lines
- 4.6.5) Methods of Plotting Traverse
- 4.6.6) Graphical Adjustments for closing error by Bowdich's rule

**Chapter 5: Leveling**

- 5.1) Definition of Terms  
Level Surface; Level Line; Horizontal Line; Datum Surface
- 5.2) Definition of Bench Mark, Types of Bench Marks
- 5.3) Study of Dumpy Level – Its parts; Various Axis of a Dumpy level -- Line of Sight, Line of Collimation; Axis of Bubble Tube, Vertical Axis. Setting up of Dumpy level , Temporary and Permanent Adjustments.
- 5.4) Study of Tilting level.
- 5.5) Study of Levelingstaves
- 5.6) Terms used in Leveling, fore sight, Intermediate Sight, Back Sight, Change Point Height of Collimation
- 5.7) Taking Reading by levels and entering in field book.  
Calculation of Reduced Levels of Points by Height of Collimation Method and Rise And Fall Method and applying arithmetic checks.
- 5.8) Classification of Leveling:  
Simple Leveling, Differential Leveling, Fly Leveling, Profile Leveling and Cross Sectioning.
- 5.9) Errors in Leveling and to eliminate them.
- 6) Study of Auto Level – Setting up and observing Readings on staff

**Chapter 6: Contouring**

- 6.1) Definition of Contour
- 6.2) Characteristics of Contour
- 6.3) Uses of Contour Map
- 6.4) Definitions of Contour Interval
- 6.5) Establishing grade Contour
- 6.6) Methods of Plotting Contour

**Chapter 7: Planimeter**

Note: Theory to be covered in Practicals.  
Construction of Planimeter, Use of Planimeter

**Chapter 8: Plane Table Survey**

- 1) Principles of plane table survey. Accessories required Setting out of plane table, Leveling, Centering and orientation.  
Methods of plane table surveying – Radiation, Intersection, and Traversing.  
Merits and Demerits of plane table Surveying. Situations where plane table survey is used. Use of Telescopic Alidade.

**Chapter 9: Theodolite Survey**

1) Components of Transit Theodolite and their functions.

2) Technical terms used. Temporary adjustments of Transit Theodolite.

3) Swinging the telescope, Transiting, Changing the face.

Measurement of Horizontal angle, method of Repetition, errors eliminated by method of repetition.

Measurement of Deflection angle. Measurement of Vertical angle. Measurement of magnetic bearing of a line by Theodolite. Prolonging a Straight line. Sources of errors in Theodolite Surveying.

Permanent adjustment of transit Theodolite (only relationship of different axes of Theodolite.).

Traversing with Theodolite – Method of included angles, locating details, checks in closed traverse,

Calculation of bearings from angles.

Traverse Computation - Latitude, Departure Consecutive Coordinates error of Closure, Distribution of a angular error,

balancing the traverse by Bowditch's rule and Transit Rule, Gale's traverse table. Simple problems on above topic.

## **PRACTICAL – I – Construction Material and Practices.**

1. Construction of English bond in different wall thickness.
2. Construction of Flemish bond in different wall thickness.
3. Construction of UCR Masonry
4. Construction of C R Masonry
5. Practice of plastering on wall surface
6. Practice of pointing on stone wall surface
7. Application of different paints on internal / external wall surface
8. Field testing of bricks
9. Field testing of cement
10. Making of wooden joints
11. Visit to site for observing Bar bending, laying of Reinforcement bars
12. Observe method of providing cover, placing concrete in RCC Members
13. Draw Figures – RCC Bars reinforcement in column Footing, column, beam, slab, lintel, Chajja, Loft
14. Exercise on preparing standard Bar bending Schedule
15. Perform bar bending and binding by using G.I. wire for forming Hook, EL, Bend, Lap, stirrups of 6 mm bar for column and beam
16. Line out for 3 to 4 Room Load Bearing Building
17. Line out for Framed structure
18. Visit to Site to study different methods of Excavation
19. Visit to site showing ingredients and process of mixing, transportation, laying, compacting and curing of concrete
20. Construction of UCR stone masonry in foundation work, UCR stone masonry for compound wall (ht 1.2 m to 1.5 m)
21. Construction of Burnt Brick Masonry in superstructures in English Bond / Flemish Bond
22. Construction of concrete block masonry in superstructure
23. Study of Laying Lintels and Sills on Construction Site
24. 1. Fixing of Tiles for Pavement
25. 2. Fixing of Tiles in area 3mX4m
26. 3. Fixing Tiles for Dado
27. Fixing of Door frame with brick wall
28. Fixing of Window frame in brick wall
29. Fixing of Ventilator frame in brick wall
30. Study of Construction of Septic tank complete
31. Reading of Building Drawing for measurement
32. Filling of Measurement Sheet
33. Preparing approximate estimate of a building using approximate method.
34. Preparation of Detail Estimate of a Residential Building (Load Bearing Structure)
35. Details estimate of septic Tank
36. Details estimate of sump well
37. Calculating Quantity of concrete & Steel for 2 to 3 room RCC Building or Hall.
38. Tender Notice 2. Tender Form 3. General Directions to Contractor
39. Schedule A 5. Schedule B 6. Schedule C 7. General terms and conditions of contract 8. Special conditions of contract 9. Specifications
40. Study of contract conditions

## PRACTICAL – II –Surveying And Leveling

<p><b>Practical Syllabus in Brief :-</b></p> <ol style="list-style-type: none"> <li>1. Recording readings through Dumpy levels and make the entries in field book , calculation of reduced levels and drawing contours (Block leveling)</li> <li>2. Chain and Compass survey</li> <li>3. Practice of Theodolite survey</li> <li>4. Practice of block leveling and profile leveling.</li> <li>5. Compass and traverse survey</li> <li>6. Practice of Plane table survey</li> </ol>
<p><b>Detailed Practical</b></p>
<p><b>Practical</b> Construct different types of Scales, Use of Paper Scales,</p>
<p><b>Practical</b> 1) Study of chain and its parts for 20m and 30m chain, arrows, pegs, Ranging Rod. 2) Fixing of station and measuring length of line joining them and entering in field book. Ranging a line using Ranging Rod. 3) Use of Line Ranger. 4) Chaining on sloping ground by Method of stepping.</p>
<p><b>Practical</b> 1) Study of Cross-Staff and Optical Square. 2) Setting of a line; Taking offsets from objects, Recording in field book 3) Location sketch of a station 4) Measurement of area of a field or plot using Chain and Cross Staff</p>
<p><b>Practical</b> 1) Study and use of Prismatic Compass 2) Setting up of compass on a station and observing bearings and finding included angles between lines 3) Measuring of Fore Bearing and Back Bearings of polygon 4 to 5 sides. Identifying stations affected by Local Attraction Calculating Included Angle, Correcting Included Angles, Correcting Bearings 4) Carry out a closed Traverse Survey of 4 to 5 sides enclosing a building. Making Entry of collected Data in Field Book. Calculating Included Angles Correcting for local attraction. Plotting the surveyed area eliminating closing errors. Plotting internal details of plot from survey data</p>
<p><b>Practical</b> 1) Study of Dumpy level. Parts of Dumpy level, Temporary Adjustment of level, Axis of Dumpy level. 2) Study of Leveling staves 3) Taking reading with Dumpy level on Leveling Staff 4) Simple Leveling Taking Reading, recording in Field Book Calculating of Reduced Level. 5) Differential Leveling Taking Reading recording in Field Book Calculating of Reduced Level. 6) Fly Leveling single check and Double check, Taking Reading, recording in Field Book, Calculating of Reduced Level. 7) Study of Tilting Level observing Readings on staff 8) Study of auto Level, observing Readings on staff</p>
<p><b>Practical</b> 1) Block Contouring for a block 200m X 200m on undulated ground by observing spot Levels at 10m X 10m. Draw a sheet showing contours at Contour interval 1.0m or 0.5m.</p>

<p><b>Practical</b>  7.1) Study of Polar Planimeter  7.2) Use of Planimeter to find area from drawings, Study of formula Anchor positions and relationship between constants  7.3) Study of Digital Planimeter, finding Area from given drawing using Digital Planimeter</p>
<p><b>Practical</b>  1) Using Accessories carrying out temporary adjustments of Plane table  2) Locating details with plane table by method of intersection and orientation by Back sighting  3) Using plane table with telescopic Alidade for survey of small area.</p>
<p><b>Practical</b>  1) Understanding the components of Theodolite and their functions, reading the vernier and temporary adjustments of Theodolite.  2) Measurement of Horizontal angle by using transit Theodolite. By method of Repetition with face left and face right Measurement of vertical angles by Theodolite. Measurement of Magnetic bearing of a line using Theodolite. Measurement of deflection angle by taking open traverse of 4 –5 sides. Extending a straight Line using Theodolite in Horizontal and Vertical plane</p>

### **LIST OF TOOLS AND EQUIPMENTS**

Sr. No.	Description of tool / equipment	No. required	Remark
1.	Tapes	6	
2.	Chains	3	
3.	Optical square	3	
4.	Prismatic compass	3	
5.	Theodolite	3	
6.	Plane table traverse	3 sets	
7.	Models of railway bridge, staircase roof & Building.	One each.	
8.	Ranging rods, leveling staff	25	
9.	Dumpy level	3	
10.	Arrows pege, flags.	-	



## **REFERENCE BOOKS**

- |     |                              |                       |
|-----|------------------------------|-----------------------|
| 1.  | Building construction        | - S.C. Rangwala.      |
| 2.  | Surveying & leveling         | - Kanetkar & Kulkarni |
| 3.  | Estimating & costing         | - B. N. Datts.        |
| 4.  | Materials in construction    | - Aggrawal & Arora.   |
| 5.  | Construction                 | - Shushilkumar.       |
| 6.  | Building construction        | - B.C. Punmia.        |
| 7.  | Building construction        | - S.C. Rangwall.      |
| 8.  | Building construction        | - Pathak & Jamkhandi. |
| 9.  | A Text book of surveying     | - Kautkar & Kulkarni. |
| 10. | A Surveying & leveling       | - V.S. Gagare.        |
| 11. | A Surveying & leveling       | - B.C. Punmia.        |
| 12. | Quantity surveying & costing | - Chakraborty         |
| 13. | Quantity surveying & costing | - Dutta.              |
| 14. | Quantity surveying & costing | - J. R. Muley.        |

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