

Maharashtra State Board of Vocational Examination, Mumbai 400 051

1	Name of Course	Diploma Course in Building Construction Technology									
2	Course Code	304407									
3	Max no. of Students	25									
4	Duration	2 year									
5	Course Type	Full Time									
6	No. of Days per week	6 days									
7	No. of hours per day	7 Hrs									
8	Space require	Theory Class Room – 200 sqft Three Practical Lab – 500 sqft each									
9	Entry qualification	S.S.C. Pass									
10	Objective of syllabus	To get Knowledge of Building Construction, To Understanding Building Drawing, To Prepare Estimate, To Prepare Building Drawing on CAD, To know Building Construction Technology									
11	Employment opportunities	Office of Architect, Office of Consultant Civil Engineer, Office of Builder, any Civil Engineering Firm, his own practice as Construction Supervisor									
12	Teachers Qualification	1) For Vocational subject - B.E.Civil 2) For Non Vocational Subject - Master Degree in Concern subject									
13	Teaching Scheme –										
	Sr.	Subject	Subject Code	Clock Hours / Week				Total			
				Theory	Practical						
	1	English (Communication Skill)	90000001	2 Hrs	1 Hrs			3 Hrs			
	2	Elective – I		2 Hrs	1 Hrs			3 Hrs			
	3	Elective – II		2 Hrs	1 Hrs			3 Hrs			
	4	Building Material and Construction	30440001	3 Hrs	8 Hrs			11 Hrs			
	5	Building Drawing and CAD	30440002	3 Hrs	8 Hrs			11 Hrs			
	6	Construction Technology and Estimating Costing	30440010	3 Hrs	8 Hrs			11 Hrs			
	Total								42 Hrs		
14	Internship	Two Months Summer Internship from 1 st May to 30 th June is Compulsory.									
15	Examination Scheme – Final Examination will be based on syllabus of both years.										
	Paper	Subject	Subject Code	Theory			Practical		Total		
				Duration	Max	Min	Duration	Max	Min	Max	Min
	1	English (Communication Skill)	90000001	3 Hrs	70	25	3 Hrs	30	15	100	40
	2	Elective – I		3 Hrs	70	25	3 Hrs	30	15	100	40
	3	Elective – II		3 Hrs	70	25	3 Hrs	30	15	100	40
	4	Building Material and Construction	30440001	3 Hrs	100	35	3 Hrs	100	50	200	85
	5	Building Drawing and CAD	30440002	3 Hrs	100	35	3 Hrs	100	50	200	85
	6	Construction Technology and Estimating Costing	30440010	3 Hrs	100	35	3 Hrs	100	50	200	85
										900	375
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16	Teachers – Three Teachers per batch for vocational component. For English, Elective-I & II guest faculty on clock hour basis.										
17	a) For Elective I – Student can choose any one subject						b) For Elective II – Student can choose any one subject				
	Code	Subject Name					Code	Subject Name			
	90000011	Applied Mathematics					90000021	Applied Sciences (Physics & Chemistry)			
	90000012	Business Economics					90000022	Computer Application			
	90000013	Physical Biology (Botany & Zoology)					90000023	Business Mathematics			
	90000014	Entrepreneurship									
	90000015	Psychology									

Subject - Building Material and Construction

Code No – 30440001

Theory	Practical
Chapter 1: Stone and Coarse Aggregate 1.1. Classifications of Rocks 1.2. Quarrying for stone 1.3. Commonly used stones in building 1.4. Requirements of good building stone 1.5. Study of crushers for obtaining coarse Aggregate 1.6. Common sizes of coarse Aggregate used in concrete 1.7. Properties of coarse Aggregate	Practical 1) Visit to Quarry to observe quarrying operations 2) Conduct Compressive strength Test on stone 3) Conduct Abrasion Test of Metal
Chapter 2: Bricks 2.1. Study of earth (Soils) used in manufacturing of Brick 2.2. Procedure of manufacture of Bricks 2.3. Classification of Bricks 2.4. Properties of a good Brick 2.5. Other types of Brick	Practical 1. Field Tests of Brick 2. Conduct Compressive Test on Brick 3. Conduct Water absorption on Brick
Chapter 3: Cement 3.1 Grades of cement as per IS 12269 – 1987, IS 8182 - 1989 and IS 289 - 1989 3.2 Ingredients of Cement, Manufacture of Cement (only introduction) 3.3 Various Types of Cements and its uses 3.4 Effect of Cement on properties of concrete 3.5 Storing of Cement	Practical 1. Field Tests of Cement 2. Determining initial & final setting time of Cement 3. Determining fineness Modulus of Cement 4. Determination of Compressive strength of cement
Chapter 4: Fine Aggregates 4.1. Types of fine aggregates used in preparation of cement mortar and concrete 4.2. Sources of fine aggregate 4.3. Properties of River Sand 4.4. Silt content and necessity of Screening & Washing of fine Aggregates	Practical 1. Sieve Analysis of Sand for finding fineness modulus 2. Finding Silt content in Sand
Chapter 5: Cement Mortar 5.1. Ingredients of Cement Mortar 5.2. Preparation of Cement Mortar – Hand Mixing, Machine Mixing – Advantages and Disadvantages 5.3. Various Proportions of Cement Mortar 5.4. Lime Mortar, its properties and use	Practical 1. Preparation of Cement Mortar 1:6
Chapter 6: Concrete 6.1) Ingredients of Concrete 6.2) Types of Concrete Plain Cement Concrete, (PCC) and Reinforced cement concrete (RCC) 6.3) Various proportion of Concrete and its uses, Batching of concrete- Volume batching and weigh batching 6.4) Procedure for preparing concrete – Hand Mixing, Machine Mixing 6.5) Transportation of concrete, precautions to taken . 6.6) Laying of concrete & precautions to taken 6.7) Necessity of compacting of concrete, equipments used for compacting concrete 6.8) Necessity of curing, Methods of curing 6.9) Workability - water cement ratio and its importance	Practical 1) Conduct Compressive Test on Concrete (cube Test) 2) Conduct Test for Workability (slump test) 3) Conduct Compaction factor Test 4) Introduction to Non Destructive Tests on Concrete

6.10) Hydration of Cement 6.11) Quality of water 6.12) Finishing of concrete surface 6.13) Admixtures used in concrete and properties of such concrete 6.14) Ready mix concrete, Properties, Manufacturing and its uses 6.15) Advances in concreting such as self compacted concrete, Trimix Concrete, etc	
Chapter 7: Steel 7.1) Types of steel used in RCC as per ISI 7.2) High Tensile Steel its properties, study of IS 1786 7.3) Cover for steel as per IS 456 - 2000 7.4) Types of sections used in Steel Structure and its properties 7.5) Rolled steel Joist of different sections and its uses	Practical 1) Conduct Tensile Test on mild steel bar / HYSD Bars
Chapter 8: Flooring Tiles 8.1) Shahabad Tiles, Kotah Tiles, Cuddappa Tiles, Marble Tiles, Granite, its occurrence, Sources of availability and its uses 8.2) Cutting of tiles 8.3) Cement tiles, marble mosaic tiles, chequered tiles- process of manufacture, and its uses 8.4) Ceramic Tiles, process of manufacture, Normal sizes & its uses 8.5) Cement mortar Briques , Process of manufactures and its uses	Practical 1) Conduct Bending Test of tiles 2) Conduct Abbreviation test of tile
Chapter 9: Timber 9.1) Types of Timber. 9.2) Sections of Timber. 9.3) Characteristics of Good Timber. 9.4) Defects in Timber. 9.5) Decay of Timber and remedies. 9.6) Seasoning of Timber, necessity and methods. 9.7) Preservation of Timber. 9.8) Timber based Product Plywood; Block Board, Veneers, Particle wood 9.9) Finishing to Timber a) Painting b) Polishing c) Sun mica	Practical Report on Visit to a Timber Factory
Advance Building Materials 10.1) Study of latest materials used in Flooring, Thermal Insulation, Sound proofing, Wall finishing, structural glazing, Metal Cladding & rendering, Partitioning, and Painting	

Chapter 8: Reinforced Cement Concrete 8.1) Different types of RCC members Definitions, its properties and its locations 8.2) Ingredients of for R. C. C. Concrete 8.3) Batching of concrete ingredients- Definition and methods, volumetric method and weight batching method of concrete mixing 8.4) Shape and types of Reinforcing steel bars used in RCC members. Explain Terms used - Cutting of bar; Straightening of bar; Bending of bar; Hooking of bar; lapping of bar, Binding of bars, use of G.I. wire, cover for bars. 8.5) Standard Hook length for plan M. S. bar, Standard length of "EL" for Torque steel bar 8.6) Joints in RCC work, Necessity, Types of joints in RCC work, Construction Joint, Expansion Joint, location of joints, Material used, & Procedure of construction of Providing Joints.	Practical i) Visit to site for observing Bar bending, laying of Reinforcement bars ii) Observe method of providing cover, placing concrete in RCC Members iii) Draw Figures – RCC Bars reinforcement in column Footing, column, beam, slab, lintel, Chajja, Loft iv) Exercise on preparing standard Bar bending Schedule v) 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
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Subject - Building Material and Construction - 2nd Year

Code No – 30440001

Theory	Practical
Chapter 1: Foundation 1.1) Necessity and Purpose of Foundation 1.2) Shallow Foundation 1.2.1) Spread Foundation 1.2.1.1) Footing for load Bearing Structure 1.2.1.2) Column Footing and combined Footing 1.3) Raft Foundation 1.4) Grillage Foundation 1.5) Deep Foundation and its types 1.5.1) Cast in-situ R.C.C. concrete pile 1.5.2) Pre cast concrete piles 1.6) Foundation in Black cotton soil, Under reamed pile	Practical 1) Line out for 3 to 4 Room Load Bearing Building 2) Line out for Framed structure
Chapter 2: Excavation 2.1) Manual method of Excavation 2.2) Mechanical Method of Excavation 2.3) Machines used for excavation 2.4) Disposal of Excavated Material 2.5) Dewatering of trenches different methods used 2.6) Shoring and strutting of Trenches 3.0) Precaution while excavation, Fencing, caution signs, removing excavated material	Practical Visit to Site to study different methods of Excavation
Chapter 3: Plain cement concrete 3.1) Mix design of concrete and uses of different mix of concrete 3.2) Procedure of preparing concrete. Manual and machine mixing, Transporting Laying, compacting and curing of concrete 3.3) Admixtures used in concrete 3.4) Ready mix concrete	Practical 1) Visit to site showing ingredients and process of mixing, transportation, laying, compacting and curing of concrete

Chapter 4: Stone Masonry 4.1) Terms used in stone masonry 4.2) Procedure of constructing un coursed Rubble and Coursed masonry, purpose of through stone in stone masonry 4.3) Points to be observed while constructing stone Masonry	Practical 1) Construction of UCR stone masonry in foundation work, UCR stone masonry for compound wall (ht 1.2 m to 1.5 m)
Chapter 5: Brick Masonry 5.1) Terms used in Brick Masonry. 5.2) Construction of Brick Masonry in English bond and Flemish Bond in cement mortar, pre-construction preparation, procedure of construction, post construction precaution 5.3) Brick Masonry stretcher bond and half brick thick masonry. 5.4) Hollow and solid concrete block masonry 5.5) Fixing of Door and window Frame in masonry 5.6) Brief information of Siporex block masonry 5.7) Brief information of Concrete Block masonry	Practical 1) Construction of Burnt Brick Masonry in superstructures in English Bond / Flemish Bond 2) Construction of concrete block masonry in superstructure
Chapter 6: Scaffolding 6.1) Purpose and Necessity of Scaffolding 6.2) Single and Double Scaffolding, name of parts erecting Scaffolding. 6.3) Materials used for Scaffolding, Tubular steel scaffolding	Practical 1) Erecting Single Scaffolding up to G + 1 floor 2) Erecting Double Scaffolding up to G + 1 floor
Chapter 7: Lintels and Sills 7.1) Necessity of lintels 7.2) R.C.C. Lintels 7.3) Jambs, Sills, Head cladding, its purpose, materials used and construction procedures.	1) Study of Laying Lintels and Sills on Construction Site
Theory	Practical
Chapter 8: Reinforced Cement Concrete 8.1) Different types of RCC members Definitions, its properties and its locations 8.2) Ingredients of for R. C. C. Concrete 8.3) Batching of concrete ingredients- Definition and methods, volumetric method and weight batching method of concrete mixing 8.4) Shape and types of Reinforcing steel bars used in RCC members. Explain Terms used - Cutting of bar; Straightening of bar; Bending of bar; Hooking of bar; lapping of bar, Binding of bars, use of G.I. wire, cover for bars. 8.5) Standard Hook length for plain M. S. bar, Standard length of "EL" for Torque steel bar 8.6) Joints in RCC work, Necessity, Types of joints in RCC work, Construction Joint, Expansion Joint, location of joints, Material used, & Procedure of construction of Providing Joints.	Practical i) Visit to site for observing Bar bending, laying of Reinforcement bars ii) Observe method of providing cover, placing concrete in RCC Members iii) Draw Figures – RCC Bars reinforcement in column Footing, column, beam, slab, lintel, Chajja, Loft iv) Exercise on preparing standard Bar bending Schedule v) 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
Chapter 9: Centering and Form work 9.1) Definitions, Different members used in Form work and centering 9.2) Materials used in preparing centering and form work 9.3) Procedure of Erecting Centering and form work 9.4) Precautions while erecting centering and form for RCC work.	Practical 1) Draw Sketches of form work for column, Beams, Slab, Lintel and Chajja 2) Visit to site to study Centering and form work for abovementioned members and table formwork, Mivon formwork etc.

<p>Chapter 10: Pointing and Plastering</p> <p>10.1 Necessity of Pointing</p> <p>10.1.1) Materials used for Pointing</p> <p>10.1.2) Procedure of applying Pointing, preparation of surface to receive pointing, Procedure of applying pointing & post applying precautions</p> <p>10.1.3) Type of Pointing</p> <p>10.2 Necessity of Plastering</p> <p>10.2.1 Materials used for plastering</p> <p>10.2.2 Types of plaster internal wall plaster, External wall plaster, Ceiling plaster, different types of furnishings, Stucco plaster.</p> <p>10.2.3 Procedure of plastering for each of above type, Use of machines for plastering</p> <p>10.2.4 P.O.P. finish to wall</p>	<p>Practical</p> <p>1) Visit to site for observing procedure for different type of plaster work</p> <p>2) Hands on experience of applying plaster of size 3m x 3 m on internal & external wall surface</p>
<p>Chapter 11: Painting</p> <p>11.1. Necessity of painting, Types of paints, thinner, varnishes. Surface preparation, Use of Primers</p> <p>11.2. Anti corrosive paints, its primers, its necessity</p> <p>11.3. White Washing to walls and ceiling, Materials used, procedure for new and old surface</p> <p>11.4. Applying Dry Distemper to walls, Material, Procedure for new and old surface</p> <p>11.5. Applying Oil Bound Distemper and Emulsion, Materials used, Procedure for new and old surface</p> <p>11.6. Applying Cement Paint to External walls, Materials used, Procedure for New and old surface</p> <p>11.7. Applying Oil Paint Primer coat, procedure of applying oil paint to woodwork, steel work and walls.</p> <p>11.8. Melamine / French polish, its application on old and new wooden surfaces</p>	<p>Practical</p> <p>Hands on experience of Painting of surface with</p> <p>a) White wash 3m x 3m surface area</p> <p>b) Dry Distemper 3m x 3m surface area</p> <p>c) Oil Bound Distemper 3m x 3m surface area</p> <p>d) Cement Paint 3m x 3m surface area</p> <p>e) Oil Paint on new Steel work and old wood work</p>
<p>Stairs</p> <p>1.1) Definitions of Terms used in Stair.</p> <p>1.2) Classification of stairs based on shape and materials used for construction.</p> <p>1.3) Requirements of good stairs</p> <p>1.4) Design of stair Thumb Rules for Design of Dog legged stair</p> <p>1.5) Hand Rails Types and Fixing Procedure</p>	<p>Practical</p> <p>1) Draw neat Sketches of any 4 types of stairs</p> <p>2) Prepare design for RCC Dog-legged stair</p> <p>3) Draw its plan and sectional elevation</p> <p>4) Visit site to site for observing various type of stair</p>
<p>Roofs</p> <p>2.1 Definition & Purpose of Roof</p> <p>2.2 Technical Terms used in Roof</p> <p>2.3 Types of Roofs</p> <p>2.3.1 Pitched Roof</p> <p>2.3.2 Lean to Roof</p> <p>2.3.3 Couple Roof</p> <p>2.3.4. King Post Truss and Queen Post Truss</p> <p>2.3.5 Steel Trusses</p> <p>2.3.6 Roof Coverings necessity & Purpose</p> <p>2.4 Types of Roof Covering and Procedure of fixing</p> <p>a) Country Tile b) Mangalore Tile</p> <p>c) CGI sheet Roof – Size and procedure of fixing</p> <p>d) Acc sheet Roof – Type, Sizes and Procedure of fixing</p> <p>2.5 Flat Roof only R.C.C. Slab</p>	<p>Practical</p> <p>1. Draw sketch of couple Roof</p> <p>2. Draw sketch of King post and Queen post Truss.</p> <p>3. Draw Line Diagrams of steel Truss</p> <p>4. Draw sketch showing details of Joint King Post for steel Truss</p>

<p>Flooring</p> <p>3.1 Definition and terms used in flooring</p> <p>3.2 Flooring at Plinth level, Plinth filling & Plinth PCC</p> <p>3.2 Types of Floor finishes and its suitability</p> <p>3.3 Procedure of Laying Tiles such as Rough Shahabad for Pavement. Cement Briquette for pavement</p> <p>3.4 Procedure of Laying polished Shahabad Tile floor.</p> <p>3.5 Procedure for Laying cement Tiles, Marble Mosaic Tile, ceramic Tiles and Marble Tiles on floors.</p> <p>3.6 Procedure for fixing PVC tiles on floors</p> <p>3.7 Skirting – Function, materials used and procedure for fixing tiles.</p> <p>3.8 Dado - Function, materials used and procedure for fixing.</p>	<p>Practical</p> <p>1. Fixing of Tiles for Pavement</p> <p>2. Fixing of Tiles in area 3mX4m</p> <p>3. Fixing Tiles for Dado</p>
<p>Door And Window</p> <p>4.1 Functions of Door, Functions of window</p> <p>4.2 Rules for providing Doors & windows</p> <p>4.3 Parts of a Door and Window</p> <p>4.4 Materials used in making of Door & window</p> <p>4.5 Wooden and Steel Door and Window frame</p> <p>4.6 Types of Door Shutters</p> <p>a) Fully paneled Shutter</p> <p>b) Fully glazed shutter</p> <p>c) Flush Door</p> <p>4.7 Fixtures & fastenings for Doors</p> <p>4.8 Rolling shutter, collapsible shutters, sliding doors</p> <p>4.9 Types of Windows Shutter</p> <p>a) Fully Paneled shutter</p> <p>b) Fully glazed</p> <p>c) Sliding shutters.</p> <p>d) Lowered window</p> <p>e) Steel Window</p> <p>f) Aluminum sliding windows</p> <p>4.10 Fixtures and Fastening for windows</p> <p>4.11 Grills for window</p>	<p>Practical</p> <p>1. Draw to a scale, drawing of fully paneled</p> <p>2. Draw to a scale, drawing of fully glazed window</p> <p>3. Visit to observe different types of doors and Windows</p> <p>4. Draw Sketches of commonly used fixtures for Door & windows</p>

List of Books

Building Material

- 1] TTTI Chandigarh Civil Engg. Materials N. Delhi, McGraw Hill, 1992
- 2] Rangwala S. C. Engg. Materials Chariot or Book Publications,
- 3] Anand Gujrath Kulkarni G. J. A Textbook of engg. Materials

Building Construction

- 1] Mackay Building Construction Vol. 1 to 4 VaynStrand
- 2] Mitchell Elementary Building Construction B. T. Batsford, London
- 3] Molnar Building Construction Drafting and Design CBS Publications. Delhi
- 4] Sushil Kumar Building Construction Delhi : Standard Publishers, 1999, 18th Ed.
- 5] Arora S. P. & Bindra S. P. Building Construction Jaipur : Dhanapat rai & Sons
- 6] Rangwala S. C. Building Construction Anand : Charotar & Publishing House

Raw Material:

Sufficient Raw Material for the Syllabus Practical should be compulsorily made available to perform the practical. (e.g. Bricks, Sand, Cement, Aggregate, Lime powder, white cement, Tiles, Reinforcement Bars, Binding wire, Color, Paint, Turpentine, Brush and other such consumable raw material)

List of Tools and Equipment

A] General Class room

Sr	Name of Item	No.
1	Steel lockers 8 compartments with individual lockers (1980 x 910 x 480 mm)	4
2	Chair with writing pad	25
3	Steel almari with self 6.5' x 3' (18 gauge)	2
4	Steel table 4' x 3'	2
5	Teacher chair	2

B] For Building Material and Construction Practical

Sr	Name of Item	No.
1	Compression Testing Machine 100 Ton Capacity (Hand Operated.)	1
2	Universal Testing Machine 40 T	1
3	Table Vibrator	1
4	Cube Mould (Small And Big)	4
5	Compaction Factor Test Apparatus	1
6	Aggregate Impact Test Apparatus	1
7	Shieve Shaker	1
8	Weighing Machine 100 Kg.	1
9	Small Sieve (All Type)	1
10	Mortar And Half Bag Concrete Mixer	1
11	Marble Cutter	1
12	High Speed Imact Drill	1
13	Marble Angle Grinder	1
14	Bench Grinder Double Ended Wheel Size 15 Cm	1
15	Vibratory Sand Screen	1

Sr	Name of Item	No.
16	Bolster 4" (100mm)	1
17	Pitching Tool (Mason)	1
18	Chisel Mason Hammer Headed Flat 200 Mm	10
19	Hammer Mason (Cube) 1.5 Lbs.	10
20	Hammer Mason	10
21	Level Masons 36" (1 Metre)	10
22	Plumb Bob.	10
23	Square (Steel) 2' X 1'	10
24	Trowel Plastering Double Hand	10
25	Trowel Brick 10"	10
26	Tasla (Tin) Pans	10
27	Spade	10
28	Measuring Steel Tape 15 Mtr.	5
29	Measuring Steel Tape 30 Mtr.	5
30	Wooden Straight Edges For Ft.	10
31	Ladders 2 To 4 Mtr.	2
32	Sledge Hammer 10 Lbs.	2
33	Buckets 14 Lits.	10
34	Bar Bending Tools And Cutting Tools 6mm To 12 Mm	2 set
35	Screw Driver 12 Inch	5
36	Pocket Steel Tape 2 Mtr.	25
37	Pick Axes	5
38	Wheel Barrow	3
39	Tubular Scaffolding 25 Mm Die With Coupling And Compete Fitting.	400 RFT
40	Steel Measuring Boxes 3 Nos. (6cft C Fts), 3 Nos. (12cfts)	6
41	Adjustable Props Steel	20
42	Platform 4 Ft X 4 Ft X 6 Ft.	2
43	Boaning Rods	2
44	Spanner Sets	1
45	Carpenter Claw Hammer	10
46	Mortise Chisel 6 Mm.	10
47	Firmer Chisel	10
48	Mallet	10
49	Pane (Iron)	10
50	Handsaw 1'6"	10
51	Drilling Machines	1
52	Sieve IS No. 9	1
53	Vicat'apparatus	1
54	Needle measuring flask	1
55	A set of 10 IS sieves 80mm, 40mm, 20mm, 10mm, 4.75mm, 1.18mm, 600u, 150u.	1 each
56	Top cover & bottom pan for sieves	1
57	Hacksaw frame	1
58	BSP Tap & Die set 18,20,25 mm	1 set
59	Pipe vice ½ " to 18" 2 each	2
60	Alluminum Level	2
61	Pipe Tube Level	2

Subject - Building Drawing and CAD - 1st Year

Code No – 30440002

Theory	Practical
A] Building Drawing	1 Year
Chapter 1: Introduction to Drawing 1.1) Different Drawing Instrument and their use 1.2) Letters its types, Sizes and its use in Drawing 1.3) Convention of different lines 1.4) Giving dimensions 1.5) Scales and its uses 1.6) Study of IS 962	Practical 1) Prepare Sheet on lettering 2) Prepare Sheet on lines 3) Prepare Sheets on Geometrical Construction 4) Prepare Sheets on Conventional Sign and Symbols
Chapter 2: Orthographic Projection 2.1) Introduction to orthographic projections 2.2) First Angle Projections Method 2.3) Third Angle Projections Method 2.4) Drawing orthographic Projections of simple pictorial view	Practical 1) 1 st Angle Projections ----- 2 Solids 2) 3 rd Angle Projections ----- 2 Solids
Chapter 3: Isometric View 3.1) Method of Preparing Isometric Views 3.2) Isometric View of Rectangular Objects 3.3) Isometric View of Circular Objects 3.4) Isometric View of Building	Practical 1) Isometric View of Rectangular Objects 2) Isometric Vies of Circular Objects 3) Isometric View of Building
Chapter 4: Building Drawing Dimensions and Details of Foundation C/S. DPC, Different Types of Door and Windows, Roof Trusses, Flooring C/S, Staircase, Brick Masonry, Lintel, Arches, Chajja, C/S details of RCC Chajja, Lintel, Beam, Footing, Column, Slab, Pardi, Staircase etc.	Practical Detailed Drawing of Foundation C/S. DPC, Different Types of Door and Windows, Roof Trusses, Flooring C/S, Staircase, Brick Masonry, Lintel, Arches, Chajja, C/S details of RCC Chajja, Lintel, Beam, Footing, Column, Slab, Pardi, Staircase etc.
Chapter 5: Building By Laws and Standard Norms 3.1) Definitions of Plot Area, Plinth Area, Built up Area, Carpet Area, Floor Space Index (FSI) 3.3) Permissible Built up Area for Residential Bldg., Public Building 3.4) Definition of Marginal Distance and their necessity, Normal Marginal Distances provided for Residential Buildings 3.5) Definition and Necessity of Building Line, Development Line 3.6) Min Dimensions for following 3.6.1) Plinth height, Sill height, Head Room in Residential Bldg, Public Buildings, Mezzanine floor, Basements and stilts for car parking 3.7) Minimum Dimensions of: Living Room, Bed Room, Master Bed Room, W.C. Bath, Toilet. 3.7.1) Min. Width for passage and Balcony 3.8) Rules for Window Opening 3.9) Min. width of step and Landing, Head Room, Thumb Rules for fixing Rise and Tread. 3.9.1) Permissible Height of Pardi, of Building as per FSI and Road Width	Practical 1) Student to Draw for A Residential. Bungalow (Load Bearing) i.e. minimum 2 Bedrooms (one Bed room with attached Toilet), 1Hall, 1Kitchen, Veranda, Staircase, Toilet block, and Car Parking. a) Plan, b) Elevation c) Two sections d) Schedule of door and window e) Site plan, f) Area statement, g) Construction notes. h) Schedule of finishes

Chapter 6: Development of Line Plan of a Building 4.1) Symbols and notations as per BIS 696 in Civil Engg. Drawing. 4.2) Preparing Line Plan of Building, necessity of preparing line plan. 4.3) Development of Plan of Residential Building having living Room, Kitchen Room, Bed Room, Bath room and w.c. with slab. Draw to scale – Plan, Elevation Sections in 3 directions 4.4) Working drawings and its necessity.	2) Draw tracing of above drawing 3) Prepare ammonia sheet 4) Prepare a working drawing for Staircase, Toilet block and kitchen
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Subject - Building Drawing and CAD - 2nd Year

Code No – 30440002

Theory	Practical
B] Computer Fundamental	6 Month
1] Fundamentals Of Computer Introduction Components of PC The system Unit Front part of system Unit Back part of system Unit CPU Memory of computer Monitor Mouse, Keyboard Disk, Printer, Scanner, Modem, Video, Sound cards, Speakers	List of Practical 1. Working with Windows 2000 desktop ,start icon, taskbar, Recycle Bin, My Computer icon ,The Recycle Bin and deleted files Creating shortcuts on the desktop 2. The Windows 2000 accessories, WordPad – editing an existing document, Use of Paint – drawing tools The Calculator, Clock 3. The Windows Explorer window, concept of drives, folders and files? Folder selection techniques, Switching drives, Folder creation, Moving or copying files, Renaming, Deleting files and folders 4. Printing, Installing a printer driver, Setting up a printer, Default and installed printers, Controlling print queues, Viewing installed fonts, The clipboard and 'drag and drop', Basic clipboard concepts Linking vs. embedding,
2] Introduction To Windows 2000/Xp Working with window Desktop Components of window Menu bar option Starting window Getting familiar with desktop Moving from one window to another Reverting windows to its previous size Opening task bar buttons into a windows Creating shortcut of program Quitting windows	5. Moving through a Word document menu bar and drop down menus toolbars 6. Entering text into a Word 2000 document, selection techniques Deleting text 7. Font formatting keyboard shortcuts 8. Paragraph formatting Bullets and numbering 9. Page formatting What is page formatting? Page margins Page size and orientation Page breaks, Headers and footers 10. Introducing tables and columns

<p>3] GUI Based Editing, Spreadsheets, Tables & Presentation</p> <p>Application Using MS Office 2000 & Open Office.Org Menus Opening, menus, Toolbars, standard toolbars, formatting toolbars & closing Quitting Document , Editing & designing your document Spreadsheets Working & Manipulating data with Excel Changing the layout Working with simple graphs Presentation Working With PowerPoint and Presentation</p>	<p>11. Printing within Word 2000 Print setup Printing options Print preview</p> <p>12. Development of application using mail merge Mail merging addresses for envelopes Printing an addressed envelope and letter</p> <p>13. Creating and using macros in a document</p> <p>14. Creating and opening workbooks Entering data</p> <p>15. Navigating in the worksheet Selecting items within Excel 2000 Inserting and deleting cells, rows and column Moving between worksheets, saving worksheet, workbook</p>
<p>4] Introduction To Internet</p> <p>What is Internet Equipment Required for Internet connection Sending &receiving Emails Browsing the WWW Creating own Email Account Internet chatting</p>	<p>16. Formatting and customizing data</p> <p>17. Formulas, functions and named ranges</p> <p>18. Creating, manipulating & changing the chart type</p> <p>19. Printing, Page setup, Margins Sheet printing options, Printing a worksheet</p> <p>20. * Preparing presentations with Microsoft Power Point. Slides and presentations, Opening an existing presentation , Saving a presentation</p>
<p>5] Usage of Computer System in various Domains</p> <p>Computer application in Offices, books publication data analysis ,accounting , investment, inventory control, graphics, database management, Instrumentation, Airline and railway ticket reservation, robotics, artificial intelligence, military, banks, design and research work, real-time, point of sale terminals, financial transaction terminals.</p>	<p>21. Using the AutoContent wizard ,Starting the AutoContent wizard, Selecting a presentation type within the AutoContent wizard Presentation type Presentation titles, footers and slide number</p> <p>22. Creating a simple text slide, Selecting a slide Layout Manipulating slide information within normal and outline view, Formatting and proofing text, Pictures and backgrounds, drawing toolbar, AutoShapes, Using clipart, Selecting objects, Grouping and un-grouping objects, The format painter</p>
	<p>23. Creating and running a slide show, Navigating through a slide show, Slide show transitions, Slide show timings. Animation effects</p> <p>24. Microsoft Internet Explorer 5 & the Internet Connecting to the Internet The Internet Explorer program window, The on-line web tutorial Using hyper links, Responding to an email link on a web page</p> <p>25. Searching the Internet, Searching the web via Microsoft Internet Explorer, Searching the Internet using Web Crawler, Searching the Internet using Yahoo, Commonly used search engines</p>

<p>6] Information technology for benefits of community Impact of computer on society Social responsibilities Applications of IT Impact of IT Ethics and information technology Future with information technology</p>	<p>26. Favorites, security & customizing Explorer Organizing Favorite web sites Customizing options – general, security, contents, connection, programs, advanced 27. * Using the Address Book Adding a new contact Creating a mailing group, Addressing a message, Finding an e-mail address 28. Using electronic mail, Starting Outlook Express Using the Outlook Express window, Changing the window layout, Reading file attachment, Taking action on message-deleting, forwarding, replying 29. Email & newsgroups, Creating and sending Emails Attached files, Receiving emails, Locating and subscribing to newsgroups, Posting a message to a newsgroup 30. Chatting on internet, Understating Microsoft chat environment, Chat toolbar</p>
<p>C] Computer Aided Designing and Drafting</p>	<p>6 Month</p>
<p>1.0 CAD Software Meaning, various CAD software available in the market AutoCAD, Felix Cad, Auto Civil, 3D Max; etc.) Starting up of CAD, CAD Window, Tool bar, Drop down menu, Command window, Saving the drawing. Introduction of Graphic screen.</p>	<p>Practical related Creating New file, Closing Drawing, Saving Drawing, Startup Methods, Modes in AutoCAD, Use of Function Keys, Use of Keyboard and Mouse in AutoCAD Practice.</p>
<p>2.0 CAD Commands WCS icon, UCS icon, co-ordinates, drawing limits, grid, snap, ortho features. All Drawing commands, line, circle, polyline, multiline, ellipse, polygon etc. All Editing commands – Copy, move, offset, fillet, chamfer, trim, lengthen, mirror, rotate, array etc. Working with Layers, Block, hatches, fills, dimensioning, text etc.</p>	<p>Practice on Small Drawing Objects using Commands in Draw Menu Practice of Editing command on above drawing objects, Dimensioning Drawing, Creating Title block, Area Statement and Schedule of Opening using Text in AutoCAD,</p>
<p>3.0 Use of Cad software for practice of: Generation of line plan, Detailed Plan, elevation, section, site plan, Area statement and print commands Generation of 3D view using 3D Modeling commands and 3d Operation commands, Creating 3D of Building Introduction to Auto desk Architect , 3D Max</p>	<p>Drawing Plan, Elevation, Section, Site Plan in AutoCAD Creating 3D Model of Building and Generating required 3D view from all sides. Other CAD Practical based on the Theory.</p>

List of Books

Building Drawing

- 1] Malik, R.S. & Meo G.S. Civil Engg Drawing Delhi: New Asian Publishing
- 2] Shah P. J. Engg. Drawing – 1 Ahmedabad : D. J. Shah Publishing
- 3] Bhat N. D. Engg. Drawing Anand : Charotor
- 4] Gurucharan Singh Civil Engg. Drawing Delhi : Standard Publishers
- 5] Sane Y.S Building planning
- 6] Shaha Kale & Patki Building Drawing
- 7] Mackay W. B. IS962 Beuro of standards India (ISI)

Computer Fundamental

- 1] Vikas Gupta Comdex Computer Course Kit First Dreamtech
- 2] Henry Lucas Information Technology for management 7Th Tata Mc-Graw Hills
- 3] B.Ram Computer Fundamentals Architecture and Organisation Revised 3rd New Age International Publisher

CAD Books

- 1] Reference Manual of AutoCAD AutoDesk
- 2] Reference Manual of Felix cad Felix CAD
- 3] Reference Manual of Intel CAD
- 4] Reference Manual of Auto Civil
- 5] Reference Manual of 3D-Max

List of Tools and Equipment

A] General Class room

Sr	Name of Item	No.
1	Steel lockers 8 compartments with individual lockers (1980 x 910 x 480 mm)	4
2	Chair with writing pad	25
3	Steel almari with self 6.5' x 3' (18 gauge)	2
4	Steel table 4' x 3'	2
5	Teacher chair	2

B] For Building Drawing Practical

Sr	Name of Item	No.
1	Drawing Board	25
2	Drawing Table	25
3	Mini Drafter	25
4	Triangular Scale	10
5	Glass board 8' x 4'	2

C] For Computer Fundamental and CAD Practical

Sr	Name of Item	No.
1	Computer System P4 with accessories Complete with license OS. compatible for- to run AutoCAD 2010 and Windows 7 OS.	5+1
2	Plotter- HP Design Jet 500 latest model	1
3	Scanner	1
4	Computer table	5+2
5	Chair for computer	10+2
6	Laser Printer	1
7	AutoCAD 2010 or above Software	1
8	M. S. Office Software	1

Theory	Practical
ENGINEERING MECHANICS 1.0. Systems of Measurements and Units 1.1. S.I. and M.K.S. System 1.2. Fundamental and Derived units 1.3. Units of Physical quantities used in Civil Engineering like length, area, volume, mass, force etc.	Group A: 1) To verify law of polygon of forces. 2) To verify law of moments. 3) To verification of Lami's theorem. 4) To determine the forces in members of a jib crane.
2.0. Forces and Moments 2.1. Definition of Force, Moment, Resultant, Equilibrant and Moment of a couple 2.2. Resultant of forces at a point, parallelogram law, Triangle law of forces, polygon law of forces 2.3. Distinguish between scalar and vector quantities, co-planar and non-co-planar forces, parallel and non-parallel forces, like and unlike forces 2.4. Conditions of Equilibrium of rigid bodies	5) Comparison of coefficient of friction of various pair of surfaces and determination of angle of repose. 6) To verify equilibrium of parallel forces – simply supported beam reactions. 7) Experimental location of center of gravity of plane plate of uniform thickness.
3.0. Centroid and Moment of Inertia 3.1. Definition - Centroid, First moment of area, moment of inertia, Radius of gyration 3.2. Position of centroid of Rectangle, triangle, circle, semi circle. 3.3. Determine position of centroids of simple built up sections made of rectangle, triangle, circle, semi-circle. 3.4. Determine M.I. of simple and built-up sections by applying perpendicular axes theorem 3.5. Radius of gyration, polar M.I. of solid and hollow circular sections	Group B: To find MA, VR, Efficiency, Ideal Effort, Effort lost in friction for various loads and establish law of machine and calculate maximum efficiency. Also check the reversibility of a machine
4.0. Simple stresses and strains 4.1. Stress and strain - tensile, compressive and shear 4.2. Mechanical properties of materials - elasticity, plasticity, ductility, brittleness, malleability, stiffness, hardness, fatigue 4.3. Stress-strain curves for ductile materials - Mild steel, elastic limit, yield point, ultimate stress, breaking stress, working stress, factor of safety. 4.4. Hooke's Law - Youngs modulus of elasticity, deformation under axial load 4.5. Composite sections - effect of axial loads and due to change of temperature 4.6. Longitudinal and lateral strain - poisson's ratio - Bulk modulus, relationship between elastic constants. (proof not required) 4.7. Composite sections - effect of axial loads and due to change of temperature	1) Worm and worm wheel or Differential axle and wheel 2) Weston's differential pulley block or Geared pulley block 3) Single purchase crab or Double purchase crab 4) Simple screw jack. 5) Two sheave and three sheave pulley block

5.0. Shear Force and Bending Moment 5.1. Types of beams - cantilevers, simply supported, over hanging - fixed and continuous beams 5.2. Calculation of S.F. and B.M. values at different sections for cantilevers, simply supported beams, over hanging beams under point loads and uniformly distributed loads - position and significance of points of contraflexure 5.3. Relation between rate of loading, S.F. and B.M. - drawing S.F. and B.M. diagrams - Location of points of contraflexure	
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Construction Technology & Estimating Costing– 1st Year

Theory	Practical
6.0. Graphic Statics 6.1. Representation of forces graphically, bows notation 6.2. Parallelogram law of forces, resultant and equilibrants 6.3. Graphical Method of determination of centre of gravity for I, L, T Sections 6.4. Drawing SFD and BMD by graphical method for SSB and cantilever beams	Group C: Graphical solutions on graph paper of the following: 1) Concurrent force system : Two problems 2) Parallel force system : Two problems 3) Reactions of a beam having vertical point loads & UDL : Two problems
Construction Technology 1. Introduction Construction in India, Classification of construction work, stages in construction work, Construction team, Resource of Construction, Functions of Construction management, Scientific methods of construction management.	1. Familiarity with tools hardware and fixtures used in building construction. 2. Marking for earth work excavation for foundation as per plan for a small one roomed building. a) for framed structure b) for load bearing structure
2. Construction Planning Job planning, Technical Planning, Tender and Construction planning - scheduling - procurement of Labour, material and equipment - program of work - Bar chart - Critical path method - preparation of network diagram critical path method – Calculation of float times.	3. Masonry works 3.1. Arrangement of bricks in English bond for 1 and 1 1/2 brick wall. 3.2 Arrangement of bricks in Flemish bond for 1 and 1 1/2 brick wall
3. Organization Types of organization principles of organization Job layout - principles of storing materials 4. Construction Labour Types of Labour, Labour welfare, Human relation, Labour Insurance Payment of wages, Minimum wages Act, Workmen Compensation Act, Contract Labour Act. 5. Inspection and Quality Control Introduction - Functions of Inspection Department – Major items of controls	4.0. R.C.C. works 4.1. Preparation of reinforcement mesh for column footing as per specifications. 4.2. Preparation of reinforcement cage for R.C.C. column monolithic with column footing as per specifications. 4.3. Preparation of pre-cast lintel a) preparation of reinforcement cage for lintel. b) Preparation of M20 grade concrete and placing concrete in lintel form work 4.4. Preparation of reinforcement cage for R.C.C. beam as per specifications.

<p>6. Contracts Legality of Contracts - Types of Contracts – Piece work contracts item rate contract – percentage contract - merits and demerits of each contract system</p> <p>7. Tender and Tender Notice Necessity of Tenders - Tender notice – EMD opening of tenders - Scrutiny of Tenders Acceptance of tenders - Work Order – contract agreement - Conditions of Contract</p> <p>8. Accounts Necessity of Accounts - Different Methods of Carrying out works P.W.D system of Accounts - Heads of Accounts - Payment to Labour - N.M.R - Measurement Books - Check measurement of works</p> <p>9. Stores Stock - classification of stores - general stock items - issue of stores material - receipts - materials at site account - indent - invoice and bin card - stock register - issue rate - accounting of shortages and surplus - write off</p>	<p>5. Building Services 5.1. Study and identification of plumbing material, tools for plumbing 5.2. Pipe cutting-thread cutting-jointing of G.I.Pipes using pipe specials 5.3. Pipe cutting-jointing of PVC pipes using specials 5.4. Preparation of piping network for water supply using various pipes and specials. 5.5. Preparation of piping network for sanitary works using various pipes and specials. 5.6. Prevention of leakages, detection and arrest of leakages in pipe lines. 5.7. Identification of different electrical accessories and their use. 6.0. Carpentry 6.1. Use and Setting of different tools 6.2. Surface Planing and Finishing 6.3. Making Simple Joints - Mortise, Tenon, dovetail etc. 6.4. Demonstration of wood working machine.</p>
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Construction Technology & Estimating Costing– 2nd Year

Theory	Practical
<p>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</p>	<p>7.0. Site visits for various activities of construction works. 7.1. Earth work excavations for foundation & column pits. 7.2. Erection of column footings and columns with concreting. 7.3. Laying of slab-form work, placing - Reinforcement and concreting. 7.4. Erection of scaffolding for different construction works like-brick masonry work, plastering etc. 7.5. Installation of water supply and sanitary fittings in a building.</p>
<p>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.</p>	<p>Practical 1. Preparation of Detail Estimate of a Residential Building (Load Bearing Structure) 2. Details estimate of septic Tank 3. Details estimate of sump well Note: No. 1 is Compulsory and any one out of 2 and 3</p>

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.	Practicals 1) Calculating Quantity of concrete & Steel for 2 to 3 room RCC Building or Hall.

Construction Technology & Estimating Costing– 2nd Year

Theory	Practical
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, CIDCO etc.	Practical related to Filling of MB from measurement taken on Site. Preparing the Bill of Payment. Visit to Accounts of PWD
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	Practical: 1. Study of contract conditions Practical related to Filling the Store Inventory Register for a residential building site, Visit to PWD Store Department.

List of Tools and Equipment

A] General Class room

Sr	Name of Item	No.
1	Steel lockers 8 compartments with individual lockers (1980 x 910 x 480 mm)	4
2	Chair with writing pad	25
3	Steel almari with self 6.5' x 3' (18 gauge)	2
4	Steel table 4' x 3'	2
5	Teacher chair	2

B] For Practical

Sr	Name of Item	No.
1	Compression Testing Machine 100 Ton Capacity (Hand Operated.)	1
2	Universal Testing Machine 40 T	1
3	Table Vibrator	1
4	Cube Mould (Small And Big)	4
5	Compaction Factor Test Apparatus	1
6	Aggregate Impact Test Apparatus	1
7	Shieve Shaker	1
8	Weighing Machine 100 Kg.	1
9	Small Sieve (All Type)	1
10	Mortar And Half Bag Concrete Mixer	1
11	Marble Cutter	1
12	High Speed Impact Drill	1
13	Marble Angle Grinder	1
14	Bench Grinder Double Ended Wheel Size 15 Cm	1
15	Vibratory Sand Screen	1
16	Bolster 4" (100mm)	1
17	Pitching Tool (Mason)	1
18	Chisel Mason Hammer Headed Flat 200 Mm	10
19	Hammer Mason (Cube) 1.5 Lbs.	10
20	Hammer Mason	10
21	Level Masons 36" (1 Metre)	10
22	Plumb Bob.	10
23	Square (Steel) 2' X 1'	10
24	Trowel Plastering Double Hand	10
25	Trowel Brick 10"	10
26	Tasla (Tin) Pans	10
27	Spade	10
28	Measuring Steel Tape 15 Mtr.	5
29	Measuring Steel Tape 30 Mtr.	5
30	Wooden Straight Edges For Ft.	10
31	Ladders 2 To 4 Mtr.	2
32	Sledge Hammer 10 Lbs.	2
33	Buckets 14 Lits.	10
34	Bar Bending Tools And Cutting Tools 6mm To 12 Mm	2 set

Sr	Name of Item	No.
35	Screw Driver 12 Inch	5
36	Pocket Steel Tape 2 Mtr.	25
37	Pick Axes	5
38	Wheel Barrow	3
39	Tubular Scaffolding 25 Mm Die With Coupling And Compete Fitting.	400 RFT
40	Steel Measuring Boxes 3 Nos. (6cft C Fts), 3 Nos. (12cfts)	6
41	Adjustable Props Steel	20
42	Platform 4 Ft X 4 Ft X 6 Ft.	2
43	Boaning Rods	2
44	Spanner Sets	1
45	Carpenter Claw Hammer	10
46	Mortise Chisel 6 Mm.	10
47	Firmer Chisel	10
48	Mallet	10
49	Pane (Iron)	10
50	Handsaw 1'6"	10
51	Drilling Machines	1
52	Sieve IS No. 9	1
53	Vicat'apparatus	1
54	Needle measuring flask	1
55	A set of 10 IS sieves 80mm, 40mm, 20mm, 10mm, 4.75mm, 1.18mm, 600u, 150u.	1 each
56	Top cover & bottom pan for sieves	1
57	Hacksaw frame	1
58	BSP Tap & Die set 18,20,25 mm	1 set
59	Pipe vice ½ " to 18" 2 each	2
60	Alluminum Level	2
61	Pipe Tube Level	2

Building Material

- 1] TTTI Chandigarh Civil Engg. Materials N. Delhi, McGraw Hill, 1992
- 2] Rangwala S. C. Engg. Materials Chariot or Book Publications,
- 3] Anand Gujrath Kulkarni G. J. A Textbook of engg. Materials

Building Construction

- 1] Mackay Building Construction Vol. 1 to 4 VaynStrand
- 2] Mitchell Elementary Building Construction B. T. Batsford, London
- 3] Molnar Building Construction Drafting and Design CBS Publications. Delhi
- 4] Sushil Kumar Building Construction Delhi : Standard Publishers, 1999, 18th Ed.
- 5] Arora S. P. & Bindra S. P. Building Construction Jaipur : Dhanapat rai & Sons
- 6] Rangwala S. C. Building Construction Anand : Charotar & Publishing House

Estimating and Costing

- 1] B. S. Patil Estimating and Costing
- 2] Estimation and costing for civil engg. Dutta 2004 UBSPD Delhi
- 3] Estimation and costingspecialisation & valuation Chakraborti,M 2004 Author -
- 4] A textbook on Estimation and costing and accounting Kohli,D.D. 2005 S.Chand Mumbai

Engineering Mechanics

- 1] Kumar Applied Mechanics
- 2] S. S. Deo. Applied Mechanics
- 3] Beer & Johnson Engineering Mechanics
- 4] Singer Applied Mechanics
- 5] Kuurmi Applied Mechanics
- 6] Ramamruthum Engineering Mechanics
