4: CONSTRUCTION TECHNOLOGY (K7, K8, K9)

Scheme of Examination

Std. XI

Paper	Title of the Paper	Theory		Practical		Term work	Project work	I.V.*	Total Marks
		Marks	Time (Hrs)	Marks	Time (Hrs)				
1	Building Materials & Safety Management	80	3	80	3	20	10	10	200
2	Building Construction	80	3	80	3	20	10	10	200
3	Civil Engineering Drawing and AutoCAD	80	3	80	3	20	10	10	200

* IV = Industrial Visits

** OJT = On Job Training

Std. XII

Paper	Title of the Paper	Theory		Practical		Term work	Project work	I.V.*	OJT**	Total Marks
		Marks	Time (Hrs)	Marks	Time (Hrs)					
1	Concrete Technology	80	3	80	3	10	10	10	10	200
2	Estimates and Contracts	80	3	80	3	10	10	10	10	200
3	Surveying	80	3	80	3	10	10	10	10	200

* IV = Industrial Visits

** OJT = On Job Training

Introduction

Construction Technology is introduced as a vocational course. This course is of two years. Students who have passed SSC are eligible for admission i.e. SSC passing is basic entry qualification for the course. Students get the facility of vocational education is formal education flow at +2 levels.

This vocational course is demand driven course. Construction industry is one of the largest industries in India. Millions of people are working in this field. It is demand of construction of construction industry to provide people at supervisor level to assist site engineer or project manager. In government sector there is demand for civil engineering assistant. Surveyor is the person who plays the important role in construction industry. These surveyors can be provided through this vocational education. Architectural assistant is demand of architectural field which can be fulfilled by this vocational education.

Qualified and skilled staff will be available at appropriate post in construction industry through this education due to best syllabus, teaching method training method, and individual guidance. The students who have passed this course can work as a construction contractor in government and private sector. This vocational course will provide employment and self employment oriented education to overcome the drawbacks in regular formal education.

There is continuous increasing in the population of India which is now participating in education rather than in the labour market. Skill Development initiatives under the National Skill Development Mission have played an important role in the process of vocational Education at 10+2 stage. The objectives of the curriculum are to enhance the employability of youth through this competency based modular vocational courses, to maintain students' competitiveness to fill the gap between the educated and the employable personnel. These courses are continued/revised keeping the foresight of future and directives of National Vocational Education Qualification Framework (NVEQF).

Salient features of this course are.

Demand driven course, Practical oriented training, Facility of on the Job Training, Industrial visits. Well equipped laboratories well designed theory and practical syllabus. Entrepreneurship Development Cell, Placement cell, Limited Seats, Individual Guidance, Government Driven and Granted Course Job Opportunities in government sector as well as in private sector, Provides facility of registration as government contractor, Provides apprentice training facility, further Education: Admission to II year diploma in Civil Engineering, Admission to BA, B.com, B.Cs, BBA, etc.

Objectives

- Employment in government & Semi Government sector at appropriate post like civil engineering assistant in PWD, ZP, CIDCO, MIDC, MHADA, MUNCIPAL CORP, Municipal Council, Grampanchayat etc.
- Building Construction Site Supervisor.
- Surveyor.
- Assistant Site Engineer.
- Technical Assistant.
- Sub Overseers.
- Assistant to Architect.
- CAD Draftsman.
- Material Testing Lab Assistant.
- Assistant to Junior Engineer.
- Estimator.
- Billing Assistant.
- Quality control Supervisor.
- Plumber.

Self employment

- As a registered government contractor, sub contractor, labour contractor, centering contractor.
- Manufacturer of fly ash bricks Building Material supplier, Trader of Construction material such as hardware, sanitary ware, manufacturer etc.

Std. XI

Paper I: Building Material and Safety Management (K7)

Objectives

To enable the students to

1. To know the materials used in building construction.
2. Acquire the knowledge of building materials used for construction of building elements.
3. To provide experts in quality testing of material in construction industry.
4. To produce a good quality supervisor replacing site engineer.
5. To provide assistant to quality control engineer.
6. To create lab assistants for building material testing laboratory.
7. To produce a technical assistant for material purchase department.
8. To create awareness about latest & modern building materials available in market.
9. To provide information for estimation.

10. To provide technically qualified and practically trained supervisors to building construction.
11. To create awareness about safety in building construction industry among the students.
12. To provide well known safety supervisors in building construction.

Theory

Sr. No.	Unit	Sub-Unit	Periods
1.	Stone	1.1 Introduction usefulness of stone in construction industry. 1.2 Types of stone from different rocks 1.3 Properties of different types of stones 1.4 Trading business of stone and its products.	06
2.	Aggregates	2.1 Introduction & Definition. 2.2 Type of aggregates according to source, size, shape etc. 2.3 Properties of aggregates. 2.4 Laboratory tests	10
3.	Bricks	3.1 Introduction, History of brick. 3.2 Soil Burnt bricks. 3.3 Fire bricks 3.4 Fly ash bricks 3.5 Concrete blocks (bricks). 3.6 Light weight bricks.	12
4.	Cement	4.1 Introduction and general information. 4.2 Definition of cement, and ingredients of cement and chemical compounds. 4.3 Types & grades of cement 4.4 Field tests of cement 4.5 Laboratory test of cement 4.6 Storage of cement.	12
5.	Steel	5.1 Introduction 5.2 Importance of steel in RCC Structure. 5.3 Types of steel hard, medium, mild. 5.4 Properties of steel. 5.5 Different forms of steel and uses. 5.6 Theoretical weight calculation of different forms of steel.	06
6.	Mortar	6.1 Introduction 6.2 Definition and function 6.3 Ingredients and function of each	08

		ingredient. 6.4 Types of mortar. 6.5 Preparation method of cement mortar. 6.6 Properties of good quality mortar 6.7 9 Additives/Adhesives in a mortar	
7.	Tiles	7.1 Introduction, general uses. 7.2 Properties of good quality tiles 7.3 Type of tiles 7.4 Ceramic tiles, Cement, clay, Stone, Artificial Tiles and Paving.	08
8.	Painting Materials	8.1 Preparation of Surface for paint. 8.2 White wash, Colour wash & Distemper 8.3 Types of paint. 8.4 Oil paint: 8.5 Wall papers	10
9.	Miscellaneous Materials	9.1 Introduction 9.2 Glass facade 9.3 Ferrous and non ferrous metal. 9.4 Damp proofing & waterproofing material.	08
10.	Health & Safety Management	10.1 Construction expectation 10.2 General construction rules 10.3 Alcohol and drugs 10.4 Emergency response procedure 10.5 First aid and medical services 10.6 Pre task planning 10.7 Safety communication and safety management by walking around. 10.8 Project hazardous material control 10.9 Pollution prevention 10.10 Solid waste management 10.11 Waste water management 10.12 Environmental Health and safety (EHS) rules	12
11.	Accidents and Safety	11.1 Accident prevention program. 11.2 Site safety program. 11.3 Personal protective kit 11.4 Major possible injuries and first aid. 11.5 Site rules and regulations.	12
12.	Possible Accidents, Precautions and Actions	12.1 Accidents at different stages 12.2 Excavation 12.3 Placing 12.4 Slab form work 12.5 Concreting of slab	12

		12.6 Removal of Centering & Shuttering of columns, beams, slabs etc. 12.7 Electrical works 12.8 Masonry and plastering work, painting work, Plumbing work. 12.9 Lift work. 12.10 Transportation. 12.11 Safety- Check list for every activity. 12.12 Health and safety management law.	
13.	Green Building	13.1 Concept of Green building 13.2 Green building standards. 13.3 Low energy building.	04
		Total	**120**
Industrial visits & visits for market survey should be performed & well organised at linked industry or traders.			

Practical

Sr. No.	List of Practicals	Periods	Procedure to Perform Practicals
1.	**Stone**		
	1. Study of Market for stones and their market forms. Study of comparative rates, main source, price at main source, dealer/sub dealer/retailer's price taxes profit loss etc	16	By arranging visits or By arranging lecture of supplier
	2. Identification and use of different types of stones such as marble, granite etc.		Presenting collected samples.
	3. Durability test of different stones.		Demonstration
2.	**Aggregates**		
	1. Study of crusher project through PPT or recording & flow diagram.	30	LCD projector presentation
	2. Determine specific gravity and water absorption of aggregates.		Demonstration and individual Practicing.
	3. Determine the bulking of sand.		
	4. Determine clay and silt content in an aggregate.		
	5. Determine the crushing strength of an aggregate.		
	6. Determine the impact value of an		

	aggregate.		
	7. Determine fineness modules.		
3.	**Bricks**		
	1. To conduct Field tests of bricks to prove the quality of different types of bricks. Colour, surface texture, size, absorption etc.	20	Demonstration and individual Practicing.
	2. Efflorescence test of brick		
	3. Dimensions and tolerance test of bricks.		
	4. Determination of compressive strength of all types of bricks. Soil brick, fly ash, ACC, concrete bricks		Demonstration
4.	**Cement**		
	1. Fineness test of cement by using I.S. sieve no.9	30	Theory part : Class teaching by using LCD projector
	2. Field tests of cement to check its quality.		
	3. Consistency test of cement.		Demonstration and individual Practicing.
	4. Setting time tests(Initial setting time, final setting time)		
	5. Soundness test of cement.		
	6. Compressive Strength Test of cement.		Demonstration and practicing.
5.	**Steel**		
	1. Field tests of steel elasticity, corrosion, hardness, uniformity, standards, etc.	16	Classroom Teaching
	2. Identification & weight calculation of steel according to size.		Practical by demonstration & use of steel table
6.	**Mortar**		
	1. Preparation of cement mortar.	16	Demonstration and practicing.
	2. Workability test of mortar.		
7.	**Tiles**		
	1. Field tests of different tiles.	20	By Organising Planned and designed visit
	2. Visit to paving block manufacturing unit.		
	3. Visit to tile traders for market survey to study of comparative rates, main source, manufacturing price, dealer/sub dealer / retailer's price taxes profit loss etc.		
8.	**Painting Materials**		
	1. Visit to hardware paint shop &	20	By Organising

	Sanitary ware to study all and paints hardware material forms, their market rates, use, price of manufacturer, dealer, retailer, taxes on it		Planned and designed visit
9.	**Miscellaneous Materials**		
	1. Market survey for different building materials used in building construction.	16	By Organising market visit.
10.	**Health & Safety Management**		
	1. Study of Environmental Health and Safety (EHS) rules.	20	Demonstration and presentation by arranging safety workshop.
	2. Prepare a project on waste water management.		
11.	**Accidents & Safety**		
	1. Study of personal protective kit and its practical use	12	Showing the film on safety in building construction.
12.	**Possible Accidents, Precautions and Actions**		
	1. Prepare check list of safety for different construction activity and observe it on site.	12	Demo. By film and on site.
13.	**Green Building**		
	1. Prepare a project report on green building.	12	Film presentation Classroom teaching Laboratory working. Site visits.
		Total	**240**
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Paper II: Building Construction (K8)

Objectives

To enable the students to

1. Awareness about terminology used in construction.
2. To know the Terminology in line out and each activity.
3. Identification of building elements.
4. To make aware about Importance of foundation in building construction.
5. Study of types of foundation.
6. Construction technology of each activity.
7. To study the skills used in building construction.
8. To acquire the different skills to be needed in building construction.

9. To learn the check lists of execution of each activity.
10. To develop the supervision skills among the students.
11. To learn the allied activities like plumbing.
12. To know the water proofing techniques.
13. To know about finishing activities.
14. To know about vertical transportations
15. To provide best technicians for construction industry.
16. To provide technically qualified & practically trained supervisors, quality control assistant, technical assistant etc. to construction Industry.
17. To provide the technically qualified and skilful contractor to construction industry.
18. To create special contractors for special activity like water proofing contractor, termite proofing contractor, painting contractor, tilling contractor, cladding contractor etc.

Theory

Sr. No.	Unit	Sub-Unit	Periods
1.	Building Elements and Terminology	1.1 Introduction. 1.2 Types of building. 1.3 Plot & related Terminology. 1.4 Lineout & related Terminology. 1.5 Building Terminology. 1.6 Sequence of building construction items.	06
2.	Foundation	2.1 Introduction. 2.2 Definition and function. 2.3 Loads on foundation 2.4 Points to be considered while selecting the type of foundation. 2.5 Bearing capacity of soil. 2.6 Types of foundation. 2.7 Causes for failure of foundation & remedial measures.	12
3.	Masonry Work	3.1 Introduction. 3.2 Technical terms in masonry work. 3.3 Types of brick masonry according to quality & material used. 3.4 Bonds in brick masonry. 3.5 Bonding of old work to new work. 3.6 Repairing of brick masonry. 3.7 Supervision points in brick masonry. (Check list for construction) 3.8 Construction of fly ash brick masonry. (Check list) 3.9 Construction of light weight brick masonry. (Check list) 3.10 Construction of concrete block	12

		masonry. (Check list) 3.11 Fire brick masonry work 3.12 Stone masonry 3.13 Technical terms. 3.14 Dressing of stone. 3.15 Types of stone masonry and their characteristics. 3.16 Method of stone masonry work. 3.17 Supervision points of stone masonry. (Check list)	
4.	Walls	4.1 Introduction. 4.2 Types of walls. 4.3 Load & non load bearing walls. 4.4 Retaining walls 4.5 Cavity walls. 4.6 Partition walls. 4.7 Glass cladding, glass partitions.	04
5.	Plastering & Pointing		
	A) Plastering	5.1 Introduction, definitions 5.2 Importance 5.3 Technical terms in plastering & pointing. 5.4 Types of plaster. 5.5 Application of plaster. 5.6 Curing of plaster. 5.7 Supervision points in plastering. 5.8 Defects in plaster and repairs of plaster	08
	B) Pointing	5.9 Introduction 5.10 Purpose of pointing 5.11 Types of pointing. 5.12 Application. 5.13 Repairing of old pointing. 5.14 Supervision points	06
6.	Roof and Roof Covering	6.1 Introduction, 6.2 Technical terms. 6.3 Type of roofs. 6.4 Pitched roof. 6.5 Flat roof. 6.6 Method of fixing AC sheets. Check list for construction. 6.7 Method of fixing GI sheets. Check list for construction. 6.8 Drainage arrangement of flat and pitched roof.	10
7.	Floors, Floorings and Cladding	7.1 Introduction 7.2 Technical terms used in floor &flooring. 7.3 Types of floor. 7.4 Advance materials used for flooring.	10

		7.5 Cladding 7.6 Check list for construction of flooring.	
8.	Doors & Windows	8.1 Introduction. 8.2 Technical terms related to doors and windows. 8.3 Location and sizes of doors &windows. 8.4 Types of doors and windows, and frames for it. 8.5 Types of doors & windows according to material used.	10
9.	Stairs & Stair Case	9.1 Introduction. 9.2 Technical terms. 9.3 Location of stair. Characteristics of Good staircase. 9.4 Classification of staircase.	08
10.	Plumbing	10.1 Introduction. 10.2 Technical terms. 10.3 Plumbing system. 10.4 Water supply system. 10.5 Assessment of water. 10.6 Service connection from authority. 10.7 Uses of different pipes. 10.8 Taps valves and cocks. 10.9 Water supply scheme for house. 10.10 Sanitary system. 10.11 Uses of different pipes 10.12 Fixing of different sanitary fittings. 10.13 Construction of septic tank. Sludge soak pit. 10.14 Drainage scheme for residential unit.	12
11.	Waterproofing and Damp proofing	11.1 Introduction. 11.2 Reasons of dampness. 11.3 Sources of dampness. 11.4 Material of damp proofing. 11.5 Material for water proofing 11.6 Methods of water proofing of flat roof. 11.7 Water proofing / damp proofing treatment to pitched roof.	10
12.	Painting	12.1 Introduction. Importance of painting. 12.2 Oil painting, Oil painting to new wood work. 12.3 Oil painting for old wood work. 12.4 Oil painting on steel work.(new / old) 12.5 Oil painting on plastered surface. 12.6 Oil painting on damp wall 12.7 Spray painting. 12.8 Distempering 12.9 Plastic painting.	12

		12.10 Exterior paints 12.11 Graining application 12.12 Defects in painting	
		Total	**120**
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Practical

Sr. No.	List of Practicals	Periods	Procedure to Perform Practicals
1.	**Building Elements and Terminology**	**18**	
	1. Visit to construction site to know the terminology.	8	Class teaching
	2. Reading of drawings required for line out.	4	Demonstration.
	3. Practical of Line out for load bearing structure.	2	Practicing for perfectness
	4. Practical of Line out for RCC structure.	4	
2.	**Foundation**	**20**	
	1. Construction of column footing foundation.	4	Class teaching.
	2. Construction of under- reamed pile foundation.	4	Presentation through LCD
	3. Visit to construction site to study the different types of foundation such as combined, continuous, cantilever footing, raft & pile foundation.	8	Demonstration and presentation. In lab. and on site
	4. Determination of bearing capacity of soil by penetration method.	4	Test in building yard.
3.	**Brick Masonry**	**24**	
	1. Construction of stretcher bond without/ kachha mortar.	4	Demonstration and Individual practicing. By using mortar without binding material.
	2. Construct a circular of wall of 2m diameter in header bond without/ kachha mortar.	4	
	3. Construct a brick wall from given drawing in English bond without/kachha mortar.	4	Theory by class room teaching.

	4. Construction of brick wall in Flemish bond from given drawing with kachha mortar.	4	Theory by class room teaching.
	5. Visit to construction site to study the different types of masonry works.	4	Organise Visits.
	6. Site visit to check the stone masonry work as per standard.	4	Inspection as per check list.
4.	**Walls**	**10**	
	1. Construction of cavity wall.	6	LCD presentation and Demonstration on site or in laboratory
	2. Prepare a check list of construction of different walls & implementation of it & study of R.C.C. band for partition walls.	4	
5.	**Plastering & Pointing**		
	A] Plastering	**20**	
	1. Application of Cement plastering. (Internal & external)	8	Demonstration in college by arranging experts.
	2. Application of Cement plastering. (Internal & external) Application of Gypsum plastering.	8	Demonstration in college by arranging experts. And individual Practicing.
	3. Prepare a check list of pointing for supervision and implementation of it.	4	
	B] Pointing	**4**	
	4. Visit to pointing work to study the pointing method.	4	Demonstration on site.
6.	**Roof and Roof Covering**	**20**	
	1. Draw the different types of roofs.	4	Demonstration in college by arranging experts
	2. Fixing of roofing sheets. (GI & AC)	8	
	3. Study of the RCC slab /Roof Casting method.	8	
7.	**Floors, Flooring and Cladding**	**30**	
	1. Prepare the vitrified tile flooring, without using binding material minimum 10 sq. m.	6	By arranging skilled tile fitter as demonstrator in college Or on site demonstration Individual Practicing.
	2. Fixing of paving blocks to prepare flooring without binding material minimum 10sq.m.	8	
	3. Wall tilling by preparing surface on minimum 5sq.m	8	
	4. Stone tile cladding	8	
8.	**Door & Windows**	**12**	

	1. Construction of different types of doors.	4	Demonstration in laboratory By using doors prepared for demonstration. Demonstration at Collaborated or linked workshop.
	2. Construction of aluminum sliding window.	8	
9.	**Stairs & Stair Case**	**8**	
	1. Study of different types of stairs, by sketching and with the help of models.	4	Demonstration in laboratory.
	2. Construction of RCC dog logged stair.	4	
10.	**Plumbing**	**36**	
	1. Threading to various G.I. Pipes.	4	Demonstration In laboratory
	2. Join different types of pipes by using proper fittings. (GI, UPVC, CPVC, PVC etc.)	4	
	3. Fixing of different taps and valves by using necessary fittings.	4	
	4. Laying the RCC, SW, PVC & CI pipes.	4	
	5. Fixing of wash basin.	4	
	6. Fixing Indian WC pan.	4	
	7. Fixing of commode (flooring, wall hung)	4	
	8. Fixing of sink.	4	
	9. Fixing of urinal pot.	4	
11.	**Water Proofing and Damp proofing**	**18**	
	1. Laying of Brick bat water proofing.	8	Demonstration In laboratory
	2. Laying of tar felt water proofing.	2	
	3. Application of water proof coating.	4	
	4. Application of crack filler to external surface.	4	
12.	**Painting**	**20**	
	1. Application of distemper.	4	By arranging Expert's demonstration in laboratory or on site. And practicing.
	2. Application of plastic / lustre paint.	4	
	3. Application of cement paint/external paint.	4	
	4. Application of oil paint.	4	
	5. Graining application in painting.	4	
		Total	**240**
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Paper III: Civil Engineering Drawing by Autocad (K9)

Objectives

To enable the students to

1. To impart the drafting skills among the students.
2. To impart the knowledge to students about rules and regulations regarding submission drawing.
3. To produce best civil draftsmen to construction industry.
4. To Impart drafting skills among the students through AutoCAD software.
5. To develop the student as a best supervisor.
6. To develop the skills of reading of all types of drawings for implementation.
7. To make students as technically and practically perfect personnel in construction industry.
8. To impart knowledge to students for work as per drawing.
9. To produce assistant to architect.
10. To Impart basic interior designing skills.

Theory

Sr. No.	Unit	Sub-Unit	Periods
1.	Engineering Drawing	1.1 Introduction 1.2 Importance of engineering drawing	02
2.	Drawing Materials and Instruments	2.1 Drawing materials and their usage. 2.2 Drawing instruments and their usage.	02
3.	Lines, Lettering & Freehand Sketching	3.1 Types of lines and their application in drawing 3.2 Lettering. Introduction and importance 3.3 Proportioning in lettering. 3.4 General rules in lettering. 3.5 Types of lettering. 3.6 Free hand sketching meaning, necessity and sketching practice.	04
4.	Dimensioning	4.1 Introduction and importance 4.2 Types of dimensioning 4.3 General rules for dimensioning	02
5.	Orthographic Projections	5.1 Introduction. Principles of orthographic projection. 5.2 Methods of orthographic projections. 5.3 Orthographic projections of simple objects.	08
6.	Sections	6.1 Introduction and importance 6.2 Method's for representing section. Various material conventions and sections.	08

		6.3 Sections of simple objects.	
7.	Building Measurement and Drawing	7.1 Introduction, different type of buildings residential, industrial, hospital, market, school and bus stands etc. 7.2 Understanding of plan, elevations and section for building drawing. 7.3 Building components and their drawing symbols 7.4 Measuring units for building measurement and their conversions. 7.5 Area calculations. Plinth area, built up area and carpet area	10
8.	Building Rules and Regulations	8.1 Extract from building rules and bye laws: Documents and plans Number of copies, Undertaking from supervisor 8.2 Submission drawings List of drawings, documents, and scales for different drawings. Drawing lay out, No. copies for submission Tracing , ammonia printing, 8.3 General/ zoning regulations – residential, agricultural and industrial. Rules and regulations for different zones. 8.4 Regulations regarding layout of building – Ground coverage, side margins, restriction on room sizes, stairs, Openings, parking provision, height restrictions, floor space index (FSI) calculations 8.5 Area calculation and tabulations as per statutory requirements.	10
9.	Working Drawing	9.1 Introduction, necessity and 9.2 Drawings for execution. Site plan, Plan, elevation, and sections through various places, lay out plan of buildings garden, internal roads, water lines, drainage lines etc. 9.3 Drawing for building components like stairs, door/ window details, toilets fittings, kitchen, flooring etc. 9.4 Plumbing drawing.	10
10.	Interior Design	10.1 Introduction and importance of interior designing 10.2 Space utilization concepts. 10.3 To enable to design and develop residential interior and to learn essential skills of space planning & furniture & finishes.	08

11.	Computer aided drawing (CAD)	11.1 Usage of CAD software for drawing with computer. 11.2 Different available CAD software. 11.3 Introduction to CAD software screen/ GUI. 11.4 Different methods of input. 11.5 Different co-ordinate systems used in CAD software. 11.6 Opening/ viewing and saving CAD drawing.	06
12.	Commands	12.1 Draw commands:- Draw lines using different co-ordinate system, like Cartesian, system, and relative co-ordinate system, polar co- ordinate system. Drawing circle, rectangle and polygons. Object selection method, erasing drawing, undo and redo commands Drawing poly lines. Different Environments like Snap, grid and Ortho, etc similar commands. 12.2 Editing Selecting Objects for Editing Moving Objects, Copying Objects, Rotating Objects, Scaling Objects, Mirroring Objects, offset, Hatch, Rotate, Move, Array, Blocks, Editing with Grips etc. Text in Drawing, Types and Modifying 12.3 Modifying Commands:-working with annotations, adding text in a drawing, modifying multiline text, formatting multiline text, adding notes with leaders to your drawing. Creating tables. 12.4 Dimensions:- Dimensioning Concepts Adding Linear Dimensions Adding Radial & Angular Dimensions Editing Dimensions 12.5 Layers: Concepts of layer, Layer states, Changing an object layer Modifying different properties of layer. 12.6 Hatching:- Hatching, Editing hatches.	10
13.	Advanced Editing Commands	13.1 Trimming and extending objects. Stretching objects. Creating files and chamfers Offsetting objects Creating arrays	14

		of object 13.2 Inserting blocks:- Concept of block Inserting block Editing of block 13.3 Setting up of layouts:- Working in lay outs Creating and arranging drawing in viewports. Guide lines for layout. 13.4 Printing drawing:- Printing layouts Printing from model tab.	
14.	Building Drawing using CAD	14.1 Building components drawing: Foundation, doors, windows, staircase, roof, flooring etc. 14.2 Submission drawings:- demarcation drawings. site plan, key plan, location plan, block plan, floor plans, elevation, section passing staircase, section passing through wick., schedule of doors and windows *	26
		Total	**120**
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Practical

Sr. No.	List of Practicals	Periods	Procedure to Perform Practicals
1.	**Lines, Lettering & Freehand Sketching**	**12**	
	1. Draw different types of lines lettering and conventional symbols used in building construction.	4	Student will be able understand and draw the basic engineering drawings.
	2. Draw sanitary fittings and fixtures by free hand sketching.	4	Demonstration On Board and practicing.
	3. Construction of geometrical figures.	4	By class teaching and giving assignment
2.	**Dimensioning**	**4**	
	1. Draw a figure showing rules for dimensioning.	4	By preparing drawing sheets accordingly.
3.	**Orthographic Projections**	**16**	
	1. Draw orthographic projections of given simple object by first angle method, enough practice and 5 to 8 examples.	8	By preparing drawing sheets accordingly.
	2. Draw orthographic projections of simple object by third angle	8	By preparing drawing sheets accordingly.

	method, enough practice and 5 to 8 examples.		
4.	**Sections**	**8**	
	1. Draw sections in the above topics 5 to 8 Examples.	8	By preparing drawing sheets accordingly.
5.	**Building Measurement and Drawing**	**24**	
	1. Sketching practice of various components of Building e.g. Foundation, floors, stairs and stair cases, doors and windows, different types of roofs.	14	Demonstration On Board and practicing.
	2. Measurement of existing building. Preparation of the existing building plan.	10	
6.	**Building Rules and Regulations**	**50**	
	1. Preparation of line plan for a few type of buildings.	14	Demonstration On Board and practicing.
	2. Preparation of detailed plan, elevation and section for one building.	14	
	3. Preparation of the submission drawing for small residence ground only structure as per local statutory guidelines.	22	
7.	**Working Drawing**	**16**	
	1. Preparation of RCC drawing for at least two building components with important reinforcement detailing.	16	Demonstration On Board and practicing.
8.	**Computer Aided Drawing (CAD)**	**4**	
	1. Introduction to CAD software & commands used.	4	Demonstration on LCD projector and Individual practicing.
9.	**Commands**	**48**	
	1. Draw different geometrical figures by using different CAD Software commands.	8	Demonstration on LCD projector and Individual practicing.
	2. Draw given objects by using different commands used in CAD software.	8	Demonstration on LCD projector and Individual practicing.
	3. Drawing of various components of Building e.g. Foundation, floors, stairs and stair cases, doors and windows, different types of roofs using CAD software.	18	Demonstration on LCD projector and Individual practicing.
	4. Measurement of existing building.	14	Demonstration on LCD

	Preparation of the existing building plan using CAD software.		projector and Individual practicing.
10.	**Building Drawing using CAD**	**58**	
	1. Preparation of the submission drawing for small residential structure as per local statutory guidelines Preparation of detailed plan, elevation and section for one two storied building using CAD software	26	Demonstration on LCD projector and Individual practicing.
	2. Preparation of RCC drawing for building components with important reinforcement detailing using CAD software.	16	Demonstration on LCD projector and Individual practicing.
	3. To Design the interior for living, Kitchen and Bed room.	16	Demonstration on LCD projector and Individual practicing.
		Total	**240**
Industrial visits & visits for market survey should be performed & well organised at linked industry or traders.			

Std. XII
Paper I: Concrete Technology (K7)

Objectives

To enable the students to

1. To aware the students about very important technology
2. To impart the knowledge about quality control
3. To impart testing skills among the students
4. To impart execution skills of concreting activity
5. To impart quality control skills in RCC
6. To impart knowledge of erection of formwork.
7. To impart knowledge for preparation of reinforcement for different activities.
8. To develop the supervision skills of students.

Theory

Sr. No.	Unit	Sub-Unit	Periods
1.	Introduction	1.1 Brief introduction, definition, 1.2 Properties of concrete 1.3 Uses of concrete 1.4 Types of concrete.	04

2.	Ingredients of Concrete	2.1 Cement: physical properties of cement. 2.2 Aggregates: classification of aggregates according to size and shape. 2.3 Grading of Aggregate: Fineness modulus. 2.4 Water: Quality required as per IS 456-2000.	08
3.	Properties of Concrete	3.1 Properties of fresh concrete. 3.2 Properties of concrete in harden state.	08
4.	Water Cement Ratio	4.1 Principle of water-cement ratio law/ Duff Abram's water-cement ratio law: 4.2 Relation between water cement ratio and strength.	06
5.	Workability	5.1 General, definition, concept of internal function. 5.2 Factors affecting workability. 5.3 Measurement of workability.	08
6.	Concrete Mix Design	6.1 Concept of mix design. 6.2 Variables in proportioning & various method of proportioning 6.3 Introductions of various grades of concrete as per IS456-2000, proportioning for normal mix as prescribed by IS 456-2000 and adjustment on site for bulking of fine aggregate, water absorption, and workability.	12
7.	Admixtures	7.1 Introduction. 7.2 Classification of admixtures- 7.3 Accelerators 7.4 Retarders 7.5 Air entraining agents. 7.6 Super plasticizers. 7.7 Other Admixture.	08
8.	Special Concretes	8.1 Introduction, 8.2 Light weight concrete. 8.3 Aerated concrete 8.4 High density concrete 8.5 Sulphur infiltrated concrete. 8.6 Fibre reinforced concrete 8.7 Cold weather concreting. 8.8 Hot weathering concrete. * 8.9 Ready mix concrete.	08
9.	Conducting Operations	9.1 Storing of cement. 9.2 Storing aggregates. 9.3 Batching of ingredients. 9.4 Mixing of ingredients. 9.5 Transportation of concrete. 9.6 Placing of concrete.	12

		9.7 Compaction of concrete 9.8 Curing of concrete. 9.9 Jointing. 9.10 Defects in concrete. 9.11 Check list of different stages.	
10.	Reinforcement in Concrete	10.1Introduction. Terminology in RCC & Introduction to all RCC members. 10.2Tools and equipments required For bar cutting & bending. 10.3Properties of reinforcement steel. 10.4Checklist for reinforcement for different RCC members.	14
11.	Form Work	11.1Introduction, Objects of form-work, properties of good quality form-work. 11.2Types of formwork as per material used in formwork. Advantages of different materials used for formwork.* 11.3Erection method of Form works for different RCC members. 11.4Checklists for formwork of different RCC member.	08
12.	R.C.C. Structural Member	12.1Reading and interpretation of RCC members. * 12.2Checklists for construction of different RCC member.	16
13.	Scaffolding	13.1Introduction. 13.2Purpose of scaffolding. 13.3Material used for scaffolding. 13.4Characteristics of good scaffolding. 13.5Types of scaffolding. 13.6Various types of rope knots metal coupling, 13.7Erection of scaffolding. 13.8Checklist for different scaffolding.	08
		Total	**120**

Practical

Sr. No.	List of Practicals	Periods	Procedure to Perform Practicals
1.	**Ingredients of Concrete**	**16**	
	1. To determine the F.M. of aggregates.	8	Student will be

			able understand and draw the basic engineering drawings.
	To determine specific gravity and water absorption.	8	Demonstration and Practicing.
2.	**Properties of Concrete**	**8**	
	1. To determine the compressive strength of concrete.	8	Demonstration and Practicing Method
3.	**Water Cement Ratio**	**8**	
	1. Perform and analyse the effect of water cement ratio on strength of cement.	8	Demonstration and Practicing Method
4.	**Workability**	**12**	
	1. To determine the workability of concrete by slump cone.	4	Demonstration and Practicing Method
	2. To determine workability of concrete by compaction factor test method.	4	
	3. To determine the slump by K slump tester.	4	
5.	**Concrete Mix Design**	**24**	
	1. To design the concrete mix for various strengths:- m100, m200, m250, etc.	16	Demonstration and Practicing Method
	2. To determine the bulking of sand.	4	
	3. To determine water content in aggregates.	4	
6.	**Special Concretes**	**8**	
	1. Visit to ready mix plant.	8	Observation VCD presentation
7.	**Conducting Operations**	**24**	
	1. Study of store on site.	4	Demonstration and Practicing Method
	2. Non destructive test on hardened concrete: Rebound hammer method Ultrasonic pulse velocity test.	8	

	3. Core testing for compressive strength.	4	
	4. Visit to construction site study the machinery and equipments used in construction industry.	8	Organise site visit
8.	**Reinforcement Concrete**	**48**	
	1. Prepare reinforcement for footing.	6	Demonstration and Practicing Method
	2. Prepare reinforcement for ckeâolumn.	6	
	3. Prepare reinforcement for beam.	6	
	4. Prepare reinforcement for slab –one way, two way, PT slab, continuous & cantilever, etc.	8	
	5. Prepare reinforcement for lintel and chajja.	6	
	6. Prepare reinforcement for stair.	8	
	7. Prepare reinforcement water tank.	8	
9.	**Formwork**	**56**	
	1. Erection of form work for RCC lintel and chajja.	8	Demonstration and Practicing Method
	2. Erection of formwork for RCC pardi.	8	
	3. Erection of formwork column footing.	4	
	4. Erection of form work for column.	8	
	5. Erection of formwork for beam slab.	8	
	6. Erection the formwork for staircase.	8	
	7. Erection of formwork for lift case.	8	
	8. Erection of formwork for round column.	4	
10.	**R.C.C. Structural Member**	**36**	
	1. Visit to construction site to know the reinforcement and formwork method for different activities.	12	Demonstration and Practicing Method
	2. Visit to construction site to study the concreting operations of various items.	4	
	3. Visit to ready mix plant.	4	

	4. Scaffolding	08	
	5. To erect different types of scaffoldings.	08	Demonstration and Practicing Method
		Total	**240**
Practical should be conducted in demo lab for more practice. Demo lab should be well designed and well equipped. Visits should be arranged at only linked and collaborated construction industry for effective results.			

Paper II: Estimates and Contracts (K8)

Objectives

To enable the students to

1. Candidate should be enabled to read engineering drawing.
2. To learn construction process of building items with respect to requirement material, their proportion and labour, tools & plants, equipments.
3. To understand qualitative difference as per specifications & rates of building material.
4. To understand cost relationship with respect to quality and quantity of building construction.
5. To enable for taking out measurements of building items.
6. To enable for computation of quantity of building items.
7. To enable to compute quantity of material for building items.
8. To enable for rate analysis and cost assessment.
9. To enable to prepare tenders.
10. To study the different contract methods.
11. To study different (construction) execution procedure.
12. To study different bills.
13. To study the construction store as store keeper.
14. To understand the responsibilities as building site supervisor/work supervisor/master clerk.

Theory

Sr. No.	Unit	Sub-Unit	Period

1.	Introduction to Estimates	1.1 Introduction 1.2 Definition of Estimate terms used in estimates. 1.3 Purpose of Estimate	04
2.	Types of Estimates	2.1 Types of Approximate Estimates. 2.2 Detailed Estimate 2.3 Comparison between approximate and detailed estimates.	04
3.	Measurement of Building Work	3.1 Methods of Measurement – 3.2 Rules for measurement. 3.3 Units of measurement for different items.	04
4.	Detailed Estimates	4.1 Data required for preparing Estimate 4.2 Steps in Preparation of Detailed Estimate 4.3 Various forms in Estimate –	04
5.	Specifications	5.1 Introduction 5.2 Definition, points to be included specifications 5.3 Importance of specifications. 5.4 Types of Specifications 5.5 Points to be noted while preparing specification. 5.6 Specifications for different items.	06
6.	Quantities of Materials	6.1 Introduction, points to be taken into consideration for material calculations. 6.2 Importance of material calculation. 6.3 Calculation of Quantities of Material for different items.	12
7.	Rate Analysis	7.1 Introduction. 7.2 Importance/necessity 7.3 Data required for Rate analysis. 7.4 Factors affecting analysis of rates 7.5 Analysis of rate for various items.	14
8.	Taking out Quantities/Quality Surveying	8.1 Introduction 8.2 General, Points to be considered while taking out quantities 8.3 Rules for taking out quantities. 8.4 Methods of taking out Quantities 8.5 Quantity survey for simple items.	18
9.	Construction Planning	9.1 Classification of construction 9.2 Planning – 9.3 Resources of construction 9.4 Construction team 9.5 Construction organization in government sector such as PWD, ZP, Municipal corporations.	08
10.	Construction	10.1 Introduction ,General Idea 10.2 Types of labor	08

	Labour	10.3 Labour acts.	
11.	Quality Control	11.1 Meaning, definition, importance. 11.2 Necessity of quality control. 11.3 Stages in quality control. 11.4 Major items for quality control. 11.5 Quality control of different items.	10
12.	P.W.D. works	12.1 Classification of P.W.D.works 12.2 Method of carrying out works- Department and contract. 12.3 Preparation of bill, Types of bill 12.4 Important points to be considered while checking bill. 12.5 Rules for MB writing.	08
13.	Contracts	13.1 Introduction, definition. 13.2 Different types of contract 13.3 Contract documents.	10
14.	Tender	14.1 Introduction, definition, General Idea. 14.2 Concept of quotation & tender 14.3 Types of tender, types according to cost and nature. 14.4 Stages in tender preparation 14.5 Tender notice. 14.6 Submission of tender. E-tendering. 14.7 Scrutiny of tender. 14.8 Work order. 14.9 Deposit works. 14.10 Earnest money and security deposits penalty. 14.11 Types of submission of tenders. 14.12 Tender documents. 14.13 Documents for registration as a contractor.	10
		Total	**120**

Practical

Sr. No.	List of Practicals	Periods	Procedure to Perform Practicals
1.	**Types of Estimates**	**8**	
	1. To calculate the different types of areas of existing building. Such as plinth area carpet area, covered area, built up area.		Class teaching For Theory

			And Field work for Practical.
2.	**Measurement of Building Work**	**16**	
	1. To take measurement of different items executed and calculate the quantities by proper method of measurement.		Practical in suitable and convenient Site by demonstration And actual practicing to student.
	1. Take all measurements in FPS. Method and convert it into MKS units for calculating quantities of different items.		
3.	**Detailed Estimates**	**8**	
	1. To prepare a sheets used in estimation, measurement sheet, abstract sheet, composite form measurement and coast.		Class Teaching
4.	**Specifications**	**12**	
	1. To prepare specification for excavation work.		Class Teaching
	2. To prepare a specification for RCC work.		
	3. To prepare specification for B. B. Masonry.		
	4. To prepare specification for Plaster.		
	5. To prepare specification for painting.		
	6. To prepare specification for flooring. (Selective item should be performed)		
5.	**Quantities of Materials**	**36**	
	1. Calculate the quantities of materials for different items.		Class Teaching
	2. Brick Masonry (for different proportions)		
	3. PCC (for different proportions)		
	4. Stone masonry (all types with different proportions)		
	5. Plastering 12mm thick,20mm thick (different proportions)		

	6. Pointing (different proportions)		
	7. RCC (with different proportions)		
	8. White washing and color washing.		
6.	**Rate Analysis**	**36**	
	1. Prepare the rate analysis for different construction items.		Class Teaching
	a. Earthwork in Excavation		
	b. PCC / RCC		
	c. Brick Masonry		
	d. Stone Masonry		
	e. Cement Plaster		
	f. Pointing		
	g. White washing		
	h. Distempering		
	i. Oil Painting		
	j. Cement Paint		
7.	**Taking out Quantities/Quality Surveying**	52	
	1. Calculate the quantities of different items for construction of compound wall from given drawing.		Class Teaching
	2. From given drawing of steps calculate the quantities of different construction items		Class Teaching
	3. Calculate the quantities of simple column footing from given drawing		Class Teaching
	4. Calculate the quantities of different items of RCC trapezoidal footing from given drawing.		Class Teaching / Laboratory Teaching
	5. Calculate the quantities of different items required for construction of circular and semicircular steps from given drawing.		Class Teaching
	6. Calculate the quantities of different items for rectangular water tank constructed in brick masonry by using both long wall –		Class Teaching

	short wall and centre line method from given drawing.		
	7. Calculate the quantities of different items for circular water tank from given drawing.		Class Teaching
	8. Calculate the quantities of different items for two rooms from given drawing by using long wall-short wall and centre line method.		
	9. Calculate the quantities of different items for three rooms from given drawing by using long wall-short wall and centre line method.		
	10. Calculate the quantities of different items for four rooms having toilet blocks from given drawing.		Laboratory teaching. Practicing by Giving Assignment.
	11. Calculate the quantities of different items for four roomed bungalow constructed in RCC from given drawing.		
	12. Calculate the quantities of different items for two storied RCC building from given drawing and prepare detailed estimate for this.		
8.	**Quality Control**	**16**	
	1. Prepare a checklist of quality control for RCC work and implement it on any construction site. Prepare a report of quality control.		Class Teaching
9.	**Works**	**16**	
	1. Take measurements of completed items and enter it into measurement book with all rules.		Class Teaching
	2. To prepare a bill from MB and DSR.		
10.	**Contracts**	**12**	
	1. Visit to PWD/Govt. office to study Different contract methods, tender Methods, and documents used for it.		Oraganise Visit
11.	**Tender**	**28**	
	1. Prepare a project:		Class teaching. Demonstration and arranging
	2. Draw four room plan of bungalow (ground floor) using AutoCAD Software.		
	3. Submission Drawing /2 packets, 3packets.		

	4. Working drawing.		Workshop To Impart Knowledge Of tender procedure for getting work.
	5. Detail Estimate for same.		
	6. Prepare a Tender form.		
	7. Prepare a Tender notice.		
	8. Submission of Tender, E-tendering.		
	9. Tender Opening stages.		
	10. Stages in Scrutiny.		
	11. Prepare a Work order.		
	12. Execution procedure		
		Total	**240**
Student should be perfect in estimation by practicing in both theory and practical. Student should be able to fill tenders for getting govt. Works, encourage the students for the same.			

Paper III: Surveying (K9)

Objectives

To enable the students to

1. To read all types of maps.
2. To read revenue land record maps.
3. Perform survey to prepare maps.
4. Perform survey to prepare layout and mark the plots.
5. To collect information for fulfillment at objectives
6. To mark the layout in the plot for the proposal construction.
7. To determine topography of land. (Rise and fall of the ground level)

Theory

Sr. No.	Unit	Sub-Unit	Period
1.	Fundamentals of Surveying	1.1 Meaning, importance and need of surveying 1.2 Different type of survey 1.3 Equipments	08

		1.4 Fundamentals of land survey	
2.	Chain Surveying	2.1 Linear survey methods, chain and its types, optical square, cross staff, locating ground feature by offsets – field book, conventional symbols, plotting chain survey and computation of areas, errors in chain Surveying and their elimination.	12
3.	Compass Surveying	3.1 Principles and use of prismatic compass, adjustments, Bearings. 3.2 Local attraction and its adjustments. 3.3 Method of Chain and compass surveying of an area. 3.4 Adjustments of traverse. 3.5 Errors in compass surveying and precautions	14
4.	Plane Table Surveying	4.1 Study of Equipment 4.2 Orientation 4.3 Methods of Plane Tabling, Three Point method.	14
5.	Leveling	5.1 Introduction and principles of Dumpy Level, 5.2 Basic definitions, 5.3 Detail of dumpy Level and use of Dumpy Level in surveying, 5.4 Temporary adjustment of Levels, Sensitiveness of bubble tube; 5.5 Methods of leveling – Differential, Profile & fly Leveling, 5.6 Effect of curvature and refraction, Automatic levels, 5.7 Plotting longitudinal sections and Cross sections; 5.8 Measurement of area and volume	16
6.	Contouring	6.1 Introduction to Topographic Map, 6.2 Characteristics of Contour. 6.3 Contour Interval. 6.4 Methods of Locating Contours, 6.5 Interpolation of Contours	12
7.	Auto Level & Digital Level	7.1 Introduction and use of Auto level. 7.2 Introduction and use of Digital level for multiple leveling	14
8.	Theodolite Survey	8.1 Component parts of transit theodolite 8.2 Measurement of horizontal angles 8.3 Co-ordinate & transverse table. 8.4 Digital Theodolite Construction and uses 8.5 Determination of horizontal of vertical angles and also slopes	16
9.	Total Stations	9.1 Introduction to total station survey 9.2 Method of using the total stations for surveying, free station surveys, tie distance, remote height 9.3 Computations (COGO) 9.4 Longitudinal and Transverse profiles	14

		9.5 Contour map, cut and fill volumes staking out, cross station reference line, road program	
		Total	**120**

Practical

Sr. No.	List of Practicals	Periods	Procedure to Perform Practicals
1.	**Fundamentals of Surveying**	**24**	
	1. Study of various instruments like Tapes, Chains, Cross-Staff, Optical square, Line Ranger, Ranging Rods.	8	Demonstration
	2. Direct Ranging For minimum 50 meter length.	8	
	3. Indirect Ranging taking some obstacles minimum 50 mater length.	8	
2.	**Chain Surveying**	**36**	
	1. To Plot & To determine area by chain surveying by Triangulation Method.	8	Class Teaching
	2. Study of various symbols used in surveying.	4	Demonstration
	3. To calculate the area of field with plotting by cross-staff surveying.	8	Practicing
	4. Setting out right angles by Optical Squares.	8	
	5. Ranging by Line rangers.	8	
3.	**Compass Surveying**	**16**	
	1. Study of Prismatic Compass.	8	
	2. To Plot & To Calculate area of field by Compass Surveying.	8	
4.	**Plane Table Surveying**	**16**	
	1. To Plot & To Calculate area of given field by Plane table surveying (radiation and orientation method)	16	
5.	**Leveling**	**40**	

	1. Study of Dumpy Level.	4	Class Teaching Demonstration Practicing
	2. Reading the leveling staff.	8	
	3. Practice in recording & finding reduce level by collimation method.	4	
	4. Practice in recording & finding reduces level by rise and fall method.	8	
	5. Taking fly levels for distance of 2.0km.	8	
	6. Profile leveling for Road Project.	8	
6.	**Contouring**	**16**	
	1. Study of Contour with Characteristics.	4	
	2. Plotting cross-sections of field with drawing contour.	12	
7.	**Auto Level & Digital Level**	**24**	
	1. Study of Auto Level.	8	Class Teaching
	2. Leveling Practice by Auto Level by Rise & Fall Method. 3. Recording levels in Field Book with check complete.	8	Demonstration
	4. Leveling Practice by Auto Level by Collimation Plane Method. 5. Recording levels in Field Book with check complete.	8	Practicing
8.	**Theodolite Surveying**	**32**	
	1. Study of theodolite	8	Class Teaching and Demonstration
	2. Adjustment & setting of theodolite	12	Demonstration of instrument and Practicals
	3. Taking readings and recording those readings in the field book	12	
9.	**Total Stations**	**36**	
	1. Study of total stations	4	Demonstration and Practicals
	2. Method of using the total station survey	8	
	3. Calculations/Computations (COGO)	8	

	4. Study of contour maps	8	
	5. To draw cross section and road program	8	
		Total	**240**

REFERENCE BOOK

Sr. No.	Name of the book	Authors & Publications
1	Building construction	B.C. Punmia
2	Construction Management	Vajrani & Chandola
3	Construction Management	Harpal Singh.
4	Building Construction	Sushil Kumar
5.	Building Construction	Rangwala.
6.	Building Material	Chaudhari
7.	Concrete Technology	M.S. Shetty/ S CHAND.
8.	Concrete Technology.	S.S. Chaudhari/ NIRALI
9.	Building Material and Construction.	RK Jain,V.R. Phadke/ Nirali
10.	Practical Building Construction & its Management.	Mantri Publication
11.	Building Construction	W.B. Mckay
12.	Surveying	B.C. Punmia
13.	Cement Concrete Mix Design	M. Y. Sabnis
14.	Surveying- Vol. 1, Vol. 2	Kanitkar and Kulkarni
15.	Building Drawing	Shah, Kale, Patki,
16.	Building Drawing	Y. S. Sane
17.	Building Drawing	Guru Charan Singh
18.	RCC Design	Shah , Kale
19.	National Building Code ,BIS, New Delhi	BIS, new Delhi.
20.	Water Supply and Sanitary Engineering	S.C. Rangwala
21.	Water Supply and Sanitary Engineering	J. S. Birdie
22.	Building Material	Harpalsingh
23.	Introduction to CAD	D.D. Vaisonet, publisher: Mc Graw Hill, New Delhi
24.	The ABC's of AUTOCAD	Alan and Miller Published by BPB pub
25.	Mastering AUTOCAD	George Omura Published

26.	Inside Auto CAD the ABC's of Auto CAD 2004	Racker and Rice Alan Miller Technical Publication Singapore.
27.	Auto CAD Practice	BPB Publishers New Delhi.
28	Estimating and Costing	B.N. Dutta
29	Estimating and Costing	Vazirani & Chandola
30	Building Construction, Vol. 1. to 4	W.B. Mackey
31	Construction Foundation Engg.	Bharat Sing
32	Estimating and Costing	Chakrabourti
33	Contract and Accounts	B.S. Patil
34	Notes for Computer Course Auto CAD	Fadake, Moghe.
35	Concrete Technology	K.C. Krishnaswami. & A.A. Khandekar Publication Dhanpatray.

MACHINERY AND EQUIPMENTS REQUIRED

SR	PARTICULAR	QTY
1	LCD PR0JECTOR WITH LAPTOP	1
2	COMPRESSIVE STRENGTH TESTING MACHINE (DIGITAL)	1
3	SET OF MOULDS CONCRETE & MORTAR CUBES 150 MM, 70.5MM (4 Nos each)	1
4	K SLUMP TESTER	1
5	SLUMP CONE SET	2
6	COMPACTION FACTOR APPARATUS	1
7	VICAT'S APPARATUS WITH ALL ATTACHMENTS.	1
8.	SIVE ANALYSIS SET FINE & COARSE	1
9	ELECTR0NIC WEIGH BALANCE (SENSITIVE BALANCE)	1
1O	SIEVES FOR FINENESS OF CEMENT SIEVE NO. 9	
11	VIBRATING MACHINE (12000 RPM+/-400)	1
13	WEIGHING BALANCE (100KG)	1
14	MINI CONCRETE MIXER.	1
15	CONCRETE NEEDLE VIBRATOR	1

16	TILE CUTTER MACHINE	2
17	TILE POLISHING MACHINE (WITH DIFFRENT NUMBER STONES)	1
18	BAR BENDING MACHINE	1
19	POWER CUTTER	1
2O	DRILLING MACHINE	2
21	METAL TRAY SET	2
22	CORE CUTTING MACHINE WITH ATTACHMENT	1
23	MECHANICAL RAMMER (COMPACTOR)	1
24	MONO BLOCK PUMP SET	1
25	MASONRY GRINDER	1
26	REBOUND HAMMMER.(NORMAL)	1
27	REBOUND HAMER (DIGITAL)	1
28	VIBRATING TABLE FOR MOULD	1
29	CONCRETE(HARDENED) TESTING KIT	1
30	AGGREGATE IMPACT VALUE APPARATUS	1
31	CRUSHING VALUE APPARATUS.	1
32	SEDIMENTATION PIPPET FR SILT CONTENT	1
33	SET OF BEAKER	1
34	GRADUATED CYLINDERS SET	1
35	MEASURING CYLINDERS 100, 5OO 1000ML.	1
36	90 MICRON SIEVE.	4
37	GUAGING TROWEL	4
38	STOP WATCH	2
39	OVEN	1
40	METAL TRAYSET.	1
41	DRILLING MACHINE	1
42	SPRAY PAINTING MACHINE	1

43	PAINT REMOVER STOVE	1
44	LEE CHATTELIERS APPARATUS	1
45	STEEL BAR CUTTER	1
46	K SLUMP TASTER	1
47	BAR BENDING TABLE	1
SURVEYING TOOLS		
1	METRIC CHAINS	2
2	CROSS STAFF	2
3	CROSS STAFF (ALL TYPES)	4
4	PRISMATIC COMPASS	2
5	METALIC TAPES	4
6	RANGING ROD	6
7	ARROWS (CHAIN PINS)	24
8	PLUMB BOB	6
9	OPTICAL SQUARE	4
10	PRISMATIC COMPASS	2
11	PLANE TABLE	2
12	ALIDADE	2
13	DRAWING BOARD	2
14	DUMPY LEVEL	1
15	THEODOLITE	1
16	AUTO LEVEL	1

17	DIGITAL LEVEL	1
18	DISTOMAT (EDM)	1
19	DIGITAL THEODOLITE	1
2O	TOTAL STATION	1
21	ADVANCED SURVEING GPS	1
22	TAPES 30M	4
TOOLS AND EQUIPMENTS		
1	MASON' S TOOL KIT	4
2	BRICK LAYER'S TOOL KIT	4
3	TILER'S TOOL KIT	4
4	BAR BENDER'S TOOL KIT	4
5	PLUMBER'S TOOL KIT	4
6	CARPENTER'S TOOL KIT (FORM WORK)	4
7	PAINTERER'S TOOL KIT	4
8	MORTAR MIXING PAN	2
9	WATER SRAYER, SPADES , BUCKET, METAL, PLASTIC PANS (each)	1O
1O	SAFETY TOOL KIT	6
11	WHEEL BURROW 0F TYRE WHHELS	6
12	BATCH BOX	2
13	HELMETS	25
14	FIRST AID TOOL BOX /FIRST AID BOX	2
15	TUB FOR CURING	1
16	GUM SHOES. SET	10

FORM WORK MATERIAL		
1	TOTAL SET OF FORWORK FOR 50 SQ. M. (STELL PLATES, STEEL PROPS WITH ALL FITTINGS etc, PLYWOOD FOR SHUTTERING, WOODEN PLANKS, WOODEN PLANKS etc,)RCC SLAB,FOOTING , COLUMN , BEAM, ETC.	1 S E T
DRAWING TOOLS		
1	DRAWING BOARDS	25
2	TEE SQURE	25
3	MINI DRAFTERS	2
4	TECHERS GEOMETRY BOX	2
5	COMPUTERS	10
6	LAP TOP	2 Nos.
7	SET SQUARES SET	4
8	INSTUMENT BOX	4
9	DRAWING SHEET CASE	4
1O	PLOTTER	1
11	PRINTER	2
12	INVERTER	1
13	PEN DRIVES 8GB	2
14	BLANK CDS	2
AUTO CAD TOOLS		
1	AUTO CAD SOFTWARE WITH LIENSE	1
2	SOFTWARE FOR 3D	1
2	FURNITURE FO COMPUTER SETTING	LS

4	INTRIOR OF LABORATORY	LS
SPACE AVAILABILITY		
	SPACE REQUIREMENT	
1	DRAWING HALL FOR 2O STUDENTS---------- (6OO SQ. FT.)	1
2	DEMO LABORATORY---------- (400 SQ. FT.)	1
3	CONST. & SURVEYING LABORATORY ---------- (600 SQ. FT.)	1
4	STORE ---------- (600 SQ. FT.)	1
5	BUILDING YARD ---------- (2000 SQ. FT.)	1
6	MATRIAL STORAGE ---------- (600 SQ. FT.)	1