

**SYLLABUS OF SEMESTER SYSTEM
FOR THE TRADE OF**

(Construction and wood working renamed as)

CIVIL ENGINEERING ASSISTANT

UNDER

CENTRE OF EXCELLENCE (COE)

(Two years/Four semesters)

Redesigned in 2014

By

**Government of India
Ministry of Labour & Employment (DGE&T)**

GENERAL INFORMATION

1. **Name of the Trade** : **CIVIL ENGINEERING ASSISTANT**
2. **NCO Code No.** : not available
3. **NOS** : not available
4. **Duration** : 2 Years (4 semesters)
5. **Entry Qualification** : Passed 10th class examination

6. **Unit Strength** : 20 trainees per unit +
30% supernumeraries =26 trainees per unit
6. **Space Norm** : 120 Sqm
7. **Power Norms** : 6KW

8. **Instructor's/Trainer's Qualification** : Degree in Civil Engineering from recognized university with one year experience in the relevant field **(or)**
Diploma in Civil Engineering from recognized institute of technical education with two year experience **(or)**
NTC/NAC in the trade of Architectural Assistant/ Mason (Building Constructor)/ Surveyor/ Plumber/ Electrician/ Carpenter with three year experience to cover the relevant portion of the syllabus
9. **Desirable qualification** : Preference will be given to a candidate with Craft Instructor Certificate (CITS)

(The degree/diploma holder instructors must be provided with orientation programme having duration of six months in Training Methodology within two year of their appointment.)

10. **Job role** : (i) Assistant supervisor in construction site of high Rise Buildings/Architect's office/Builders

(ii) Assistant supervisor in cement factory
(iii) Assistant supervisor in ready mix concrete plant
(iv) Start own agency for construction equipments contract /own building maintenance contract

Week wise content index of first semester

S.No	Week No.	Contents Heading Practical/Theory		Duration
1.	01	Safety & Codes	Safety & Codes	1 weeks
2.	02	Drawing Layouts	Drawing Layouts	1 weeks
3.	03	Dimensioning & Scales	Dimensioning & Scales	1 weeks
4.	04	Architectural Symbols	Architectural Symbols	1 weeks
5.	05	Floor Area Calculations	Floor Area Calculations	1 weeks
6.	06	Building Bye Laws	Building Bye Laws	1 weeks
7.	07	Floor Plans	Floor Plans	1 weeks
8.	08	Sanitary & Electrical	Sanitary & Electrical	1 weeks
9.	09	Lighting & Ventilation	Lighting & Ventilation	1 weeks
10.	10	Types of Building Materials	Types of Building Materials	1weeks
11.	11	Cementing Materials	Cementing Materials	1 weeks
12.	12	Protective Materials	Protective Materials	1 weeks
13.	13	Foundation	Foundation	1 weeks
14.	14	Masonry	Masonry	1 weeks
15.	15	Dampness	Dampness	1 weeks
16.	16	Flooring	Flooring	1 weeks
17.	17	Units of Measurements	Units of Measurements	1 weeks
18.	18	Measurements	Measurements	1 weeks
19.	19	Levelling	Levelling	1 weeks
20.	20-21	Estimating & Costing	Estimating & Costing	2 weeks
21.	22	Estimate by Centre Line Method	Estimate by Centre Line Method	1 weeks
22.	23-24	Revision	Revision	2 weeks
23.	25-26	Examination	Examination	2 weeks

Week wise content index of second semester

S.No	Week No.	Contents Heading Practical/Theory		Duration
1.	01	Technical Terms in Carpentry	Technical Terms in Carpentry	1 weeks
2.	02 - 03	Joints	Joints	2 weeks
3.	04	Fastening	Fastening	1weeks
4.	05	Timber	Timber	1 weeks
5.	06	Seasoning	Seasoning	1 weeks
6.	07	Wood Products	Wood Products	1 weeks
7.	08	Electrical Safety	Electrical Safety	1weeks
8.	09	Electricity Units	Electricity Units	1 weeks
9.	10	Fuses	Fuses	1 weeks

10.	11	Work, Power, Energy, Force	Work, Power, Energy, Force	1 weeks
11.	12	Estimating of Wiring	Estimating of Wiring	1 weeks
12.	13	Earthing	Earthing	1 weeks
13.	14	Electrical Appliances	Electrical Appliances	1 weeks
14.	15	Transformers	Transformers	1 weeks
15.	16	Plumbing Tools	Plumbing Tools	1 weeks
16.	17	Pipe Fittings	Pipe Fittings	1 weeks
17.	18	Method of Cutting	Method of Cutting	1 weeks
18.	19	Water Supply	Water Supply	1 weeks
19.	20	Valves	Valves	1 weeks
20.	21	Sanitary	Sanitary	1 weeks
21.	22	Kitchen & Toilet Appliances	Kitchen & Toilet Appliances	1 weeks
22.	23-24	Revision	Revision	2 weeks
23.	25-26	Examination	Examination	2 weeks

Week wise content index of Third semester

S.No	Week No.	Contents Heading Practical/Theory		Duration
1.	01	Definition of Concrete Technology	Definition of Concrete Technology	1 weeks
.	02 - 07	Types of Cement	Types of Cement	6 weeks
3.	08-10	Preparation of Concrete	Preparation of Concrete	3 weeks
4.	11-12	Classification & Specification of Concrete	Classification & Specification of Concrete	2 weeks
5.	13-14	R.C.C.	R.C.C.	2 weeks
6.	15	Scaffolding & Formwork	Scaffolding & Formwork	1 weeks
7.	16-17	Rate Analysis	Rate Analysis	2 weeks
8.	18	Formwork & Bar Bending	Formwork & Bar Bending	1 weeks
9.	19	Formwork	Formwork	1 weeks
10.	20	Bar Bending	Bar Bending	1 weeks
11.	21-22	Tools & Equipments	Site Visit	2 weeks
12.	23-24	Revision	Revision	2 weeks
13.	25-26	Examination	Examination	2 weeks

Week wise content index of Fourth semester

S.No	Week No.	Contents Heading Practical/Theory		Duration
1.	01	Modern Trends of Concrete Technology	-----	1 weeks
2.	02 - 03	Pile Foundation	Site Visit – Piling	2 weeks
3.	04	Damp Proof Course	Damp Proof Course	1 weeks
4.	05	Plastering & Pointing	Plastering & Pointing	1 weeks
5.	06-07	Flooring	Market Survey for collection of samples, brochures related to flooring & site visit	2 weeks
6.	08-09	Annual Repair	Annual Repair	2 weeks
7.	10-11	Special Repair	Field Training	2 weeks

8.	12	Anti termite Treatment	Market Survey related to different materials of termite treatment	1 weeks
9.	13	Plumbing Maintenances	Site Visit where plumbing works is been executed	1 weeks
10.	14	Water Meter	Lab	1 weeks
11.	15	Plastering	-----	1 weeks
12.	16	Adhesive & Joint Filler	Site Visit	1 weeks
13.	17	Construction Equipments	Field Training	1 weeks
14.	18	Excavation Equipment	Field Training	1 weeks
15.	19	Hoisting Equipment	Field Training	1 weeks
16.	20	Condeying & Drilling Equipments	Field Training	1 weeks
17.	21-22	Construction Management	Field Training	2 weeks
18.	23-24	Revision	Revision	2 weeks
19.	25-26	Examination	Examination	2 weeks

SYLLABUS FOR THE TRADE OF CONSTRUCTION TECHNOLOGY
UNDER COE

First Semester

Semester Code: CNT- 01

Duration :Six months

BASIC ARCHITECTURE

WEEK	Trade Theory	Trade Practical
1.	Importance of module, importance of safety, architect office organization. Code of practice for general and architecture drawing.	Instrument used in the module, types of work to be done in the section, types of jobs made. Getting ready to draw using drawing instruments. Introduction to B.I.S
2.	Basic engineering drawing Use of drawing instruments and materials, lay out of drawing sheet, drawing conventional line according to IS code, Folding of sheet	Use of drawing instruments and materials, lay out of drawing sheet, drawing conventional line according to IS code. Folding of sheet
3.	Importance of lettering, sizes proportion etc., as per BIS Dimensioning technic ,types of dimensioning Scales – recommended scales for drawing with reference to IS code, choice of scale	Importance of lettering, sizes proportion etc., as per BIS Dimensioning technic ,types of dimensioning Scales – recommended scales for drawing with reference to IS code, choice of scale
4.	Different types of line, and symbolic representation of Architectural material. Importance of using symbols of different fittings	Different types of line, and symbolic representation of Architectural material. Importance of using symbols of different fittings
5.	Introduction about building construction Types of buildings Structural system of building. Different parts of building Site selection Orientation and ventilation of building	Line diagram Two roomed building Calculation of floor area and carpet area Calculation of FAR
6	Main considerations of architectural design Bye-law of the locality Climate and its effects Materials and method of its construction People and their requirements.	Main considerations of architectural design Bye-law of the locality Climate and its effects Materials and method of its construction People and their requirements.

7.	Building plans Introduction Types of plan Typical floor plan Foundation plan Structural plan Terrace plan	Plan cut out at window sill level Drawing plan, elevation and section Typical cross section showing various elements of a building
8.	Conventional symbols Construction materials Doors and windows Sanitary items Electrical items	Drawing details of single storied residential building. Layout and detailing of residential building Drawing plan, elevation and section.

BASIC BUILDING CONSTRUCTION

9.	Introduction about Building Construction: Its importance, types of buildings, site selection of different types of buildings, Name the different parts of the building, orientation and ventilation of the building.	Introduction with buildings about different parts of the building and draw a neat sketch passing thro' door, window, and roof of multi stories building, orientation and ventilation of building.
10.	Types of building materials Solid material – brick, stone, iron, timber Brick- Size, classification, Uses Stone- Size, classification, uses. Steel – Types of steel, varieties of steel Timber- Uses of timber, Importance of timber in construction work.	Introduction by showing the different types of materials i.e. bricks, stones, tiles, cement, sand, aggregates, lime, steel, timber, earthen ware, Standard size of local market bricks available in your locality, site visit of brick kiln showing the manufacturing of bricks, field test of cement. Etc.
11	Cementing material Cement - Uses, varieties grades, ingredients. Lime- Uses, varieties grades, ingredients. Mortar- Uses of mortar, preparation of mortar, ingredients in mortar, proportions in mortar.	Field test on cement Batching of material for preparation of mortar Mixing – hand mixing, machine mixing Placing & curing
12	Protective material Paint – uses, different types, ingredients. Varnish - uses, different types, ingredients. Plastering – purpose of plastering, proportion, curing, purpose of curing, plastering method.	-Application of paint- cement paint, plastic emulsion, enamel paint different surfaces -Process of varnishing -Tools used in plastering -Plaster in two coats -External finishes—sand finish, textured finish
13	Foundation Objects of foundation Requirements of a good foundation Types of foundation Methods of setting out of foundation trench	Setting out foundation trench
14	Masonry Types of masonry Tools used in masonry work Materials used in masonry work Different types of bond Arch and lintels	Tools of Brick masonry, how to use the tools of brick masonry, construction of wall –header bond stretcher bond, English bond, Flemish bond
15	Damp proof course Different materials used Causes of dampness Methods of damp proofing	Laying of d.p.c Methods of d.p.c Materials used

16	<p>Flooring Types of flooring material Tools and instruments used Types of floor finishings Floorings suitable for different situations Methods of laying.</p>	<p>Choice of flooring materials Materials selection Construction of all types of floors, making of formation level, laying of Base Layers, laying of Topping, etc.</p>
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BASIC QUANTITY SURVEYING

17	<p>Units of measurement for different works in M.K.S. and F.P.S. system, conversion of units.</p>	<p>Familiarization with institute and importance of the module. Instrument, equipments used in the module, type of work done by the trainees in the institute, nature of job done by the trainees of the module.</p>
18	<p>Measurements Linear measurements Angular measurements Instruments used for taking measurements Measurement of length by chain and tape Calculation of area of a plot</p>	<p>Practice in folding and unfolding chain, alignment of lines, measurement of distance between given points and their booking.</p>
19	<p>Levelling Purpose of surveying Principles of surveying Types of surveying Levelling instrument Types of levelling Methods of levelling Plotting level</p>	<p>Practice in setting out a level and performing temporary adjustments. Practice of fly leveling, differential leveling. Reduction of levels, booking of field work, height of collimation, rise and fall method. Calculation of area of cross sections.</p>
20-21	<p>Estimating and costing Need and importance Types of estimate Items of work Measurement of items Calculation of quantities of various items</p>	<p>Estimating and costing Need and importance Types of estimate Items of work Measurement of items Calculation of quantities of various items</p>
22	<p>Estimate of one room building by centre line method and separate wall method</p>	<p>Estimate of one room building by center line method and separate wall method. Calculation of different material from the quantities worked out in the estimate.</p>
24-25	REVISION	
25-26	EXAMINATION	

Second Semester

Semester Code: CNT- 02

Duration :Six months

BASIC CARPENTARY

Week	Trade theory	Trade Practical
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1.	<p>Technical terms in carpentry.</p> <ul style="list-style-type: none"> - Carpentry, Joinery, Planing, Moulding, Rebating, Chamfering, Sawing. <p>Tools used in carpentry</p> <ul style="list-style-type: none"> - Boring tools - Cutting tools - Hammers - Marking tools - Planing tools - Miscellaneous tools 	<p>Identification of hand tools demonstration and using measuring, sawing practice using different types of saws, and planes etc.</p>
2-3	<p>Classification of joints.</p> <ul style="list-style-type: none"> - Lengthening joint - Widening joint - Angle joint - Framing joint - Bearing joint 	<p>Ripping , cross cutting , curve cutting , oblique sawing .use of sawhorse , bench hook Bench vice , Bench stop etc , Identification of timber , showing defects knots , shakes , grains etc .</p>
4	<p>Fastenings</p> <ul style="list-style-type: none"> - Bolts - Coneectors - Dogs - Nails - Pin - Screw - Sockets - Spikes - Straps - Wedges 	<p>Planning practice: planning face side , face edge , marks use of marking gauge etc , testing of accuracy flatness , use of straight edge bench stop , try square , cross planning , edge planning , planning piece of size , grinding , sharpening of plan blade etc .</p>
5	<p>Timber</p> <ul style="list-style-type: none"> - Uses of timber in construction work - Importance of timber in construction work - Different parts of structure of tree - Hard wood, soft wood – uses - Commonly used timber trees in construction work. 	<p>Demonstration and making of joints. Framing joints: halving joints, trenching, housing joints, mortised and tanon joint , Door joint , bridle joint , dovetail joint , lap dovetail joint , miter joint etc .</p>
6	<p>Seasoning</p> <ul style="list-style-type: none"> - Purpose of seasoning - Methods of seasoning - Preservation of timber - Types of preservation - Application of preservatives - Causes of decay of timber. 	<p>Broadening joint: simple butt, slot screw joint, pocket screw joint, tongue and groove butt joint, etc.</p>
7	<p>Wood products</p> <ul style="list-style-type: none"> - Industrial forms of timber - Veneer - Laminated sheet - Fibre board - Hard board - Plywood 	<p>Lengthening joints: slopping scarf, racking scared, half lapping scarf , table scarf joint etc.</p>

BASIC ELECTRICALS

8	Familiarization with trade, safety precautions, first aid in electrical shop, fire accident, symbols and measuring unit of work, power, energy and force	Demonstration and introduction of various systems involved in the trade. Demonstration and practice of using trade hand tools.
9	Basic electricity and its units Conductor insulator semi-conductor wires, cables, cable joint, wire joint, measurement of cable	Joints straight and Tee
10	Fuses and its types Rewriteable HRC fuse, MCB soldering ELCB, RCCB, ABCB, MCCB AC and DC, AC fundamentals, poly phase.	Practice of using SWG and micro meter
11	Work, Power Energy, Force, Unit Introduction to electrical wiring Accessories, ISI rules of wiring Types of wiring	Identification of accessories and their connection
12	Estimate and costing of wiring Fault finding	<ul style="list-style-type: none"> - To control one lamp with one switch - Stair case circuit fitting - Godown fitting - Hospital fitting
13	Earthing , types of earthing	
14	Electrical appliances Care and maintenance Fault finding Illumination	Practice of connecting electrical appliances as per their specification Practice of fixing and connecting accessories and taking reading with voltmeter
15	Explanation and working of different type of transformers and its classification	Identification of transformer, their testing and use

BASIC PLUMBING

16	Use of plumbing tools Materials used in plumbing <ul style="list-style-type: none"> - Ferrous , non ferrous and non- metal 	Simple pipe connection using G.I. Pipes, socket, elbow, tee, reducing elbow, G.I. union, cap plug, reducer, Three face elbow, reducing socket, plug, G.I. nipple etc. installation of water meter.
17	Different types pipes and fittings Joints <ul style="list-style-type: none"> - GI, PVC, AC, SW, CI, lead ,steel - Properties and use in plumbing work 	Joining of thread joint, lead joint, flange joint, cement joint, D. Joint etc.
18	Method of cutting and joining Elbow joint, socket joint, Tee joint, reducing elbow joint, floor trap joint	Different types of drill. What is taping . Different types of tapings, Drilling and taping of C.I. main and fixing ferrule and connection to a house.
19	Water supply Sources of water Water requirements Purification Storage of water Distribution of water	Layout of soil pipe and waste pipe to the sanitary fitting using different types of fitting. Door junction, door Bend , H.R. bend, Plain Bend, Double door junction, inverter junction, cowel , floor trap, Gully trap, P-trap etc.

20	Different types of valves used in plumbing <ul style="list-style-type: none"> - Types of damages in taps , valves and water meter and tanks. - Method of rectification 	Practice of cutting and shaping P.V.C. pipe to size, use and fixing of P.V.C. pipe. Different types of valves and fittings.
21	Sanitary Technical terms - sewer, sewage, sullage etc. -Soil pipe and waste pipe fitting	Reconditioning of taps, valves & flushing tank, testing for correct functioning. Types of tanks R.C.C., P.V.C. Iron tanks etc.
22	Different types of water closets Different types of urinal port Kitchen sinks Bath tub Wash basin	I. Fitting of I.W.C with high level cistern. II. Fitting of washbasin. III. Fitting of E.W.C. with low level cistern, IV. Fitting of kitchen sink. V. Fitting of bath tub. VI. Fitting of urinal pot with auto cistern.
23-24	REVISION	
25-26	EXAMINATION	

Third Semester

Semester Code: CNT- 03

Duration :Six months

CONCRETE TECHNOLOGY

Week	Trade theory	Trade Practical
1.	Definitions and terms related to concrete technology Applications of concrete technology and modern trends	
2-7	Types of cement, relevant IS codes comparative study of their physical & chemical properties, significance of different properties <ul style="list-style-type: none"> • Hydration of cement • Selection of cement • Storage of cement • Factors affecting strength of cement • Rejection of cement <u>AGGREGATE</u> <ul style="list-style-type: none"> • Classification (IS : 383) • Grading • Characteristics (grading, fineness modules) • Bulking of fine aggregate • Deleterious substances • Factors affecting strength of concrete <u>WATER</u> <ul style="list-style-type: none"> • Quality • Water requirement for hydration & workability 	<ul style="list-style-type: none"> • Test cement for consistency, setting times & strength • Conduct field tests for adulteration • Make proper arrangement to store cement at site • Perform sieve analysis on aggregate • Determine grading, fineness modulus • Determine presence of silt and clay • Perform test to determine shape & size of aggregate • Perform test to determine bulking of sand <ul style="list-style-type: none"> • Perform test and analyse the effect of water cement ratio (w/c) on strength of cement

	<ul style="list-style-type: none"> • Effect of impurities present in water <u>ADMIXTURE</u> <ul style="list-style-type: none"> • Meaning of terms • Functions • Classification • Water proofing and permeability reducing admixture <u>CONSTRUCTION CHEMICALS</u> <ul style="list-style-type: none"> • Interpretation of specifications manufactures • Meaning of terms • Functions • Classification (IS : 4082) • Water proofing and permeability reducing admixture 	
8-10	<u>Preparation of concrete</u> Methods used, merits and demerits of methods, tools and equipment used and precautions to be taken for the following processes : <ul style="list-style-type: none"> • Batching • Mixing • Transportation • Placing • Compaction • Curing • Finishing • Strength & durability requirements (IS : 456 – 2000) • Stripping of form work • Application of Modern Power Tools 	<ul style="list-style-type: none"> • Prepare concrete and lay at required place using power tools • Carry out all operations taking necessary precautions related to form work and reinforcement • Test strength of concrete • Remove form work properly
11-12	<u>Classification & specifications of concrete</u> Classification of concrete according to grade, weight & methods of mixing Ready mixed concrete, self levelling concrete, nominal mixed and design mixed concrete Properties of concrete Workability & consistency Segregation Bleeding Strength Durability Impermeability Volume stability	<ul style="list-style-type: none"> • Prepare reinforcement for foundation, beams, columns, slabs
13-14	<u>Reinforced cement concrete</u> <ul style="list-style-type: none"> • Definition, purpose and types of reinforcement • Methods and tools used for bar bending • Precautions to be taken Joints: <ul style="list-style-type: none"> - Joints in concrete structure - Quality control of concrete Precast concrete Concrete cracks Points to be observed while supervising concrete	

15	<p>Scaffolding & form work</p> <ul style="list-style-type: none"> • Definitions of common terms • Types & applications • Different materials used in form work • Safety precautions to be observed in scaffolding 	<ul style="list-style-type: none"> • Erect scaffolding & form work using safety measures
16-17	<p>Steps in rate analysis</p> <p>Material</p> <p>Labour</p> <p>Plant and machinery</p> <p>Overhead charges</p> <p>Profit</p> <p>Specification</p> <p>General and detailed specification</p>	<p>Steps in rate analysis</p> <p>Material</p> <p>Labour</p> <p>Plant and machinery</p> <p>Overhead charges</p> <p>Profit</p>
18	<p><u>Form work & bar bending</u></p> <ul style="list-style-type: none"> • Technical terms used in form work & bar bending • Plain cement concrete (PCC) & Reinforced cement concrete (RCC) • Properties of PCC & RCC in green state and hardened state • Importance of form work and reinforcement in construction 	<ul style="list-style-type: none"> • Select appropriate material for form work at different locations • Erect form work at different locations • Identify defects & adjust form work • Remove form work safely
19	<p><u>Form work</u></p> <ul style="list-style-type: none"> • Common terms used and their meanings • Different material used for form work • Techniques of fixing forms at different location • Defects in form work • Deshuttering /removal of forms • Form release agents • Maintenance & repair of form work • Precaution in form work 	<ul style="list-style-type: none"> • Read & interpret a given blue print • Estimate quantity of steel and binding wire required for a given job • Prepare bar bending schedule under the guidance of instructor • Carry out all the operations following guidelines & codes <ul style="list-style-type: none"> • Demonstrate quality standards in all the practices
20	<p><u>Bar bending</u></p> <ul style="list-style-type: none"> • Technical terms & their meanings • Symbols, conventions used in bar bending • Specifications of material • Physical properties of reinforcing bars • Estimate the quantity of material • Structural elements & characteristics (simply supported, continuous, fixed, cantilever, overhang) • Importance of use of reinforcement in concrete • Tools used in bar bending • Correct use of tools • Different operation in bar bending (straightening of bars, cutting of bars, bending of bars, placing of bars, binding of bars, fixing of cover blocks) • Use of relevant BIS codes & tables • Guidelines for laying reinforcement 	<ul style="list-style-type: none"> • Prepare concrete and lay at required place using power tools • Carry out all operations taking necessary precautions related to form work and reinforcement • Test strength of concrete • Remove form work properly <p>Erect scaffolding & form work using safety measures</p>

21-22	<p>Methods used, merits and demerits of methods, tools and equipment used and precautions to be taken for the following processes :</p> <ul style="list-style-type: none"> • Batching • Mixing • Transportation • Placing • Compaction • Curing • Finishing • Strength & durability requirements (IS : 456 – 2000) • Stripping of form work • Application of Modern Power Tools 	<p>Visit to construction site during different stages of work and record observations related to form work, bar bending, column, beam & slab casting</p> <p>Visit to ready mix plant</p>
23-24	REVISION	
25-26	EXAMINATION	

Fourth Semester
Semester Code: CNT- 04
Duration :Six months
Maintenance & management

Week	Trade theory	Trade Practical
1.	<p>Definitions and terms related to concrete technology</p> <p>Applications of concrete technology and modern trends</p>	
2-3	<p>Pile foundation</p> <ul style="list-style-type: none"> • uses of piles • types of piles • materials used in the construction of load bearing piles <p>Factors considered selection of piles</p> <p>Pile driving& equipments used for pile driving</p>	<p>Visit to site when piling is been executed</p>

4	<p>Damp proof course</p> <ul style="list-style-type: none"> • Terms & definitions • Different materials used • Laying damp proof course using different materials • Termite treatment 	<ul style="list-style-type: none"> • Lay damp proof course using different materials and provide termite treatment
5	<p>Plastering & pointing</p> <p>Special materials used in plastering</p> <p>Types of plaster finishes</p> <p>Tools used</p> <p>Defects and remedies of plastering</p>	<p>Prepare surface for plastering</p> <ul style="list-style-type: none"> • Perform plastering operation at different surface • Perform rendering & wall cladding
6-7	<p>Flooring</p> <ul style="list-style-type: none"> • Meaning of terms . • Different material used in flooring . • Different types of flooring . • Tools & instruments for flooring . • Grinding & polishing of floor . 	<p>Market survey for different materials used in flooring</p> <p>site visit to get used to the practical techniques of flooring</p>
8-9	<p>Annual Repair</p> <p>White washing</p> <p>Flooring</p> <p>Replacing of glass</p> <p>Re-polishing of floor</p> <p>Removal of stains from terrace and floor</p>	<p>Perform white washing, floor polishing, stain removal form floor</p>
10-11	<p>Special repair</p> <ul style="list-style-type: none"> • Foundation failure • Strengthening of foundation • Rectification of leaking roof • Repair to expansion joint 	<p>Field Training</p>
12	<p>Anti – termite treatment</p> <ul style="list-style-type: none"> • Pre construction treatment • Post construction treatment 	<p>Market survey for different materials used anti termite treatment and application of the same</p>
13	<p>Plumbing</p> <ul style="list-style-type: none"> • Layout of house plumbing and drainage plan • Tracing leakage, repair to service main, repairing of waste outlet • Cleaning of sanitary installation • Scrapping and painting of pipes 	<p>Visit to new construction site at the time laying of plumbing lines and sanitary fittings</p>
14	<p>Water meter</p> <ul style="list-style-type: none"> • Installation of water meter • Removal of air lock 	<p>Practice and perform in the lab</p>
15	<p>Plastering</p> <ul style="list-style-type: none"> • Special materials used in plastering • Types of plaster finishes 	
16	<p>Adhesive and joint filler</p> <ul style="list-style-type: none"> • Introduction • Types • Adhesive used in timber construction • Adhesives used in ceramic tile fixing • Adhesives used in joining concrete 	<p>Field Training</p>

	<ul style="list-style-type: none"> • Joint filler • Sealing compound 	
17	Construction equipments <ul style="list-style-type: none"> • Classification • Selection of equipments • Sources of equipments 	Field Training
18	Excavation equipment <ul style="list-style-type: none"> • Tractor • Bull dozer • Excavator 	Field Training
19	Hoisting equipment <ul style="list-style-type: none"> • Crane • Pulley • Cable way 	Field Training
20	Conveying equipments <ul style="list-style-type: none"> • Belt conveyor • Rope way • Pumping equipments Drilling equipments <ul style="list-style-type: none"> • Types of drills • Classification of drill • Drill bits • Selection of drilling pattern 	Field Training
21-22	Construction management Management of man materials ,machines with economy	
23-24	Revision	
25-26	Examination	

CIVIL ENGINEERING ASSISTANT

LIST OF TOOLS AND EQUIPEMENTS

(Note: latest configuration to be achieved while procuring all Tools & Equipments)

No. of Unit / Batch : 1 (one)
 Strength : 20 trainees

Furniture for Theory/ Practical

SNo.	Name of the Item	Quantity
1.	Dual Desk	**12 No.
2.	Drawing Boards measuring 1250mm x900mm fixed over adjustable	**20+1Sets

	stand	
3.	Draughtsman stool with back (revolving type)	**24 No.
4.	Students Lockers – with 8 compartments	3 No.
5.	Wooden Chest of Drawers	4 No.
6.	Steel book case (with lockable glass shutters)	1 No.
7.	Instructor’s table with glass top	2 No.
8.	Revolving Chair for Class room	2 No.
9.	Instructor’s revolving with arm chair	2 No.
10.	Visitor’s revolving chair	2 No.
11.	Steel Almirah	2 No.
12.	Magnetic White Board	2 Nos.
13.	Pin-up board (with or without stand)	6 No.
14.	Working table size 1250x950	2nos
15.	Tracing Table with Plain glass 1250x900	1 no

**Numbers may be increased depending on on-roll trainee’s strength and additional unit (if any)

Furniture for CAD Lab

S No.	Name of the Item	Quantity
1.	Personal Computer with LCD monitor & DVD re-writer along with Latest compatible OS	**20 No.
2.	Notebook PC	2 No.
3.	Drafting Software like AutoCAD, or equiv.	**20 No.
4.	Plotter (A0 size)	1 No.
5.	Laser Jet color printer (A4 size)	1 No.
6.	Inkjet/ Laser Jet Printer (A3 size)	1 No.
7.	Color Scanner/printer with Latest Configuration	1 No.
8.	700VA or higher Offline UPS	**20 No.
9.	Computer work station (module type)	**20 Nos.
10.	Printer Table (module type)	1 No.
11.	Operator’s revolving chair	22 No.
12.	Instructor ‘s Lab table	1 No.
13.	Instructor’s revolving chair with arm	3 No.
14.	Book shelf with glass shutters	1 No.
15.	Air conditioner 2.0 tons (split type) for CAD lab	2 No.
16.	LAN connectivity	As per requirement
17.	Internet connection	1 No.
18.	Visualizer	1 No.
19.	Vacuum Cleaner	1 No.

**it may be as per requirement i.e. equal to no of trainees.

Mouse & Keyboard should be treated as Raw Material.

Audio Visual Aids

Sl no.	Name of the item	Quantity
1.	LCD Projector	1 No.
2.	Interactive Board	1 No.

EQUIPMENTS FOR PRACTICAL LABS

<u>FOR BASIC ARCHITECTURE STUDIO</u>		
1	Box drawing instrument one 15 cm compass with pin point, pin point & lengthening bar, one pair spring bows, rotating compass with interchangeable ink and pencil points, drawing pens with plain point & cross point, screw driver and box of leads.	5nos
2	Protractor celluloid 15 cm semi-circular.	5 nos
3	Scale card board-metric set of eight A to H in a box 1:1, 1:2, 1:2: 5, 1:5, 1:10, 1:20, 1:50, 1:100, 1:200, 1:500, 1:1000, 1:2000, 1:1250, 1:6000, 1:38 1/3, 1:66 2/3.	**20 No.
4	Set square transparent 2 mm thick with beveled edges 45 degrees 20 cm.	**20 sets.
5	Set square celluloid 2mm thick beveled edges 60degrees 20cm.	**20 No
6	Drawing Board with facility of parallel bar	**20 No
7	Mini drafter	**20 No
8	Erasing shield small size	5nos
9	Template – Architects and builders	5 nos
10	Pantograph	1no.
11	Geometrical Models (wooden) as per given below	
	(1) Cube 08 mm sides.	2 no.
	(2) Rectangular parallel piped 8 cm x 15 cm.	2 no.
	(3) Sphere 8 cm dia.	2 no.
	(4) Light circular core 8 cm x 15cm vertical height	2 no.
	(5) Square pyramid 8 cm side base and 15 cm vertical height.	2 no.
	(6) Cylinder 8 cm dia. 15 cm height.	2 no.
	(7) Prisms triangular 8 cm side base and 15 cm length.	2 no.
	(8) Prism hexagonal 8 cm sides hexagon and 15 cm length.	2 no.
12	French curves-transparent plastic set of 12.	5nos
13	Flexible curves 80 cm long.	5 nos
14	Calculator (pocket size) 1 (FX)	5nos
15	Proportional dividers 15 cm.	5 nos
16	Stencils-complete set 6 H.	2 sets
17	Print Trimmer cutting edge 100 cm.	1 no.
<u>FOR BASIC BUILDING CONSTRUCTION LAB</u>		
1.	Land measuring steel tape (30 mt long)	10No.
2.	Land measuring plastic tape (30 mt long)	10 No.
3.	Steel taps (3 mt long)	20 No.
4.	Steel taps (5 mt long)	20 No.
5.	Shovel	5 No.

6.	M.S pan 45 cm dia.	10 No.
7.	Farma of mild steel for measuring aggregate (Heaving volume 0.03472 cm)	2 No.
8.	Bucket G.i. 35 cm dia.	5 No.
9.	Mason plumb rule with spirit level	20 No.
10.	Mason square 30x60 cm	20 No.
11.	Sieve for sand in adjustable stand (1mm, 100cm x 60cm fixed in steel frame)	2 No.
12.	Trowel 25 cmx10cm	16
13.	Brick hammer with handle	10 No.
14.	6" pointing Trowel	20 No.
15.	Line pin corner block	20 No.
16.	Mortar board 2 mt x 2 mt.	2 No.
17.	Wire brushes	10 No.
18.	Float wooden	20 No.
19.	Steel float	20 No.
20.	Sprit level 30 cm long	10 No.
21.	Chisel 25 cm long hammer headed	16 Nos.
22.	Bolster	10 No.
23.	Claw hammer	10 No.
24.	Spade	10 No.
25.	Ladder aluminium 3m long	3 Nos.
26.	Pick axe	5 Nos.
27.	Hammer 250 grams	10 Nos.
28.	Crow bar 30mm dia 1.5 m long of mild steel	6 Nos.
29.	Hand hammer 1000 grams.	6 Nos.
30.	Gloves canvas	10 Pair
31.	Gloves plastic	10 Pair
32.	Drums 200 liters capacity	2 Nos.
33.	Mixture machine	1 Nos.
34.	Brush for painting & white washing	As required
<u>FOR BASIC QUANTITY SURVEYING</u>		
1.	Land measuring chain 30 mm with arms.	5 no.
2.	Steel tape 20 meter long.	2 no.
3.	Ranging rods wooden 2m long	20 no.
4.	Optical square PWD pattern.	5 no.
5.	Optical square box type circular	1 no.
6.	Off set rod.	5 no.
7.	Steel tap 5m & 2.5 m.	1 no.
8.	Gunter's chain	1 no.
9.	Engineer's chain	1 no.
10.	Dumpy level builder 25 cm focal length x 23 mm completes with box and accessories and stand.	2 no.

11.	Leveling staff 4 meters reading to 5mm telescopic type.	2 no.
12.	Surveyor's umbrella.	4 no.
13.	Spirit level 30 cm.	2 no.
14.	Spade	2 no.
15.	Hand hammers 1 kg.	2 no.
16.	Pickaxe.	2 no.
17.	Gloves (canvas and plastic)	20 Pair each
18.	Gum boots	20 Pair
19.	Chains	3 sets
20.	Prismatic compass	3 sets
21.	Plane tables	3 sets
22.	Auto level	3 sets
23.	Theodolites	3 sets
24.	Total station	2 sets
<u>FOR BASIC CARPENTRY LAB</u>		
1	Flexible tape role steel (3 meter)	20 No.
2	Try Square (20 mm)	20 No.
3	Square bevel	20 No.
4	Marking Gauge (Wooden)	20 No.
5	Hand Saw 450 mm	20 No.
6	Saw tenon 300 mm	20 No.
7	Jack plane metal 335 mm X 50 mm cutter	20 No.
8	Plane smoothing metal 250 mm X 50 mm cutter	20 No.
9	Chisel firmer (bevel edge) 6, 10, 15, 20, 25mm with (5 nos.)	20 No.
10	Chisel mort ice 6,10,15, (3nos)	20 No.
11	Screw driver (300 mm)	20 No.
12	Wooden mallet (medium size)	20 No.
13	Hammer claw (500gms)	20 No.
14	Carborandom stone (200x 50x 25mm)	20 No.
15	Hand brush for bench cleaning (400mm)	20 No.
16	Screw Driver 250 mm	5 No.
17	Pincer 50mm	5 No.
18	File Half Round 2nd Cut 250mm	10 No.
19	File half wood rasp bastard 300mm	10 No.
20	File slim taper 100 mm	10 No.
21	Card File (Steel) wire brush for file	10 No.
22	Electrically operated motorized cutter	5 No.
23	Boring tools	1 set
24	Fastenings	1 set
25	Hinges and locks	1 set each
<u>FOR BASIC PLUMBING LAB</u>		
1	Rules steel 300 mm both in inch and mm	21 No.

2	Hacksaw frame adjustable for 250 to 300 mm	21 No.
3	Chisel cold flat 20 x 250 mm	21 No.
4	Hammer ball peen 800 gms.	21 No.
5	File flat rough 300 mm	21 No.
6	Level spirit wooden 300 mm	21 No.
7	Plumb bob 50 gms.	21 No.
8	Stilson wrench 200 & 350 mm	21 No.
9	Screw Driver 250 mm.	21 No.
10	Wooden mallet small	21 No.
11	Cutting pliers	21 No.
12	Steel tape	21 No.
13	Chisel cold flat 20 mm x 300 mm	2 Nos.
14	Tap and die set to cut BSP Thread	1 set.
15	Spanner monkey up to 50 mm	2 Nos.
16	Cutter, pipe wheel type 6 mm to 25 mm.	1 No.
17	Inside caliper 150 mm	5 Nos.
18	Caliper outside 150 mm	5 Nos.
19	Plumbers ladle	2 Nos.
20	Plumbers metal melting pot 10 kg.	1 No.
21	Pipe vice to grip pipes up to 77 mm.	2 Nos.
22	Tool caulking set of 2	2 Sets
23	Stillson pattern pipe wrenches 450 mm to take pipe up to 52 mm dia.	2 sets
24	Stillson pattern pipe wrenches 300 mm to take pipe to 20 mm to 32 mm.	2 sets
25	Chain pipe wrenches 90 mm-650 mm	2 sets
26	Adjustable spanner A 375	2 Nos.
27	Flat Smithy tong.	2 Nos.
28	Working Bench 2400x 1200 x 750 mm	2 Nos.
29	Ratchet rack with post and clamp flat 5 drill 6 to 35 mm by 0.2 mm.	1 Set
30	Ratchet pipe die 15 mm to 32 mm	2 No.
31	Double face hammers	5 Nos.
32	Monkey Plier (gas pliers)	5 Nos.
33	Electric handling machine 6 to 35 mm by 0.2 mm. for drilling	1 No.
34	Trowel 125	2 Nos.
35	Saw plumber 300 mm	2 Nos.

FOR BASIC ELECTRICAL LAB

1.	Rule wooden 4 fold 60 mm	20 No.
2.	Scriber 150 mm (Knurled Centre position)	20 No.
3.	Pincer 150 mm	20 No.
4.	Plier insulated 150 mm	20 No.
5.	Screw driver 150 mm	20 No.
6.	Punch Centre 150 mmx 9 mm	20 No.
7.	Knife double bladed electrician	20 No.
8.	Hammer, cross pane 115 grams with handle	20 No.

9.	Electrician connector, screw driver 100 mm. Insulated handle thin stem	20 No.
10.	Electrician testing pencil I I neon Tester	20 No.
11.	Heavy duty screw driver 200 mm	20 No.
12.	Electrician screw driver 250 mm thin stem insulated handle	20 No.
13.	Rule steel 300 mm	20 No.
14.	Saw tenon 250 mm	20 No.
15.	Hammer ball pane 0.75 kg with handle	20 No.
16.	Firmer chisel wood 12 mm	20 No.
17.	Gimlet 6 mm	20 No.
18.	Bradawl	20 No.
19.	Plier sued cutting 150 mm	20 No.
20.	C. Clamps 200 mm, 150 mm, 100 mm	2 No.
21.	Spanner 150 mm adjustable 15 degree as cly-burns	2 No.
22.	Blow lamp 0.5 liter	2 No.
23.	Melting pot	1 No.
24.	Ladder	2 No.
25.	Chisel cold flat 12 mmx 200 mm	2 No.
26.	Chisel firmer 25 mm and 6 mm	4 No.
27.	Drill machine hand 0 to 6 mm capacity	2 No.
28.	Electric drill machine 12 mm capacity	1 No.
29.	Out side micrometer 0 to 25 mm	1 No.
30.	Bench grinder motorized	1 No.
31.	Raw plug tool and bit	2 No.
32.	Bearing puller	1 No.
33.	Multi meter 0 to 1000 M ohms 2.5 to 5000 volt	2 No.
34.	K.W. meter 0 to 1 K.W. capacity with C.T.1: 2.	1 No.
35.	Milli voltmeter Centre zero 100-0-100m volt.	1 No.
36.	Spring balance 0 to 15 kg. And 0 to 2.5 kg.	2 No.
37.	Stop watch	1 No.
38.	Screw driver 100 mm	5 No.
39.	Square try 150mm blade	5 No.
40.	Divider 150 mm, out side and inside caliper.	4 No.
41.	Tweezers 100 mm.	5 No.
42.	Snip straight 150 mm	2 No.
43.	File flat 200 mm 2 nd cut	3 No.
44.	File half round 200 mm 2 nd cut	5 No.
45.	File half round 200 mm smooth	5 No.
46.	File round 200 mm 2 nd cut	5 No.
47.	File flat 250 mm rough	5 No.
48.	File flat 250 mm bastard	5 No.
49.	Rasp, half round 200 bastard	5 No.
50.	Iron, soldering 225 grams 125 watt with bits	5 No.
51.	Vice hand 50mm jaw	5 No.
52.	Megger 500 volts	1 No.
53.	Fan A.C. 230 volt 1200 mm	2 No.

54.	Fan D.C. 220 volt 1200 mm	2 No.
55.	Bench working 2.5x 1.20x 0.75 meters	5 No.
56.	Almirah 2.5x1.20x0.50 meter	1 No.
57.	Metal rack 180x150x47 cm.	5 No.
58.	Wire stripper 20 cm.	1 No.
59.	Domestic appliances: (a) Electric hot plate 1500 watt. 220v with temperature control.	2 No.
60.	(b) Electric kettle, 1000 watts, 230v	2 No
61.	(c) Electric iron 1200 watts, 230v with temperature control.	2 No
62.	(d) Immersion heater 750/1000/1500w-230v	2 No
63.	(e) Geyser 25 liter 240v (storage type)	2 No
64.	(f) B.A. taps and dies 0-2-4-6-8 sizes	2 No
65.	(g) Mixture grinder	2 No
66.	Spring balance 0 –1 kg.	1 No.
67.	Motor A.C. series type 230 v, 50 cycles, ¼ HP with starter and switch	1 No.
68.	Scientific calculator	2 Nos.
69.	Multi meter digital	10 Nos.
70.	Motor AC single phase 230 volt, 50 cycles capacitor type with starter switch 1 HP	1 No.
71.	Motor universal 230 volt, 50 cycles with starter/switch 1 HP	1 No.
72.	Variable auto transformer 0-250 V, amps	2 No.
73.	Earth leakage ckt. Breaker	1 no.
74.	M.C.B. 5 KVA	1 no.
75.	Voltage stabilizer manual and automatic	1 no. Each
76.	Multi meter	3 sets
77.	Meger	2 sets
78.	Earth tester	2 sets
79.	Electric tool kit	4 sets
80.	Multi meter	3 sets
81.	Meger	2 sets
<u>FOR FORMWORK & BAR BENDING</u>		
1	Measuring tape 15 mtr. (steel)	4
2	Measuring tape 3 mtr. (steel)	4
3	Try square	4
4	Bevel	4
5	Marking point	4
6	Tenon saw, dovetail saw	4 each
7	Chiesel (different suitable sizes)	4 sets
8	Hammer 500 gm.	4
9	Hammer 1 kg.	4
10	Hammer 5 kg.	4
11	Bar bending table	2
12	Bending pipes (suitable diameter and length)	2 each
13	Bar bending lever (suitable diameter and length)	2 sets
14	Manual bar bending machine of suitable size	2
15	Portable hand bender of suitable size	2
16	Power cutter of suitable size	2
17	Repair tools	2 sets

18	Safety gloves	8 pairs
19	Safety glass	8 pairs
<u>FOR CONCRETE TECHNOLOGY</u>		
1	Steel taps (3 meter)	16
2	Steel taps (15 meter)	8
3	Steel taps (30 meter)	4
4	Masons square 300 x 600	8
5	Marking rope & thread (15 m)	64 each
6	Bevel	8
7	Shovel	16
8	Pan (M.S. or PVC)	16
9	Mortar board (2000 x 2000)	2
10	Measuring box (35 ltr. Capacity)	4
11	Plumb rule and Bob	8
12	Spirit level	8
13	Straight edge	8
14	Water tube (6 m)	8
15	Bucket (5 ltr. & 10 lrt.)	8 each
16	Trowel (required shape & sizes)	8 set
17	Concrete mixer	2
18	Concrete vibrator (pin type & plate type)	2 each
19	Water drum 200 ltr.	4
20	Bar bending table	4
21	Bending pipes (suitable dia & length)	2 each
22	Bar bending lever (suitable size & length)	2each
23	Bar bending machine	2
24	Power cutter	2
25	Mono block pump set (1/2 HP)	4 Nos.
26	Steel / plywood shuttering plates	50 sqm.
27	Telescopic pipes / props	100
28	Telescopic/ adjustable spans	25
29	Masonry grinder	2
30	Scientific calculator	16
31	Personal computer with advance configuration and required software	10
32	Gloves (canvas and plastic)	16 Pair each
33	Gum boots	16 Pair
34	90 micron is sieve	2 set
35	Weighing balance 1 kg., 10 kg. Digital	2 each
36	Bristle brush (25 & 40 mm with 250 handle)	2 each
37	Vicat apparatus with plunger, needles and mould	2 set
38	Stop watch	8
39	Cube mould (70.5 mm size)	24
40	Gauging trowel	4
41	Digital compression testing machine	1
42	Cube mould (150 mm size)	24
43	Measuring cylinder 100 ml., 500 m., 1000 ml.	4 each
44	Non porous plate	16
45	Water container (1000 ltr.)	1

46	Vibrating machine (12000 ± 400 rpm)	1
47	Indian standard test sieve	2 set
48	Graduated cylinder	8
49	Metal tray	8
50	Steel rules	8
51	Beaker	8
52	Oven	1
53	Weighing platform (100 kg.) digital	1
54	Slump test apparatus with temping rod	2 set
55	Electronic balance (30kg) – 1gram L.C	1
56	IS Brass sieves -4.75mm,2.36mm, 1.18mm, 600micron, 300 micron, 150 micron, 90 micron, 75 micron, 45micron, pan and cover	1 each
57	Motorised sieve shaker	1
58	Thickness and length gauges (Elongation and Flakiness Index)	1 each
59	Pyconometer for specific gravity	2
60	Bulk density apparatus (Cylindrical measure for fine aggregate and coarse aggregate)	1
61	Aggregate impact tester with cylindrical cup and measuring cylinder	1
62	Sample tray- steel and plastic (300x250x40mm)	10 each
63	Sampling scoops (2kg and 5 kg)	5 each
64	Cube mould (70.5mm size)	10
65	Mortar cube vibrator- 12000±400rpm	1
66	Standard IS sand (Grade 1, Grade 2, Grade 3)	2 bags each
67	Water testing kit – for ph value	2
68	Tile cutter	4
69	Masonry grinder	2
70	Electric heater	1
71	Le Chatelier Mould (for soundness test of cement)	1
72	Le Chateliers flask (For specific gravity test of cement)	1
	<u>For Construction Equipments & Maintenance Of Buildings</u>	
1	Steel taps (3 meter)	16
2	Steel taps (15 meter)	8
3	Masons square 300 x 600	8
4	Marking rope & thread (15 m)	64 each
5	Shovel	16
6	Pan (M.S. or PVC)	16
7	Mortar board (2000 x 2000)	2
8	Plumb rule and Bob	8
9	Spirit level	8
10	Straight edge	8
11	Water tube (6 m)	8
12	Bucket (5 ltr. & 10 lrt.)	8 each
13	Trowel (required shape & sizes)	8 set
14	Water drum 200 ltr.	1
15	Power cutter	2
16	Masonry grinder	2
17	Scientific calculator	16
18	Personal computer with advance configuration and required software	10

19	Gloves (canvas and plastic)	16 Pair each
20	Gum boots	16 Pair
21	Weighing balance 1 kg., 10 kg. Digital	1 each
22	Bristle brush (25 & 40 mm with 250 handle)	2 each
23	Gauging trowel	4
24	Metal tray	8
25	Steel rules	8
26	Beaker	8
27	Sampling scoops (2kg and 5 kg)	3 each
28	Tile cutter	4
29	Drill and bit set	3 each
30	Spray painting machine	1
31	Brushes for painting	10 each
32	Floor polishing machine	1
33	Spanner monkey up to 50 mm	10
34	Stillson pattern pipe wrenches 450 mm to take pipe up to 52 mm dia.	2
35	Adjustable spanner A 375	10
36	Double face hammers	10
37	Screw driver Set	10
<u>For Modern Construction Techniques & Management</u>		
1	Steel taps (3 meter)	16
2	Steel taps (15 meter)	8
3	Steel taps (30 meter)	4
4	Masons square 300 x 600	8
5	Marking rope & thread (15 m)	64 each
6	Bevel	8
7	Shovel	16
8	Pan (M.S. or PVC)	16
9	Mortar board (2000 x 2000)	2
10	Measuring box (35 ltr. Capacity)	4
11	Plumb rule and Bob	8
12	Spirit level	8
13	Straight edge	8
14	Water tube (6 m)	8
15	Bucket (5 ltr. & 10 lrt.)	8 each
16	Trowel (required shape & sizes)	8 set
17	Concrete mixer	2
18	Concrete vibrator (pin type & plate type)	2 each
19	Water drum 200 ltr.	4
20	Hammer (different required shape and weight)	4 each
21	Brick hammer	4

22	Gauging trowel	8
23	Floats (wooden)	8
24	Wire brushes	8
25	Chisel (required shape & sizes)	8 set
26	Ladder (3m)	8
27	Aluminum float	8
28	Tile cutter (hand operated)	4
29	Power operated cutting machine	4
30	Wooden mallet	8
31	Polishing machine	1
32	Polishing stone (different grade / number)	8 set
33	Bar bending table	4
34	Bending pipes (suitable dia & length)	2 each
35	Bar bending lever (suitable size & length)	2each
36	Bar bending machine	2
37	Power cutter	2
38	Mono block pump set (1/2 HP)	4 Nos.
39	Steel / plywood shuttering plates	50 sqm.
40	Telescopic pipes / props	100
41	Telescopic/ adjustable spans	25
42	Masonry grinder	2
43	Scientific calculator	16