

### DRAFT Syllabus For Construction Site Supervisor

<b>Course Name</b>	Construction Site Supervisor
<b>Course Code</b>	STC-CON/CSSU/0808
<b>Occupation</b>	Construction Site Supervisor
<b>Job Description</b>	1. Construction of surface drain/culvert/boundary wall. 2. Construction, renovation or repairing of room/small building. 3. Construction of toilet with septic tank/rural latrine. 4. Construction of road/footpath or repairing of road. 5. In plant training in factory/work shop/ manufacturing of construction material such as steel fabrication, brick manufacturing, precast articles, furniture, sanitary ware etc. 6. Any construction of renovation work of municipality/ Corporation/Panchayat.
<b>Anticipated Volume of Training</b>	1200 Hrs (Theory- 200 Hrs + Practical- 610 Hrs, Employability Skill – 90 Hrs, OJT: 300 Hrs.)
<b>Trainees' Entry Qualification</b>	Class 8 Pass + ITI (2 Yrs) with 2 years experience, OR Class 10 Pass + ITI (1Yr) after class 10 with 1 year experience, OR Class 10 Pass + ITI (2 yrs) after class 10, OR Class 10 Pass with 2 years experience, OR Class 10 Pass and pursuing continuous regular schooling, OR 3 years diploma after class 10 or Class 12 Pass with 6 months experience, OR Previous Relevant Qualification of NSQF Level 3 with 2 yrs experience.
<b>Trainers Qualification</b>	BE/B.Tech in Civil Engineering / Construction Engineering with 2 Yrs experience OR Diploma in Civil Engineering with 4 Yrs experience. OR ITI in Mason Trade in Building construction with 5 Yrs experience.

#### Structure of Course:

Module No.	Outcome	Theory (Hrs)	Practical (Hrs)	Total (Hrs)
Student will be able to				
1	Use of various Engineering Drawing Instruments and Draw cross sectional plan, elevation, Side view of various Civil Engineering Structure.	10	30	40
2	Determine the quality of various Building Construction materials and make a Judgment on the quality of the same.	22	70	92
3	Take a decision or Judgment on applying proper method or Technology on construction of various components of Civil Engineering structure.	80	244	324
4	Identify different construction machineries and describe their applications	10	25	35
5	Make a list of various water supply and sanitary fittings required for Plumbing Works and install them in proper place of Building.	20	60	80
6	Estimate & prepare cost-sheet for a building as per Government rate.	32	96	128
7	Take measurement of works and prepare running and final bills.	6	25	31

Module No.	Outcome	Theory (Hrs)	Practical (Hrs)	Total (Hrs)
8	Perform Field survey by different methods and prepare map.	20	60	80
TOTAL:		200	610	810

**Employability Skill – 90 Hrs,  
OJT: 300 Hrs.**

## **SYLLABUS:**

### **Module No. 1: Basic Engineering Drawing**

#### **Outcome:**

Use of various Engineering Drawing Instruments and Draw cross sectional plan, elevation, Side view of various Civil Engineering Structure.

#### **Theory Content:**

1.1 Importance of B.I.S., Layout of drawing, Types of Lines, Use of Lines. Lettering, Dimensioning. Knowledge of different types of scales – Plain, comparative, diagonal, vernier, Principle of R.F.

#### **Practical Content:**

Symbols & conventional representation for materials as per SP-46 2003 for building drawings.  
Line, Lettering, Dimensioning, and Scale – Plain, Comparative, Diagonal, Vernier.  
Construction of plain geometrical figures.  
Drawing of Three views in Orthographic Projection of Line, Plane, Solid objects & section of solids.  
Isometric Projection of Geometrical solids.

### **Module No. 2: Construction materials**

#### **Outcome:**

Determine the quality of various Building Construction materials and make a Judgment on the quality of the same.

#### **Theory Content:**

- 2.1 Bricks:** Composition of brick earth, Characteristics of good bricks, classification of bricks, specific uses, size, weight, strength of traditional and modular bricks. Special bricks – fly ash bricks, hollow bricks, Acid resistant bricks, fire clay bricks, Refractory bricks.
- 2.2 Tiles:** Roofing tiles – Types, uses. Floor Tiles
- 2.3 Cement:** Characteristics, ingredients, types, uses and test of good cement.
- 2.4 Sand:** Types and their uses, characteristics of good sand, bulking of sand
- 2.5 Timber:** Types, structure, disease & defects, characteristics of good timber, Decay of timber, Preservation of timber, seasoning of timber, Uses, alternative material to Timber.
- 2.6 Metal:** Mild Steel, HYSD and high tensile strength steel(TMT)
- 2.7 Paints and Varnishes:** Characteristics of good paint oil bound paint, types of paints, uses, method of applying paint, Varnishes – composition, uses, cement based paints, distemper.
- 2.8 Tar and Bitumen –** Properties, types, application & uses.

#### **Practical Content:**

Testing of Bricks: Size, shape, colour, hardness density, water absorption quality, test of compressive strength of bricks.

Use of Floor Tiles

Test of Cement: Fineness and soundness test of cement (sieve test and Le chatelier test), Test for normal consistency and initial setting time of cement. Test of compressive strength of cement and mortar.

Test of Sand: Determination of unit weight, bulking factor, and percentage voids in sand, sieve analysis and determination of fineness modulus of sand.

Sieve analysis and determination of fineness modulus of coarse aggregates of concrete.

Draw structure of a good timber. Measure size of timber.

Measure unit weight, length and dia. of Steel Bar

Prepare for application of white washing, colour washing, distempering and cement based paints in wall surface.

Prepare for application of Tar and Bitumen in surface.

### **Module No. 3: Construction Technology**

#### **Outcome:**

Take a decision or Judgment on applying proper method or Technology on construction of various components of Civil Engineering structure.

#### **Theory Content:**

**3.1 Foundation:** Concept and object of foundation, different types of shallow and deep foundation, causes of failure of foundation, dead and live load, bearing capacity of soil, construction of foundation – setting out plan-excavation of foundation-filing of foundation trenches and plinth, simple machine foundation.

**3.2 Brick Masonry:** General principles to be observed in brick masonry construction, bonds in brick work, different types of bonding – uses, mortar used in brick masonry.

**3.3 Damp Proofing and Water proofing:** Causes and effect of dampness, prevention of dampness, materials used for damp proofing, damp proofing treatment for basement, plinth, roofs, water proofing treatment for roofs. Anti-termite treatment – objectives and materials required.

#### **3.4 Concrete:**

Coarse & fine aggregates, characteristics of good quality coarse and fine aggregates, sizes, grading and fineness modulus, water cement ratio- its effect on strength of concrete-slump of concrete-strength of concrete, mixing of concrete-hand mixing, machine mixing, transportation, laying and compaction of concrete, curing of concrete, types of concrete-plain or ordinary concrete,

Reinforce cement concrete (R.C.C.) – Reinforcement, nominal mix proportion, grades of concrete.

**3.5 Form work:** Scaffolding and staging – Materials used, requirement of good form work-types and removal of form work.

**3.6 Flooring:** Object, materials used, types –construction details of artificial stone floor, Terrazzo or Mosaic floor, Marble floor, Tiles floor.

**3.7 Plastering:** Types, Pointing mortar used for plaster, preparation of surface and application of plaster.

**3.8 Stairs:** Terms, requirements, Planning and designing of stair and details of construction. Basic concept of lift and Escalator.

**3.9 Building Planning:** Economy & orientation. Provision for lighting and ventilation. Provision for drainage and sanitation. Type of building. Planning and designing of residential building.

**3.10 Doors & Windows:** Doors: Parts, location, standard sizes, types. Windows: Parts, location, standard sizes, types. Different types of doors including panelled, glazed and flush door. Different types of windows and ventilators.

**3.11 Culvert & Bridge:** Introduction of Culvert & Bridge. Classification of culverts, Component parts of culvert.

**3.12 Reinforced cement concrete structure:**  
Introduction to RCC uses.

Materials – proportions,

Formwork

\* Bar bending schedule of R.C.C. beam, lintel, chajja, one way slab, column, column footing, and calculation of quantity of shuttering works.

### **Practical Content:**

**Drawing of Foundation :** Drawing of different types of foundation –

Shallow – Spread Footing, Grillage foundation

Deep – Pile foundation, Raft foundation, Well foundation, Special foundation.

**Practical Training on Brick Masonry** – Preparation of cement sand mortar, Brick bonding – English bond, Flemish bond – 5” thick, 8” thick, 10” thick wall, corner, pillar, tee junction, brick soling – Diagonal bond, Zig-Zag bond.

Prepare for application Damp proofing in different position of structure.

**Practical work of Concreting:** Preparation of mix as per proportion & water cement ratio, mixing, laying, compacting & curing of concrete.

Standard slump test for concrete. Determination of compressive strength of cement concrete cube.

**Practical training work:** Preparation of cutting, bending, binding of reinforcements for R.C.C. Chajja, Lintel, beam, slab, column with column footing.

**Practical Training on Carpentry** – Use of carpenter’s tools for cutting & shaping, preparation of journey – Dovetail joint, Tenon & Mortise Joint, use of fittings for doors & windows.

Different types of floor finishing, sequence of construction.

Prepare mortar for application of plastering and pointing in a small wall surface.

Draw different types of R.C.C. stair – open newel, dog-legged, geometrical and bifurcated stairs.

**Building Drawing (Residential):** Prepare Plan, elevation and sectional details of two storied residential building with load bearing & R.C.C. framed structure.

Draw Front elevation, sectional plan, sectional side elevation and details of joints of panelled door and  $\frac{1}{3}^{\text{rd}}$  glazed  $\frac{2}{3}^{\text{rd}}$  panelled window.

**Culvert drawing:** Prepare Plan, elevation and cross section of slab culvert showing abutment wall, wing wall, curtain wall, parapet wall, wheel guard.

### **Drawing details of R.C.C members with reinforcement :**

i) Longitudinal section and two cross section of R.C.C. continuous beam over columns.

ii) Longitudinal section and cross section of R.C.C. Lintel with chajja.

iii) Plan, sectional elevations of R.C.C. one way slab and two way slab.

iv) Plan and section of R.C.C. column and column footing.

v) Cross section of R.C.C. dog legged stair flight.

## **Module No. 4: Construction Machineries**

### **Outcome:**

Identify different construction machineries and describe their applications

### **Theory Content:**

**4.1 Construction Machineries:** Different machineries, tools & plants used in construction site, identification & specific use, concrete mixer-types-capacity-working principle, Vibrators-types-working principles, floor grinding machines, pumps.

### **Practical Content:**

Follow how to use of concrete mixer, vibrator, floor grinding machines, pumps etc. in construction field.

## **Module No. 5: Plumbing and Sanitary**

### **Outcome:**

Make a list of various water supply and sanitary fittings required for Plumbing Works and install them in proper place of Building.

### **Theory Content:**

**5.1 Plumbing and Sanitary:** Types of pipes used in water supply – joints-system of water connection to houses, Appurtenances for house connection – ferrule, bibcock, stop cock, sluice valve, air valve, reflux valve – function. Types of sewer-their joints, Appurtenances-cistern, wash basin, plumbing system of drainage.

5.2 Hand Tube well – ordinary, DWP fitted – sketches-different parts-boring of tube wells.

5.3 Septic tank-sizes, sketches, soak pit.

### **Practical Content:**

#### **Practical Training on Plumbing & Sanitary work –**

Pipe threading, joining connection with socket, bend, Tee, Stop cock, Bibcock, Valves, connection of Sink, Wash Basin, Shower, Sewer Pipe Laying, jointing, connection of W.C. Pan to sewer line/ Septic Tank.

## **Module No. 6: Estimating and Costing**

### **Outcome:**

Estimate & prepare cost-sheet for a building as per Government rate.

### **Theory Content:**

#### **Estimating and Costing:**

6.1 Introduction, purpose and common techniques, rough cost estimate, detailed estimate, Plinth area and cubic rate estimate, different item of works, unit of measurement.

6.2 Detailed estimate, centre line method, long wall-short wall method, calculation of quantities of different items of works of boundary wall, surface drain, single room, double room, single storied residential building with load bearing wall and R.C.C. column structure.

6.3 Calculation of quantity of materials required for different items of works. Preparation of rate analysis, Rate analysis of typical items and their specification - Earth work in excavation, Brick flat soling, Plain Cement concrete(1:3:6), R.C.C. works(1:1.5:3), Brick work in cement mortar(1:6), Brick work for half brick thick wall with cement mortar(1:4), D.P.C.(1:1.5:3), Plastering work(1:6), Artificial stone flooring(1:2:4), Mosaic flooring, wood work for door and windows.

6.4 Govt. schedule of rate.

### **Practical Content:**

\* Earth work calculation for Road, Canal, tank by Mid-section formula, Trapezoidal formula, Prismoidal formula.

\* Calculation of quantities of different items of works for water bound macadam road, brick pavement, and simple type box culvert.

\* Quantity and cost calculation of ordinary and D.W.P. fitted hand tube well, septic tank for 20 users.

\* Preparation detailed estimate and abstract of estimated cost with local govt. rate of single storied

building with load bearing wall and with RCC column structure.

## **Module No. 7: Construction Management**

### **Outcome:**

Take measurement of works and prepare running and final bills.

### **Theory Content:**

#### **Construction Management:**

7.1 Site Management and accounts – Maintaining bill, Vouchers, challans Files, Register, Stock book, Indent and issue of materials, Engagement and payment of labour & labour rules.

### **Practical Content:**

Prepare a bill, vouchers, challans, maintain Files, Register, Stock book, Indent and issue of materials & Labour payment register.

## **Module No. 8: Field Surveying**

### **Outcome:**

Perform Field survey by different methods and prepare map.

### **Theory Content:**

#### **Field Surveying:**

8.1 Basic knowledge about surveying –Measurements units by chain, tape, scales measurement of distances, areas, setting out right angles a ground with tapes, Laying out of building and structures.

8.2 Chain Survey: Introduction. History and principles, Equipment and instrument used to perform surveying. Use care maintenance and common terms. Classification, accuracy, types, main divisions (plane & geodetic), chaining, speed in field and office work. Knowledge of Mouza map.

8.3 Compass Survey :

Instrument and its setting up. Bearing and each included angle of close traverse, local attraction, Magnetic declination and its true bearing, precaution in using prismatic compass.

8.4 Plane Table Survey:

Instrument used in plane table survey, care and maintenance of plane table.

8.5 Levelling: Auto level, dumpy level, tilting level – Introduction, definition. Principle of levelling, Levelling stuffs, its graduation & types, minimum equipment required, types, component/pat and function, Temporary and permanent adjustment, procedure in setting up. Level & horizontal surface, Datum, Benchmark, focussing & parallax, deduction of level/reduced level. Types of levelling.

### **Practical Content:**

Chain Surveying: Prepare a small plot of land including entry in field book and drawing from field data, practice for ranging a line, taking offsets, chaining a line across obstacles.

Compass Survey: Study of Prismatic compass, setting the compass and measuring bearing of lines, dimension of angle between two lines.

Plane Table Survey: Setting out of Plane table, Centering, Levelling and orientation of plane table. Plane table surveying of a small area including fixing (by radiation) in details.

Levelling: Idea of level instrument, setting of dumpy level instrument, taking reading, calculation of reduced level of different points. Entry of reading in level book. Fixing of plinth level, foundation level at site.

**List of Tools, Equipment & materials needed for 30 Trainees:**

<b>Sl No</b>	<b>Items with description</b>	<b>Qty</b>
1.	Box Drawing Instrument, scale card board, set square celluloid, T-Square	15 nos each
2.	Drawing board of A <sub>1</sub> size	30 nos
3.	Geometric Model (Wooden / Plastic) – Cube 8cm sides, rectangular parallel piped 8cm x 15 cm, Sphere 8cm dia, Right circular Cone 8cm dia base and 15 cm vertical height, square pyramid 8cm side base and 15cm vertical height, Traingular prism of 8cm side, cylinder of 8cm dia and 15 cm height.	1 no each
4.	Consumables Materials:	
	Traditional bricks	100nos
	Floor Tiles (2ft x 2ft)	1 packet
	Sand	5 cft
	Stone Chips (20mm nominal sizes)	5 cft
	Hollow bricks	10 nos
	Refractory bricks	10 nos
	Sample of Tor Steel and TMT bar of 1m length of different diameter	1 no each
	Cement	2 bags
5.	Digital weighing machine 1gm sensitivity	2 nos
6.	Digital weighing machine 0.01gm sensitivity	2 nos
7.	Brass sieve of 200 mm dia and 90 micron size	4 nos
8.	Le-chatelier apparatus with water bath	4 nos
9.	Vicat apparatus	3 nos
10.	Compressive strength testing machine of 3000 KN capacity	1 no
11.	7.5 cm mortar cube	6 nos
12.	15 cm cement concrete cube	6 nos
13.	Laboratory concrete mixer 55 litre capacity	1 no
14.	Pipe thread cutting equipment	1 no
15.	PVC Pipe of 1", 1.5" dia of 1m length	1 no each
16.	Socket, bend, T, Stop cock, Bib cock, Gate valve	1 no each
17.	Sink, wash Basin, Shower, WC Pan	1 no each
18.	Stoneware Sewer Pipe 3" dia, 1 meter length	1 no
19.	GI Sieve 300mm diameter consists of aperture size – a) 40 mm, b) 20mm, c) 10mm, d) 4.75 mm	2 sets
20.	Brass Sieve 200mm diameter consists of aperture size – a) 4.75 mm, b) 2.36mm, c) 1.18mm, d) 600 micron, e) 300 micron, f) 150 micron, g) 75 micron	2 sets
21.	Measuring Cylinder (Borosil) – a) 1 litre, b) 500ml, c) 200ml	5 nos each