MES COURSE MODULES
In

CONSTRUCTION SECTOR

3D ADVANCED DESIGNER Using PROE (CONSTRUCTION)

Under
MODULAR EMPLOYABLE SKILLS (MES)

Redesigned in
2014

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

PREFACE

Good qualities are considered to be the backbone of any kind of development in any country. And, development is always, a continuous process. Hence, there are vast opportunities for 3D Advanced Designed ProE in getting employment. The trainees who successfully complete this Module, which is of 500 hours' duration, can independently 3D designed of details / features of construction.

GENERAL INFORMATION

Name of Sector	Construction
Name of Module	3D ADVANCED DESIGNER Using PROE
MES Code	CON701
Qualification Pack Code	
Competency as per NCO Code	
Duration of Course	500 Hrs
Entry Qualification of Trainee	10th Std.
Age	18 years & above
Unit Size	20
Power Norms	2 KW
Space Norms	60 sqm
Job Role	• Do the work on Mechanical 3D Advanced Modeling & Assembly. • Apply this knowledge to understand the engineering in the Assembly and Analysis in Manufacturing Industry

Instructor's Qualification	3 years Diploma in Civil Engg.
Desirable Qualification	CITS

Course Contents for the Module of
3D ADVANCED DESIGNER Using PROE

PRACTICAL	THEORY
Basic Part design using pro-E	Theory related for the same.
Creating Sweep feature With Select Traj option With Sketching a Trajectory aligned to an Existing Geometry	1) Trajectory
Creating thin sweep protrusion Creating a sweep cut	Sl.no.1) Theory related to sweeping
Blend feature Parallel with straight and smooth option Rotational Blend with open and closed option Using blend vertex	Theory related to blend and about transition between sections
Shell option with constant and variable thickness	Theory related to shell and hollow sections
Datum curves Through points, with spine , with single radius, with multiple radius, single point, whole array, From equations	Mathematics / Theory behind the creation of the curves
Creating datum curves by sketching	Mathematics / Theory behind the creation of the curves
Creating draft feature Variable angle draft	Intersecting of features
Creating feature using the variable section sweep	Intersection between the solids and surfaces
Create features using swept blend option	Theory required for sweeping and blending since this is a combination of both
Create features using helical sweep option	Applications like springs and terms like coil dia, pitch etc
Create features using Section to Surface option	Intersection of surfaces
Create features using Surface to Surface option	Intersection of surfaces
Create features using from file option	Intersection of surfaces
Create features using toroidal bend option	Features with curved surfaces
Create spinal bend option	Repositioning cross sections along the curve(spine)
Create wrap transformation by using transformation tools.	Advanced modeling concepts
Creating assemblies using top down approach	Top down assembly approach
Creating assemblies using bottom up approach	Bottom up assembly approach

Creating components in the assembly mode	Part modeling
Inserting components in the assembly	Co-ordinate system
Placing components using constraints	aligning
Packaging Components	Assembly datum planes
Use the view manager	Part modeling
Edit assembly constraints after assembling	Part modeling
Modify components of the assembly with in the assembly	Part modeling
Create the exploded state of the assembly	Part modeling
Add offset lines to exploded components	Part modeling
Understand the Bill of materials in the assembly	About the product

Tools and Equipment:

1. Hardware: 20 workstations of suitable configuration
2. Software: 20 licenses of 3D software

ASSI STANT " SHUTTERING CARPENTER & SCAFFOLDER"

Name : **Assistant Shuttering Carpenter & Scaffolder Sector**
Course Code : CON702
Aligned to NCO- 2004/9312.10
Entry Qualification : **5th Standard**
Age : 18 Years & above
Duration : 300 hours

Terminal Competency

 Should be able to identify, select and practically use the carpentry tools. Should be able to measure, mark, cut to given size and drill holes in timber and
Plywood. Should be able to identify, select and know the use of wooden materials used in basic carpentry, shuttering and scaffolding works. Should be well versed with the safety procedures with selection and use of safety tools
and equipments. Should have knowledge of good housekeeping practices, Handling of materials and
waste disposal. Should be able to erect staging by local resources like Drums, Bamboos, pipes and ballies.

Optional Terminal Competency In optional Formwork System should be able to identify by name and use of the
standard components as per optional Basic Competencies. Should be able to erect & dismantle system straight shutter.
 In Optional Conventional Formwork should be able to Prepare, erect and dismantle the straight Shutter with proper support. He should have sufficient knowledge to identify the shuttering material and tools for columns and raft foundations.
 In optional Scaffolding should be able to check, prepare, erect and dismantle the staging, walkways,

COURSE CONTENTS:-

Practical Competencies Underpinning Knowledge(Theory) Common Basic Competencies

1 . Identification of tools and equipments used in carpentry & shuttering . 2. Use of protective clothing, boots, goggles and equipment as applicable to a task. 3 .Good house keeping practices, proper handling of materials and waste disposal. Safety precautions and safety belts while working at site Store/lay materials at work in safe manner Use and store of tools and equipments in a safe manner Measurement length, width & depth in MKS & FPS system . 4 .Size a raw timber using proper tools to measure, mark, cut and drill holes within required tolerances and standards.	1. Role of Assist ant " carpenter and scaffolder". Description of trade Different types of tools and equipments used in shuttering and scaffolding. Safety precautions. 2. While using different hand tools While using raw materials With co-workers On the machines & equipments. 3. Study of various types of wooden materials used in shuttering and carpentry. 4. Knowledge of measurements and its conversion to other system. 5. Identification of timber as per quality and classification, care and safe uses of tools.

5 .Preparation of a ply piece out of plywood sheet using proper tools to measure, mark, cut and drill holes within required tolerances and standards. 6. Preparation of half lap, dove tail, tenon & mortise joints with shaped timbers using proper tools to measure, mark, cut and fit within required tolerances and standards. 7. Preparation of a straight shutter with sized timbers and plywood using proper tools to measure, mark, cut and fit within required tolerances and standards. 8. Erection of conventional type scaffolding using bamboos/ wooden poles, empty drums, ropes, wooden planks etc within required safety norms and practices .	Understanding tolerances & house keeping Identification of plywood as per quality, use and classification, care and safe uses of tools. 6. Understanding tolerances. Storage & maintenance of plywood. 7. Identification, care and safe uses of timber jointing tools, knowledge of various joints and appropriate applications, their relative merits and demerits. 8. Identification, care and safe uses of timber jointing tools, knowledge of various joints and appropriate 9. Identification of different types of conventional scaffolding materials & their uses.
A - Optional Basic Competencies – L&T System Identification of L&T system components, stacking them separately as per stacking norms and their maintenance Erection and dismantling of system straight shutters using system components and proper tools within the tolerances and standards. Identification of L&T system Foundation Form components, stacking them separately as per stacking norms and their maintenance. Identification of L&T system Column Form components, stacking them separately as per stacking norms and their maintenance.	Knowledge of system components and its applications, safety while handling and stacking, methods of stacking and maintenance. Knowledge of system components and its applications, safety while handling and stacking, methods of stacking and maintenance. Knowledge of L&T system Foundation Form components and its applications, safety while handling and stacking, methods of stacking and maintenance. Knowledge of L&T system Column Form components and its applications, safety while handling and stacking, methods of stacking and maintenance.
B - Optional Basic Competencies – Conventional System Preparation of a straight shutter with sized timbers and plywood using proper tools to measure, mark, cut and fit within required .tolerances and standards. Erection & dismantling of conventional straight shutters using appropriate supports and proper tools within the tolerances and standards. Familiarization with conventional column and raft	Identification, care and safe uses of timber framing tools, knowledge of various shutters and appropriate applications, handling and maintenance of ply shutters. Knowledge of erection & dismantling of straight shutters, safety while erection & dismantling, handling and stacking, methods of stacking and maintenance.

foundation, tightening and supporting system.	Knowledge of conventional column and raft foundation, handling and stacking, methods of stacking and maintenance.
C - Optional Basic Competencies – Scaffolding Make different types of scaffolding using cup- lock system including bracing within the tolerances and standards. Make different types of scaffolding using scaffolding pipes and couplers including bracing within the tolerances and standards. Make different types of walkways and platforms including side bracing, side railings and toe board.	Types of scaffolding :- wooden and steel (brick layers scaf f old, Needle scaffold, Mason‟s scaffold, tubular scaffold. Handling and stacking of scaffolding materials, maintenance of couplers and scaffolding materials. Types of walkways and platforms and their appropriate use.
Industry and construction site visit.	

LIST OF TOOLS AND EQUIPMENTS

FOR COURSES:-

- **Assistant Shuttering Carpenter & Scaffolder**

LIST OF TOOLS AND EQUIPMENTS-CARPENTER

NAME OF THE TOOLS	QUANTITY
1 Claw Hammer 2 Lb.	10 Nos.
2 Ball Pin Hammer 2 Lb.	10 Nos.
3 Handsaw 18”	10 Nos.
4. Tenon Saw 12”	10 Nos.
5 Wooden Jack Planner 15”	10 Nos.
6, Iron Jack Planner 12 ”	10 No.
7.Wooden Marking Gauge cum Mortise Gauge	10 Nos.
8.Spirit Level 12” Long	10 Nos.
9.Tri-square 12”	10 Nos.
10. Auger – 1/2”, 3/4”, 1”	3 Nos. each
11.Steel Measuring Tape – 3 Mtr. & 5 Mtr.	5 Nos. each
12 Farmer Chisel – 1/2”	10 Nos.
13Farmer Chisel 1”	10 Nos.
14. Mortise Chisel ¼”	10 Nos.
15. Mortise Chisel ¾”	10 Nos.
16. Bevel edge Chisel 1”	10 Nos.
17. Bevel edge Chisel 1/4”	10 Nos.
18. Bevel edge Chisel 1/2”	10 Nos.
19. Cutting Pliers 8”	10 Nos.
20. Screw Driver 10”	10 Nos.
21.Star Screw Driver 10”	10 Nos.
22 Marking Knife	05 Nos.
23. Scriber	05 Nos.
24.Wooden Mallet	10 Nos.

25.Oil Stone (curborundum)	10 Nos.
26.Cutting Chisel 4”	10 Nos.
27.Centre Punch	10 Nos.
28. Bench Vice 10”	10 Nos.
29.Hacksaw Frame with blade 12”	10 Nos.
30. Triangular file – 6 mm (Medium)	10 Nos.
31. Half Round File 1” x 12” Long (Smooth)	10 Nos.
32. Flat File 1” x 12” (Smooth)	10 Nos.
33. Heavy duty electrical drill machine with Bit 8” Dia.	03 Nos.
34. Drill Bit – 8, 12, 16, 18, 22 mm (Straight Shaft) (5*2 Nos.)	10 Nos.
35. Plumb Bob – 200 g	10 Nos.
36. Ring Spanner – 21 / 23, 20 / 22, 18 / 19 (3 each in a set)	10 sets.
37. Double End Spanner – 21 / 23, 20 / 22, 18 / 19 (3 each in a set)	10 sets.
38.Screw Spanner 12” LM	10 Nos.
39.” L “ Square	05 Nos.
40.” T ” Bar Cramp (04 ft.)	04 Nos.
41.” T ” Bar Cramp (02 ft.)	04 Nos.
42 Gimlet	10 Nos.
43. “ G “ or “ C “ Cramp (8 “)	05 Nos.
44. Gauge Blocks	10 Nos.
45. Thread	10 Nos.
46. Safety Goggles	10 Nos.
47. Safety Helmet	10 Nos.
48. Cotton Hand – Gloves (10 * 2)	10 Nos.
49. Tools Bag	10 Nos.
50. Safety Belt	10 Nos.
51. Face Mask	10 Nos.
52. Safety Shoes (Assorted Size)	10 Nos.
53 Ear Muff	10 Nos.
54. Bevel square	10 Nos.

Plywood & Wood Consumable Cost

1 Water Proof Plywood (8’ x 4’ – 12 mm)	60 Nos
2 Water Proof Plywood (8’ x 4’ – 19 mm)	3 Nos
3 Koungu Wood Scantlings	34.6 Cft
4 Silver Wood	92.6 Cft
5 Commercial Ply & Boards	120 Nos
6 Sun mica	20 Nos

Consumable

1. Wire Nails 1 ½,	20 kgs.
2. Wire nail 2 ½ & 3 ”	75 Kgs
3. Diesel	20 Ltrs.
4. Grease	5 Kgs
5. Cotton Waste	10 Kgs

6. Glue 10 Kgs

System Components & Materials

I Heavy Duty Tower System: -
1 Basic Frame 0.9 M 25.71 4 103
2 Basic Frame 1.2 M 30.00 22 660
3 Basic Frame 1.8 M 38.82 16 621
4 Bracing D 9.152 3.56 2 7
5 Bracing D 12.152 3.88 3 12
6 Bracing D 18.152 4.73 2 9
7 Bracing H.152 3.16 8 25
8 Bracing D 9.225 4.90 2 10
9 Bracing D 12.225 5.14 35 180
10 Bracing D 18.225 7.50 14 105
11 Bracing H.225 4.62 56 259
12 H.D. Coupler 0.93 32 30
13 Tower Spindle 12.10 92 1113
14 Foot Plate 2.04 52 106
15 U Head 3.10 40 124
16 Spring Lock Pin Dia 16mm 0.24 168 40
17 Brace Stirrup 2.93 45 132
18 Beam Span 2230 21.00 36 756
19 Short Prop 11.26 20 225
II Flex Floor System: -
20 Floor Prop CT 410 (SN) 19.00 10 190
21 Folding Tripod 11.80 37 437
22 Four-way Head H 16 3.54 49 173
23 Supporting Head H 16 1.16 4 5
III Wall / Column System: -
24 Steel Waling 1.20 M 23.60 16 378
25 Steel Waling 2.40 M 47.02 20 940
26 Splice Plate 7.45 4 30
27 20 x 130 Connecting Pin 0.42 40 17
28 Universal Outside Fixing 4.78 16 76
29 Top Scaffold Bracket 60 14.10 2 28
30 Tie Rod 18 x 5 – 1.0 M Long 1.62 36 58
31 Tie Rod 18 x 5 – 1.5 M Long 2.43 8 19
32 Anchor Plate 12 x 12 – 16 Thick 1.80 136 245
33 Anchor Plate 12 x 6 0.90 16 14
34 Wing Nut 18 x 5 0.40 152 61
35 Supporting Bracket 7.17 26 186
36 Foot Adapter 9.64 26 251
37 Head Adapter 6.80 52 354
38 Swivel Coupler 50 x 40 1.25 5 6
39 Swivel Coupler 40 x 40 1.20 20 24
40 Floor Prop CT 340 (DN) 16.81 18 303
41 Floor Prop CT 410 (DN) 20.00 8 160
IV Beam Forming System: -
42 Beam Forming Support 8.00 64 512
V Stair Tower System: -

43 Stair Bracket 225 Left 21.00 4 84
44 Stair Bracket 225 Right 21.00 4 84
45 Inner Hand Railing 225 4.05 4 16
46 Intermediate Railing 225 5.20 4 21
47 Connection Angle 225 7.09 8 57
48 Grid Iron (600 x 300 mm) 4.94 32 158

VI Climbing Scaffold System: -

49 Floor Form 1200 x 600 30.86 64 1975
50 Lapping Plate 1200mm 18.63 4 75
51 Floor Form Corner 1200 5.10 4 20
52 Floor Form Clamp 0.12 108 13
53 Pipe Waler Clamps 1.11 24 27
54 Waler Connector 1.80 16 29

VII Access Scaffolding System: -

55 Scaffold Frame 1.80 M 20.49 4 82
56 L.D. Coupler (for Frame) 1.04 4 4
57 Scaffold Spindle 5.22 4 21
58 L.D. Foot Plate 1.91 4 8
59 Bracing 2H-225 13.47 2 27
60 Scaffold Board 2250 x 300 M 20.50 20 410
61 H-16 Timber Beam – 2.40 M 50
62 H-16 Timber Beam – 3.60 M 40
63 H-16 Steel Beam – 1.80 M 40
64 H-20 Timber Beam – 1.80 M 20
65 H-20 Timber Beam – 2.40 M 4
66 H-20 Steel Beam – 1.8 M 10
67 H-20 Steel Beam – 2.4 M 46
68 C.T. Props – 410 S/N (G.I) 19 31 589
69 Ledger Pipe – 40mm – 10 RM 3
70 Ledger Pipe – 40mm – 6 RM 1
71 Ledger Pipe – 40mm – 5 RM 8
72 Flange Claw Assembly 100
73 M6bolt with wing nut 75 mm 250
74 Ledger Pipe – 40mm – 3 RM 10

Carpentry Machinery

NAME OF THE MACHINE	**QUANTITY**
. 1 Portable power planer.	02 Nos.
2 Portable power saw.	02 Nos.
3 Portable power drill machine.	02 Nos.
4 Portable power router.	01 Nos.
5 Portable power sander	01 Nos.

REDESIGNED MODULES FOR THE SECTOR

OF

ASSISTANT BAR BENDER & STEEL FIXER (CONSTRUCTION)

Under
MODULAR EMPLOYABLE SKILLS (MES)

Redesigned in
2014

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

PREFACE

Since Construction & Real Estate Sector is a fast developing industry all over the world, particularly in India, there is huge demand for skilled construction labourers. Any individual, who has a minimum 5th standard qualification, irrespective upper age factor, can join this course, and start earning a good income and thereby support his/her family.

GENERAL INFORMATION

Name of Sector	Construction
Name of Module	**Assistant Bar Bender & steel Fixer**
MES Code	CON703
Qualification Pack Code	
Competency as per NCO Code	
Duration of Course	500 Hrs
Entry Qualification of Trainee	5th Passed
Age	18 years & above
Unit Size	20
Power Norms	2 KW

Space Norms	60 sqm
Job Role	To work as a bar bender by performing straightening, marking, cutting of steel bars: making & using ties, hooks, links, chairs, spacers, cranks, stirrups &steel mesh.
Instructor's Qualification	NCVT in relevant trade Or 3 years Diploma in Civil Engg.
Desirable Qualification	CITS

Course Contents for the Module of

Assistant Bar Bender & Steel Fixer (CON106)

Theory	Practical Components
Role and description of trade. Tools & equipments used, safety precautions, knowledge of measurements and conversion to other system.	Identification of tools & equipments used in masonry & concreting. Use of protective clothing, boots, goggles, & equipments. Good housekeeping practices, proper handling of materials & waste disposal. Safety precautions & safety belts. Safe storage of materials at worksite. measurement of length & diameter in MKS & FPS systems.
Identification of steel as per quality & classification, care & safe use of tools , understanding tolerances 7 house keeping.	Methods to stack steel at work place. Transporting steel by head load and by mechanical means.
Storage of steel in store and at work place.	Identification and straightening of steel from coils.
Knowledge of marking on steel, safety precautions in using rod cutting machine.	Practice with marking on steel, cutting manually & by machine.
Various ties used in binding. Safety precautions with tying machine.	Practice with tying of steel with binding wire manually & by binding machine.
Hooks, chairs & links and their uses.	Preparation of hooks, links & chairs/spacers within the tolerances.
Cranks & stirrups and their uses.	Preparation of cranks & stirrups within the tolerances.
Protective painting on steel.	Preparation of steel mess for precast slab within tolerances.
Steel overlapping.	Practice to crank the steel for overlapping.
Visit to industry and construction site.	

List of Tools & Equipments for the Module

Of

ASSISTANT BAR BENDER & STEEL FIXER

Sl. No.	Description	Quantity
1	10 pounds hammer	6
2	0.1 P hammer	16
3	Chisel	11
4	Binding hook	21
5	Lever-6,8, 10 &12 mm	21
6	Lever 900 mm long-16,20 & 25 mm	12
7	Plumb bob	4
8	Measuring tape-3 m	21
9	Measuring tape-15 m & 30 m	1 each
9	Tri-square	4
10	Pin plate	20
11	Bull head rail pieces(90pbs) 600 mm long	6
12	Chalk box	5
13	Binding wire-18 gauge	125 kg
14	Reinforcement steel rods-8,10,12,16 &25 mm	0.75 tonne
15	Wooden planks-3mx25cmx5cm	10
16	Wooden posts-1.5mx10cmx10cm	40
17	Paint-smoke grey	10 lit
18	Wood primer	10 lit
Safety items		
19	Safety helmet	21
20	Safety shoes	21
21	Goggles	21
22	Hand gloves	21
Machineries		
23	Bar cutting machine	2
24	Bar binding machine	2
25	Bar bending machine (Manual)	2

REDESIGNED MODULES FOR THE SECTOR

OF

ASSISTANT HIGHWAY WORKS SUPERVISOR (CONSTRUCTION)

Under
MODULAR EMPLOYABLE SKILLS (MES)

Redesigned in
2014

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

PREFACE

During wars, epidemics, natural calamities etc., the Highway plays an important role. For the development of a country, a good quality and network of Highways are necessary. The civilization of that country, Highway helps us in movement of public commodities, Agricultural Produce, Industrial Produce etc., from one place to another place. Hence, there are vast opportunities for **Assistant Highway Works Supervisor in** getting employment. The trainees who successfully complete this Module, which is of 500 hours' duration, can independently supervise the work of Highway construction.

GENERAL INFORMATION

Name of Sector	Construction

Name of Module	Assistant Highway Works Supervisor
MES Code	CON704
Qualification Pack Code	
Competency as per NCO Code	
Duration of Course	500 Hrs.
Entry Qualification of Trainee	Inter pass, ITI, GWS, III Year diploma appeared
Age	18 years & above
Unit Size	20
Power Norms	2 KW
Space Norms	60 sqm
Job Role	• Identify the materials, tools, machinery, plants & equipment tools used in Highway Construction Industry • Work out Conversions, Mensuration, Measurements, Angle notation, Study of plans, Quantity surveying, Estimate understanding, Taking of field measurements and levels, safety norms in construction areas.
Instructor's Qualification	3 years Diploma in Civil Engg.
Desirable Qualification	CITS

Course Contents for the Module
of
ASSISTANT HIGHWAY WORKS SUPERVISOR

1. MEASUREMENTS AND MENSURATION		
Sl. No.	PRACTICAL	THEORY
1	Measurements	1)Linear measurements 2)Angular measurements To read various measuring tools for calculating Linear measurements and Angular measurements
2	Mensuration	Areas, Volumes of different shapes, Calculation of areas and Volumes of various shapes of structures
3	Knowledge of different formulae for area and volume of different shapes and Knowledge of measurement and its conversion to other systems	Measurement length, width, and depth in M.K.S , C.G.S, F.P.S and S.I system
4	Identification of Tools and Equipments used in undertaking construction work	Different types of tools and Equipments used in construction work

5	Identification of materials	Procedure for identification of materials
2.SURVEYING& LEVELLING		
Sl. No.	PRACTICAL	THEORY
1	Scientific Instruments Angular	Compass, Theodalite & Total station
2	Leveling Instruments	Dumpy, Auto, Theodalite, Total Station
3	Linear traversing and Closed traversing	Measuring angles and Deflection angles of traverse
4	Different types of Levelling	Identification of different types of levelling instruments.
5	Reading of levels	Knowledge about different methods of levelling
6	Transferring the levels from one place to other	Calculating the levels by using different methods
3. READING OF DRAWING AND PLANS & CROSS SECTIONS		
Sl. No.	PRACTICAL	THEORY
1	Key map, Index map Study of Alignment of Road, Longitudinal sections, Cross sections	Map study, Reconnaissance, Preliminary and Detailed surveys
2	Knowledge of reading the Site Plan	Reading Site Plan, LS, Cross sections
3	Knowledge of Formation level – Side slopes, Drainage works, Gradients	Checking the Ground levels, Formation level, Side slopes, Gradients
4. SETTING OUT & MARKING		
Sl. No.	PRACTICAL	THEORY
1	Establishing working Bench Marks – Reference Bench Marks	Carrying out permanent Bench marks by Check levels
2	Knowledge of Setting out, Carriage way, Central line, Curve points	Setting out road alignment, Peg marking central line – Outer limits of formation position of Cross Drainage works – Curve points
5.HIGHWAY GEOMETRICS		
Sl. No.	PRACTICAL	THEORY
1	Classification of Highways	National Highways, State Highways, Major District Roads, Other District Roads and Village Roads
2	Terrains	Plain, Rolling and Hilly for laying procedures
3	Widths	Land Width (Right of Way), Formation Width (Road way width), Carriage way Width, Shoulder width (berm width), Building lines and Control lines
4	Horizontal Alignment and Vertical Curves	Horizontal Alignment, Curves, Super Elevation, Camber or Cross Fall, Extra Features at curves and allowable gradients
5	Road Formation, Carriage Width	Formation & Carriage way Widths
6.HIGHWAY CONSTRUCTION MATERIALS		
Sl. No.	PRACTICAL	THEORY

1	Cement	OPC, PPC, Rapid Hardening Portland cement Portland slag cement
2	Bitumen	Identifying Bituminous, Emulsion etc.,
3	Steel	Identifying Mild steel, HYSD Steel of different diameter bars, etc.,
4	Aggregates	Identifying Coarse and Fine aggregates, identifying different sizes of aggregate.
7.CONSTRUCTION EQUIPMENT		
Sl. No.	PRACTICAL	THEORY
1	**Other Scientific Instruments**	**Screw gauge, Vernier Calipers, Physical Balance, Thermometer**
2	**Plants & Machinery**	**Mini hot mix plant, Design mix plant, Batch mix plant, Concrete mixer, Concrete batch mix plant, weigh mix plant, Peg mix plant.**

Mini hot mix plant, Design mix plant, Batch mix plant, Concrete mixer, Concrete batch mix plant, weigh mix plant, Peg mix plant.

ASSISTANT PLUMBER

Name : Assistant Plumber
Sector : Construction

Code : CON 705

Entry Qualification : Vth Standard

Age : 18 Years & above
Duration : 500 hours

Terminal Competency

1.Capable to identify & select the plumbing materials and fittings.
2.Capable to performed work with safety following safety procedures with suitable PPE..
3.Capable to cutting in wall as per drawing using suitable tools & equipments and filling the wall with same replaced material with new finish.
4.Capable to select waste disposal place as catagories.
5.Capable to perform cutting, threading of GI pipes. Should be able to tighten the GI pipe line 6Capable be able to perform supporting activities on wall like drilling, nailing, clipping and hammering.
7.Capable to fix Sanitary Pipeline, including gas pipe waste pipe line horizontally and vertically .
8. Capable to fill mortar in the joints of RCC pipes (After fixing done by plumber)
9. Capable to handling sanitary bathroom fitting .
10. Knowledge about concrete mixture proportion.
11.Capable to encase light weighed pipes with concrete.
12 Capable to replace broken sanitary and bathroom fittings with new one.
13. Capable to fix PVC pipes ,sanitary, Over head tank fittings.

COURSE CONTENTS:-

Practical Competencies	Underpinning Knowledge(Theory)
Identification of tools and equipments used in plumbing works Use of protective clothing, boots, goggles and equipment as applicable to a task Good house keeping practices, proper handling of materials and waste disposal. Safety precautions and safety belts while working at site Store/lay materials at work in safe manner Measurement length, width & diameter	Role of assistant plumber Description of trade Different types of tools and equipments used in plumbing works. Safety precautionsWhile using different hand tools,raw materials.co-workers On the machines & equipments Knowledge of measurements and its conversion with FPS & MKS system
Identification of different types of pipes & specials used in plumbing works	Knowledge of various types of pipes with colour code and selection of pipe as per work specific uses.

Preparation of cement mortar and performing chase cutting and mortar filling	Knowledge of operations with G I Pipes selection of Die method of cutting ,Threading.
Carry out operations on GI pipes – cutting, threading & tightening	Knowledge of lay out of plumbing fittings
Carry out operations on walls – drilling, nailing, clipping, finishing and hammering	How pressure of liquid increase or decrease depends on selection of fitting material
Carry out operations of fixing and tightening of GI pipes to specials & fittings	Knowledge of various sanitary fittings
Carry out operations of tightening of sanitary fittings (fixed by plumber)	Knowledge about angle of soil pipe considering
Carry out operations main line connection with ferrule in CI, G.I & cemented pipe.	Uses of Modern Tool Like Ratchet Die
Carry out jointing of RCC pipes and collars with cement mortar	
Carry out fitting of WC , Indian & western type pan with concrete	Knowledge of cement concrete and its use
Carry out fixing PVC pipes to fittings and prepare joints with flush tank& general work.	Encasing activity with cement concrete around SW, AC and light weight CI (Rain water) pipes
Replacement of old/ broken fixtures and fittings, defect of flush tank & remedy .	
Industry and construction site visit	

LIST OF TOOLS AND MATERIALS

For courses Assistant Plumber

S.No.	Description	Unit	Quantity		Total
1	Traditional & ratchet typePipe Die Set - 1/2" to 1" & 1 1/4" to 2"	Set		3 each	6
2	Pipe Wrench (Size No.8) & (Size No.12) Chain wrench 1”---4”	Set		6 each 2 Each	12 4
3	Pipe Vice (Size No.2) & (Size No.3)	Nos		4 each	8
4	Wooden Bench (3' x 6' height - 4')	Nos		3	3
5	Hammer Sledge (2 pound) & (1 pound)	Nos		4 each	8
6	Flat Chisel (1') & Point Chisel (1')	Nos		5 each	10
7	Flat Punch (1/2') & Point Punch (1/2')	Nos		5 each	10
8	Rawel Jumper Bit set (6 mm) & (8 mm)	Nos		5 each	10
9	Pipe Wheel Cutter (upto 2" cutting)	Nos		5	5
10	Spanner Set (Double End)	Set		2	2
11	Spirit Level (length 2 feet)	Nos		5	5
12	Tube Level (1/4" Hose White)	Mtr		30	30
13	Screw Spanner (Size No.12)	Nos		5	5
14	Screw Driver (1 1/2 feet) & (1 feet)	Nos		5 each	10
15	Grip Plier (266 - 10)	Nos		5	5
16	Pocker (Tapuria 871)	Nos		5	5
17	Cutting Pliers - Taparia	Nos		5	5
18	Hacksaw Frame with Blade	Nos		10	10
19	Try Square (small)	Nos		5	5
20	Plum Bob (Small)	Nos		5	5
21	Cocking Chisel (1 1/4")	Nos		4	4
22	Blow lamp	Nos		4	4
23	Trowel Mason (small) & (Big)	Nos		5 each	10
24	Spade with handle	Nos		5	5
25	Mortar Pan	Nos		5	5
26	Hand Drilling Machine	Nos		1	1
27	Cleaning Brush & Painting Brush (2")	Nos		5 each	10
28	Oil Can (Small)	Nos		3	3
29	Chain Wrench (upto 3")	Nos		2	2
30	Hand Bending Machine (1/2" to 1")	Nos		3	3
31	Ladder (10 feet height)	Nos		2	2
32	Measuring Tape (5m)	Nos		5	5
33	Spun Yarn	Kg		50	50
34	Hydraulic Pressure Test Pump	No		1	1

36	Safety Shoes & Safety Helmet			20 each	40
37	Cotton Hand Gloves			20	20
1	GI Pipe 1/2", 3/4", 1", 1 1/4", 1 1/2", 2"	m		50 each	300
2	PVC Pipe 1/2", 3/4", 1", 1 1/4", 1 1/2", 2"	m		50 each	300
3	CI Pipes 4", 6" 2 M length	Nos		10	20
4	Lead and lead wool	kg		25	25
5	Stone Ware Pipe 4"	Nos		20	20
6	White Wash Basin	Nos		2	2
7	White I.W.C Cistern	Nos		2	2
8	White E.W.C (Normal)	Nos		2	2
9	White `p' Trap 4"	Nos		2	2
10	White `s' Trap 4'	Nos		2	2
11	White kitchen Sink	No		1	1
12	White Urinal (Flat)	No		1	1
13	White Urinal (magnon)	No		1	1
14	1/2" Bibcock (l) & (s)	Nos		5 each	10
15	1/2" Pillar cock & Angle Cock	Nos		5 each	10
16	1/2" Ball Valve	Nos		5	5
17	1" Gate Valve, Globe Valve & Check Valve	Nos		5 each	10
18	1" NRV	Nos		5	5
19	1" Foot Valve & 2" Foot Valve	Nos		3 each	6
	Pipe Fittings				
20	1/2" G.I. Elbow	Nos		10	10
21	3/4" G.I Elbow	Nos		10	10
22	1" G.I Elbow	Nos		10	10
23	1/2" 3/4" G.I. Tee	Nos		30	30
24	1"x 3/4", 1/4" x 1/2", 1"x 1/2"	Nos		30	30
25	G.I Reducer Elbow 1"x 3/4", 1" x 1/2"	Nos		10 each	20
26	G.I Reducer Elbow 3/4"x 1/2"			10	10
27	G.I Coupling 1/2" x 3/4" x 1"	Nos		30	30
28	G.I Straight Reducer 1" x 3/4" x 1 1/2"	Nos		30	30
29	G.I Bend 1/2", 3/4", 1"	Nos		30	30
30	G.I union 1/2", 3/4", 1"	Nos		30	30
	PVC Fittings				
31	All types pasted thread each	Nos		10	10
32	Solvent Cement	Litre		2	2
33	Shellac	Nos		20	20
34	Thread Ball	Nos		50	50

REDESIGNED MODULE FOR THE SECTOR OF CONSTRUCTION

ASSISTANT WORKS SUPERVISOR

UNDER

MODULAR EMPLOYABLE SKILLS (MES)

Redesigned in 2013

By

Goverenment of India
Ministry of Labour & Employment (DGE&T)

GENERAL INFORMATION

Name of sector	Construction
Name of Module	Assistant works Supervisor
MES code	**CON707**
Competency as per NCO code	
Duration of Course	500 hours
Entry qualification of Trainee	8th pass + 14 years of age
Unit size (No. of trainees)	20
Power norms	
Space norms	60 sq m

Instructors qualification	Degree in Civil Engineering from recognized engg. College/University with one year experience in the relevant field **(or)** Diploma in Civil Engineering from recognized institue of technical education with two year experience **(or)** NTC/NAC in the trade of Mason (Building Constructor)/ assistant –civil construction with three years of experience
Desirable qualification	Craft Instructor Certificate (CIC)

Course contents for Assistant Works Supervisor

	Measurements and Mensuration	
Sl. No.	**Theory**	**Practical**
1	Measurements 1)Linear	To read various measuring tools for
2	Mensuration 1) Area, Volumes of different shapes	Calculation of areas and volumes of various shapes of structures
3	Identification of Tools and Equipments used in construction work	Different types of tools and Equipments used in construction work
4	Identification of materials	Procedure for identification of materials
5	Knowledge of different formulae for area and volume different shapes and knowledge of	Measurement length, width, and Depth in
	Surveying (Leveling)	
1	Chain Survey	Transferring measuremt to field book
2	Fixing and leveling different types of Instruments	Identification of different types of leveling Instruments.

3	Reading of levels and instruments angles	Knowledge about different methods of leveling
4	Transferring the levels from one place to other	Calculating the levels by using different methods
	Reading of Drawing	
1	Draw/prepare basic drawings – plan section, elevation , excavation , sections etc	Knowledge about reading Plan, cross section, elevation,excavation, foundation etc
	Marking	
1	Knowledge about Pythagoras	Marking with Pythagoras theorem method
2.	Knowledge about tools and materials used for layout	Checking the layout
3	Knowledge about grid marking with the help of drawings for layout	Marking the columns with the help of Brick
	EXCAVATION	
1	Knowledge of different types of soils	Identification of different types of soils
2.	Methods of different types of tools used in Excavation	Safety precautions while excavation of the soil
	Foundations	
1	Knowledge about different types of foundations	Knowledge of reading the drawings for foundation. Checking the levels while excavation of the soil

	Concrete Works	
1	Basic Knowledge about 1) Plain Cement Concrete(PCC) 2 Reinforced cement Concrete (RCC)	Materials used in RCC and PCC & slump test
2.	Basic Knowledge about various concrete grades	Identification of bars & their unit weights

3	Basic Knowledge about the Crushing Strength of the concrete	Minimum coverings and calculation the volume of work and material required.
	Safety & Precautions	
1	Knowledge about safety precautions in connection with personal, mechanical, electrical and knowledge of first aids	Identification and use of safety gadgets and first aid

Tools & Equipments required

1.	Measuring flexible steel tape 3 mtr.,	1 no. (for each trainee)
2.	Measuring flexible steel tape 15mt. & 30 mt.	1 each
3.	Spade, Trowel, Brick hammer, Plumb – bob, Sprit level, Brick saw, hack saw, Tasla, Pick axe, Jumper, Shovel, ladder	1 each

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REDESIGNED MODULES FOR THE SECTOR

OF

BAR-BENDER
(CONSTRUCTION)

Under
MODULAR EMPLOYABLE SKILLS (MES)

Redesigned in
2014

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

PREFACE

Good qualities are considered to be the backbone of any kind of development in any country. And, development is always, a continuous process. Hence, there are vast opportunities for **Bar-bender** in getting employment. The trainees who successfully complete this Module, which is of 500 hours' duration, can independently carryout Bar-bender work needed for the different types of R.C.C. Construction.

GENERAL INFORMATION

Name of Sector	Construction
Name of Module	**BAR-BENDER**
MES Code	CON 708
Qualification Pack Code	
Competency as per NCO Code	
Duration of Course	500 Hrs
Entry Qualification of Trainee	**5th Standard**
Age	18 years & above
Unit Size	20
Power Norms	2 KW
Space Norms	60 sqm
Job Role	▪ to measure, mark, cut and tie to make cage for beams with shear bars. ▪ to measure, mark, cut and tie to erect column with base. ▪ to measure, mark, cut and tie to erect

	column with corbels and cranks. ▪ well versed with functions and operations of bar cutting machine, manual bar bending machine and binding machine. ▪ to assess the requirement of materials for a specific work. ▪ to calculate the quantum of work done.
Instructor's Qualification	3 years Diploma in Civil Engg.
Desirable Qualification	CITS

Course Contents for the Module

Of

BAR-BENDER

PRACTICAL	THEORY
• Identification of tools and equipments used in Bar Bending work • Use of protective clothing, boots, goggles and equipment as applicable to a task • Good housekeeping practices, proper handling of materials and waste disposal. • Safety precautions and safety belts while working at site • Store/lay materials at work in safe manner • Use and store of tools and equipments in a safe manner • Measurement length & diameter in MKS & FPS system	• Role of Bar Bender. • Description of trade • Different types of tools and equipments used in bar bending work. • Safety precautions • While using different hand tools • With co-workers • On the machines & equipments • Study of various types of steel used in Bar Bending work • Knowledge of measurements and its conversion to other system
• **Prefabricate Pre-cast Elements (Slabs)** From pre-cast drawings and schedule to form mats with ends hooks and tie on moulds as per schedules to a tolerance of± 5mm. All bends to be in flat plane.	• Read and understand pre-cast drawing schedule no. Repetition mirror images if any and spacers.
• **Prefabricate cage for beams** From simple drawing and schedule select, cut and bend steel to given dimension and from page for beam, using closed four sided stirrups, all bars as per drawing to a tolerance of ±5mm. Links to be tight (Can not be moved by hand).	• Read and understanding drawing, and schedule marking out, sequence of construction, selection of former. Use of hand tools.

• **Prefabricate cage for beam with shear bars** From drawing / schedule. Select, cut and bend steel to given dimension and form cage for beam. Using stirrups. Additional crank bars all bars as per drawing and to a tolerance ±5mm. Stirrups to be tight (cannot be moved by hand)	• Read and understand drawing / schedule, marking out, sequence of construction, selection of former. Use of hand tools.
• **Prefabricate cage for column and base and set in position** From drawing / schedule. Select, cut and bend steel to given dimension, make up set up in-situ, all bars as per drawing ±5mm. Base and starter bars rigid, all ties tight.	• Read and understand drawing / schedule, marking out, sequence of construction, selection of former. Use of hand tools.
• **Pre-fabricate cage for column incorporating Corbels** From drawing / schedule. Select, cut and bend steel to given dimension, make up and all bars brackets as per drawing to a tolerance of ±5mm. Bars to be true horizontal and vertical, ties tight	• Read and understanding drawing / schedule, marking out, sequence of construction, selection of former. Use of hand tools.
• **Pre-fabricate cage for column incorporating crank bars** From drawing / schedule. Select, cut and bend steel to given dimension, make up and all bars as per drawing to a tolerance of ±5mm. All bars to be true vertical and ties tight. All crank bars in flat plane.	• Read and understand drawing / schedule, marking out, sequence of construction, selection of former. Use of hand tools.
• **Prefabricate cage for beam with alteration in section a long length** From drawing / schedule. Select, cut and bend steel to given dimension, make up and all bars as per drawing. Introduce new bars and alterations to a tolerance of ± 5mm. All bars to be true vertical and ties tight. All crank bars in flat plane.	• Read and understand drawing / schedule, marking out, sequence of construction, selection of former. Use of hand tools.
• **Lap length to fabricate weld** From drawing / schedule. Select, cut and bend steel to given dimension, make up and all bars as per drawing. Introduce new bars and alterations to a tolerance of ±5mm. All bars to be true vertical and ties tight. All crank bars in flat plane.	• Read and understand drawing / schedule, marking out, sequence of construction, selection of former. Use of hand tools
• **Prefabricate and set in-situ cage for stair case** From drawing / schedule. Select, cut and bend steel to given dimension, make up and set up	• Read and understand drawing / schedule, marking out, sequence of construction, selection of former. Use of hand tools

in-situ, required angle, slope all bars as per drawing ±5mm. Base and starter bars rigid, all ties tight.	
• Industry and construction site visit	

LIST OF TOOLS AND EQUIPMENTS

For course of

Bar-Bender

S.No	Description	Quantity		Total
		Display	Training	
1	10 Pounds Hammer	1	5	6
2	0.1 P Hammer	1	15	16
3	Chisel	1	10	11
4	Binding Hook	1	20	21
5	Lever (sizes-6mm,8mm,10mm & 12mm)	1	20	21
6	Lever (900mm long)-16,20, and 25mm)		12 Nos.	
7	Plumb Bob		4 Nos.	
8	Measuring Tape-3mtr.	1	20	21
9	Measuring Tape-15 & 30mtr.		1 each	2
10	Tri-square		4 Nos.	
11	Pin Plate		20 No's	
12	Bull Head Rail Pieces (90 Lbs) 600 mm length		6 No's	
13	Chalk box		5 Boxes	
14	Binding Wire (18 gauge)		4 Kgs.	
15	Reinforcement steel rods			
	a) 8 mm		0.5 ton per batch	
	b) 10 mm		0.75 ton for four batches	
	c) 12 mm		0.75 ton for four batches	
	d) 16 mm		0.75 ton for four batches	
	e) 25 mm		0.75 ton for four batches	
16	Wooden Planks (3 m x 25 cm x 5 cm)		10 No's	
17	Wooden Planks (1.5 m x 10 cm x 10 cm)		40 No's	
18	Paint (Smoke)		10 liters	

19	Wood Primer		10 liters	
Safety Items				
1	Safety Helmet		21 No's	
2	Safety Shoes		21 No's	
3	Goggles		21 No's	
4	Hand Gloves		21 No's	
Machineries				
1	Bar Cutting Machine		21 No's	
2	Bar Binding Machine		21 No's	
3	Bar Bending Machine (Manual)		21 No's	

BUILDING CARPENTER

Name : Building Carpenter

Sector : Construction

Code : CON709

Aligned to NCO – 2004 / 7124.20

Entry Qualification : Vth Standard

MES course on ‘ Assistant Shuttering Carpenter & Scaffolder’

Age : 18 Years & above

Duration : 300 hours

Terminal Competency

 Should be able to identify, select and practically use the carpentry tools. Should be well versed with the safety procedures with selection and use of safety tools

and equipments. Should have knowledge of good housekeeping practices, Handling of materials and

waste disposal. Should be able to identify, select and use different hard and soft wood. Should be able to identify the parts of drilling machine and planning machine. Should

be well versed with the functioning of these machines and should be able to operate and perform the work with safety.

 Should be able to make frames for doors, windows and ventilators. Should be able to make shutters for doors, windows and ventilators.

 Should be able to calculate the quantum of work done.

Course Contents

Practical Competencies **Underpinning Knowledge(Theory)**

Identification of tools and equipments used in building carpentry work Use of protective clothing, boots, goggles and equipment as applicable to a task Good house keeping practices, proper handling of materials and waste disposal. Safety precautions and safety belts while working at site Store/lay materials at work in safe manner Use and store of tools and equipments in a safe manner Measurement length, width & depth in MKS &FPS System.	Role of Building Carpenter. Description of trade Different types of tools and equipments used in carpentry works. Safety precautions □ While using different hand tools □ While using raw materials □ With co-workers □ On the machines & equipments Study of various types of wooden materials used in building carpentry Knowledge of measurements and its conversion to other system
Identification & Selection Identification of timber used in building works – Sal wood, Shisham, Teak, Deodar etc. with specific use. Identification of commercial ply woods & boards, sun-mica etc with specific use. Identification and selection of timber based on quality & seasoning identification on carpentry hardware with size & specific uses. Identification of soft wood & hard wood and its uses.	Description of timber used in building making work. Teak wood, Deodar wood, Sal wood etc. Other wood as available in the local market. Selection of different type of wood. Seasoning of wood need different methods Familiar with door, window & ventilator fittings, Hinges, Handles, Locks, and Tower bolts, Earl Drawer. Plywood, Ply board, Sun-mica, Nails, Screws, Hinges, Tower bolt, Handles, Locks, Glues etc.
Operation & Use Drill Machine, Planer Machine	Introduction to carpentry machine. Description Types, Sizes, Parts, Functions, Operations
Joints & Frames Make basic joints related with building work. Mark and make door, window and ventilator frame.	Study of basic Joints related with building
Shutters Make framed, paneled, glazed, wire mesh, door, window and ventilator shutters.	work. Knowledge of marking Knowledge of Marking framed, paneled, glazed, wire mesh, door, window and ventilator shutters

Industrial and site visits.

LIST OF TOOLS AND EQUIPMENTS

FOR COURSES:-

Building Carpenter

LIST OF TOOLS AND EQUIPMENTS-CARPENTER

NAME OF THE TOOLS	QUANTITY
1 Claw Hammer 2 Lb.	10 Nos.
2 Ball Pin Hammer 2 Lb.	10 Nos.
3 Handsaw 18”	10 Nos.
4. Tenon Saw 12”	10 Nos.
5 Wooden Jack Planner 15”	10 Nos.
6, Iron Jack Planner 12 ”	10 No.
7.Wooden Marking Gauge cum Mortise Gauge	10 Nos.
8.Spirit Level 12” Long	10 Nos.
9.Tri-square 12”	10 Nos.
10. Auger – 1/2”, 3/4”, 1”	3 Nos. each
11.Steel Measuring Tape – 3 Mtr. & 5 Mtr.	5 Nos. each
12 Farmer Chisel – 1/2”	10 Nos.
13Farmer Chisel 1”	10 Nos.
14. Mortise Chisel ¼”	10 Nos.
15. Mortise Chisel ¾”	10 Nos.
16. Bevel edge Chisel 1”	10 Nos.
17. Bevel edge Chisel 1/4”	10 Nos.
18. Bevel edge Chisel 1/2”	10 Nos.
19. Cutting Pliers 8”	10 Nos.
20. Screw Driver 10”	10 Nos.
21.Star Screw Driver 10”	10 Nos.
22 Marking Knife	05 Nos.
23. Scriber	05 Nos.
24.Wooden Mallet	10 Nos.

25.Oil Stone (curborundum)	10 Nos.
26.Cutting Chisel 4”	10 Nos.
27.Centre Punch	10 Nos.
28. Bench Vice 10”	10 Nos.
29.Hacksaw Frame with blade 12”	10 Nos.
30. Triangular file – 6 mm (Medium)	10 Nos.
31. Half Round File 1” x 12” Long (Smooth)	10 Nos.
32. Flat File 1” x 12” (Smooth)	10 Nos.
33. Heavy duty electrical drill machine with Bit 8” Dia.	03 Nos.
34. Drill Bit – 8, 12, 16, 18, 22 mm (Straight Shaft) (5*2 Nos.)	10 Nos.
35. Plumb Bob – 200 g	10 Nos.
36. Ring Spanner – 21 / 23, 20 / 22, 18 / 19 (3 each in a set)	10 sets.
37. Double End Spanner – 21 / 23, 20 / 22, 18 / 19 (3 each in a set)	10 sets.
38.Screw Spanner 12” LM	10 Nos.
39.” L “ Square	05 Nos.
40.” T ” Bar Cramp (04 ft.)	04 Nos.
41.” T ” Bar Cramp (02 ft.)	04 Nos.
42 Gimlet	10 Nos.
43. “ G “ or “ C “ Cramp (8 “)	05 Nos.
44. Gauge Blocks	10 Nos.
45. Thread	10 Nos.
46. Safety Goggles	10 Nos.
47. Safety Helmet	10 Nos.
48. Cotton Hand – Gloves (10 * 2)	10 Nos.
49. Tools Bag	10 Nos.
50. Safety Belt	10 Nos.
51. Face Mask	10 Nos.
52. Safety Shoes (Assorted Size)	10 Nos.
53 Ear Muff	10 Nos.

54. Bevel square	10 Nos.

Plywood & Wood Consumable Cost

1 Water Proof Plywood (8’ x 4’ – 12 mm)	60 Nos
2 Water Proof Plywood (8’ x 4’ – 19 mm)	3 Nos
3 Koungu Wood Scantlings	34.6 Cft
4 Silver Wood	92.6 Cft
5 Commercial Ply & Boards	120 Nos
6 Sun mica	20 Nos

Consumable

1. Wire Nails 1 ½,	20 kgs.
2. Wire nail 2 ½ & 3 ”	75 Kgs
3. Diesel	20 Ltrs.
4. Grease	5 Kgs
5. Cotton Waste	10 Kgs
6. Glue	10 Kgs

System Components & Materials

I Heavy Duty Tower System: -

1 Basic Frame 0.9 M 25.71 4 103

2 Basic Frame 1.2 M 30.00 22 660

3 Basic Frame 1.8 M 38.82 16 621

4 Bracing D 9.152 3.56 2 7

5 Bracing D 12.152 3.88 3 12

6 Bracing D 18.152 4.73 2 9

7 Bracing H.152 3.16 8 25

8 Bracing D 9.225 4.90 2 10

9 Bracing D 12.225 5.14 35 180

10 Bracing D 18.225 7.50 14 105

11 Bracing H.225 4.62 56 259

12 H.D. Coupler 0.93 32 30

13 Tower Spindle 12.10 92 1113

14 Foot Plate 2.04 52 106

15 U Head 3.10 40 124

16 Spring Lock Pin Dia 16mm 0.24 168 40

17 Brace Stirrup 2.93 45 132

18 Beam Span 2230 21.00 36 756

19 Short Prop 11.26 20 225

II Flex Floor System: -

20 Floor Prop CT 410 (SN) 19.00 10 190

21 Folding Tripod 11.80 37 437

22 Four-way Head H 16 3.54 49 173

23 Supporting Head H 16 1.16 4 5

III Wall / Column System: -

24 Steel Waling 1.20 M 23.60 16 378

25 Steel Waling 2.40 M 47.02 20 940

26 Splice Plate 7.45 4 30

27 20 x 130 Connecting Pin 0.42 40 17

28 Universal Outside Fixing 4.78 16 76

29 Top Scaffold Bracket 60 14.10 2 28

30 Tie Rod 18 x 5 – 1.0 M Long 1.62 36 58

31 Tie Rod 18 x 5 – 1.5 M Long 2.43 8 19

32 Anchor Plate 12 x 12 – 16 Thick 1.80 136 245

33 Anchor Plate 12 x 6 0.90 16 14

34 Wing Nut 18 x 5 0.40 152 61

35 Supporting Bracket 7.17 26 186

36 Foot Adapter 9.64 26 251

37 Head Adapter 6.80 52 354

38 Swivel Coupler 50 x 40 1.25 5 6

39 Swivel Coupler 40 x 40 1.20 20 24

40 Floor Prop CT 340 (DN) 16.81 18 303

41 Floor Prop CT 410 (DN) 20.00 8 160

IV Beam Forming System: -

42 Beam Forming Support 8.00 64 512

V Stair Tower System: -

43 Stair Bracket 225 Left 21.00 4 84

44 Stair Bracket 225 Right 21.00 4 84

45 Inner Hand Railing 225 4.05 4 16

46 Intermediate Railing 225 5.20 4 21

47 Connection Angle 225 7.09 8 57

48 Grid Iron (600 x 300 mm) 4.94 32 158

VI Climbing Scaffold System: -

49 Floor Form 1200 x 600 30.86 64 1975

50 Lapping Plate 1200mm 18.63 4 75

51 Floor Form Corner 1200 5.10 4 20

52 Floor Form Clamp 0.12 108 13

53 Pipe Waler Clamps 1.11 24 27

54 Waler Connector 1.80 16 29

VII Access Scaffolding System: -

55 Scaffold Frame 1.80 M 20.49 4 82

56 L.D. Coupler (for Frame) 1.04 4 4

57 Scaffold Spindle 5.22 4 21

58 L.D. Foot Plate 1.91 4 8

59 Bracing 2H-225 13.47 2 27

60 Scaffold Board 2250 x 300 M 20.50 20 410

61 H-16 Timber Beam – 2.40 M 50

62 H-16 Timber Beam – 3.60 M 40

63 H-16 Steel Beam – 1.80 M 40

64 H-20 Timber Beam – 1.80 M 20

65 H-20 Timber Beam – 2.40 M 4

66 H-20 Steel Beam – 1.8 M 10

67 H-20 Steel Beam – 2.4 M 46

68 C.T. Props – 410 S/N (G.I) 19 31 589

69 Ledger Pipe – 40mm – 10 RM 3

70 Ledger Pipe – 40mm – 6 RM 1

71 Ledger Pipe – 40mm – 5 RM 8

72 Flange Claw Assembly 100

73 M6bolt with wing nut 75 mm 250

74 Ledger Pipe – 40mm – 3 RM 10

Carpentry Machinery

	NAME OF THE MACHINE	**QUANTITY**
.	1 Portable power planer.	02 nos.
	2 Portable power saw.	02 Nos.
	3 Portable power drill machine.	02 Nos.
	4 Portable power router.	01 Nos.
	5 Portable power sander	01 Nos.

CONVENTIONAL SHUTTERING CARPENTER

Name : Conventional Shuttering Carpenter
Sector : Construction
Code : CON710
Aligned to NCO- 2004 / 9312.10
Entry Qualification : Vth Standard and
MES course on ' Assistant Shuttering Carpenter & Scaffolder'
Age : 18 Years & above
Duration : 300 hours

Terminal Competency

 Should be able to identify, select and practically use the carpentry tools. Should be well versed with the safety procedures with selection and use of safety tools and equipments. Should have knowledge of good housekeeping practices, Handling of materials and waste disposal. Should be able to layout the foundation plan, prepare the foundation formwork, handle, erect and dismantle the same within the tolerances. Should be able to layout the column plan, prepare the column formwork, handle, erect and dismantle the same within the tolerances. Should be able to layout the straight and curved wall plan, prepare the wall formwork, handle, erect and dismantle the same within the tolerances. Should be able to prepare the beam and slab formwork, handle, erect and dismantle the same within the tolerances. Should be able to assess the requirement of materials for a specific work and well versed with the repetition of formwork. Should be able to calculate the quantum of work done.

COURSE CONTENTS:-

Practical Competencies Underpinning Knowledge(Theory)

Identification of tools and equipments used in conventional shuttering work Use of protective clothing, boots, goggles and equipment as applicable to a task Good house keeping practices, proper handling of materials and waste disposal. Safety precautions and safety belts while working at site. Store/lay materials at work in safe manner Use and store of tools and equipments in a safe manner Measurement length, width & depth in MKS & FPS system.	Role of Conventional Shuttering Carpenter. Description of trade Different types of tools and equipments used in shuttering works. Safety precautions While using different hand tools While using raw materials With co-workers On the machines & equipments. Study of various types of conventional materials used in shuttering and carpentry. Knowledge of measurements and its conversion to other system
Handling, Erecting and Dismantling Conventional – Foundation Form Given the system shutters, consumables and tools, assemble and dismantle foundation form including props and tie rods for a foundation as per sketch to a tolerance of -6mm / +25mm overall dimension, -2.5% of height and out-of-line not	Knowledge of marking layout; techniques of assembly, alignment, supporting, deshuttering; pockets and embedment; tackling formwork problems during concrete placing; release agents; repetitions of formwork; tolerance

more than 1% of foundation width or 25mm which ever is less.	in line, level and dimensions; safe handling and working; house keeping.
Handling, Erecting and Dismantling Conventional – Column Form Given the conventional shutters, consumables and tools, assemble and dismantle column form including props and tie rods for a column as per sketch to a tolerances of +/ - 3 mm in cross sectional dimensions and +/- 3 mm for a height of 3m or +/- 12mm over entire height whichever is less.	Knowledge of marking layout; techniques of assembly, alignment, supporting, deshuttering; pockets and embedment; tackling formwork problems during concrete placing; release agents; repetitions of formwork; tolerance in line, level and dimensions; safe handling and working; house keeping.
Handling, Erecting and Dismantling Conventional – Wall Form Given the conventional shutters, consumables and tools, assemble and dismantle wall form including props and tie rods for a wall as per sketch with the variation in plumb not exceeding 3mm over 6m height or 6mm over entire height whichever is less, variation in thickness not exceeding –3mm/-6mm and variation in linear line not exceeding +/-12mm.	Knowledge of marking layout; techniques of assembly, alignment, supporting, deshuttering; pockets and embedment; tackling formwork problems during concrete placing; release agents; repetitions of formwork; tolerance in line, level and dimensions; safe handling and working; house keeping.
Handling, Erecting and Dismantling Conventional – Curved Wall Form Given the conventional shutters, consumables and tools, assemble and dismantle wall form including props and tie rods for a wall as per sketch with the variation in plumb not exceeding 3mm over 6m height or 6mm over entire height whichever is less, variation in thickness not exceeding –3mm/-6mm and variation in linear line not exceeding +/-12mm.	Knowledge of marking layout; techniques of assembly, alignment, supporting, deshuttering; pockets and embedment; tackling formwork problems during concrete placing; release agents; repetitions of formwork; tolerance in line, level and dimensions; safe handling and working; house keeping.
Handling, Erecting and Dismantling Conventional FW – Beam Form Given the conventional shutters, consumables and tools, assemble and dismantle beam form over the erected staging including props and tie rods for a beam as per sketch with the variation in level not exceeding 3mm over 3m length or 10mm over entire length whichever is less, variation in cross sectional dimension not exceeding – 3mm / + 6m and variation in linear line not exceeding + / - 3mm in 3m.	Knowledge of marking layout; techniques of assembly, alignment, supporting, deshuttering; pockets and embedment; tackling formwork problems during concrete placing; release agents; repetitions of formwork; tolerance in line, level and dimensions; safe handling and working; house keeping.
Handling, Erecting and Dismantling Conventional Beam/Slab Form Given the conventional shutters, consumables and tools, assemble and dismantle beam form over the created staging including pros and tie rods for a beam as per sketch with the variation in level not exceeding 3m over 3m length or 10mm over entire length whichever is less, variation in linear line not exceeding +/- 3mm in 3m. Given the conventional shutters, consumables and tools, assemble and dismantle slab form including props for a slab as per sketch with the variation in level not exceeding 3mm over 3m length or 10mm over entire length whichever is less and variation in linear line not exceeding +/- 12mm.	Knowledge of marking layout; techniques of assembly, alignment, supporting, deshuttering; pockets and embedment; tackling formwork problems during concrete placing; release agents; repetitions of formwork; tolerance in line, level and dimensions; safe handling and working; house keeping.

LIST OF TOOLS AND EQUIPMENTS

FOR COURSES:-

Shuttering Carpenter
LIST OF TOOLS AND EQUIPMENTS-CARPENTER

NAME OF THE TOOLS	QUANTITY
1 Claw Hammer 2 Lb.	10 Nos.
2 Ball Pin Hammer 2 Lb.	10 Nos.
3 Handsaw 18”	10 Nos.
4. Tenon Saw 12”	10 Nos.
5 Wooden Jack Planner 15”	10 Nos.
6, Iron Jack Planner 12 ”	10 No.
7.Wooden Marking Gauge cum Mortise Gauge	10 Nos.
8.Spirit Level 12” Long	10 Nos.
9.Tri-square 12”	10 Nos.
10. Auger – 1/2”, 3/4”, 1”	3 Nos. each
11.Steel Measuring Tape – 3 Mtr. & 5 Mtr.	5 Nos. each
12 Farmer Chisel – 1/2”	10 Nos.
13Farmer Chisel 1”	10 Nos.
14. Mortise Chisel ¼”	10 Nos.
15. Mortise Chisel ¾”	10 Nos.
16. Bevel edge Chisel 1”	10 Nos.
17. Bevel edge Chisel 1/4”	10 Nos.
18. Bevel edge Chisel 1/2”	10 Nos.
19. Cutting Pliers 8”	10 Nos.
20. Screw Driver 10”	10 Nos.
21.Star Screw Driver 10”	10 Nos.
22 Marking Knife	05 Nos.
23. Scriber	05 Nos.
24.Wooden Mallet	10 Nos.
25.Oil Stone (curborundum)	10 Nos.
26.Cutting Chisel 4”	10 Nos.
27.Centre Punch	10 Nos.
28. Bench Vice 10”	10 Nos.
29.Hacksaw Frame with blade 12”	10 Nos.
30. Triangular file – 6 mm (Medium)	10 Nos.
31. Half Round File 1” x 12” Long (Smooth)	10 Nos.
32. Flat File 1” x 12” (Smooth)	10 Nos.
33. Heavy duty electrical drill machine with Bit 8” Dia.	03 Nos.
34. Drill Bit – 8, 12, 16, 18, 22 mm (Straight Shaft) (5*2 Nos.)	10 Nos.
35. Plumb Bob – 200 g	10 Nos.
36. Ring Spanner – 21 / 23, 20 / 22, 18 / 19 (3 each in a set)	10 sets.
37. Double End Spanner – 21 / 23, 20 / 22, 18 / 19 (3 each in a set)	10 sets.
38.Screw Spanner 12” LM	10 Nos.
39.” L “ Square	05 Nos.
40.” T ” Bar Cramp (04 ft.)	04 Nos.

41.” T ” Bar Cramp (02 ft.)	04 Nos.
42 Gimlet	10 Nos.
43. “ G “ or “ C “ Cramp (8 “)	05 Nos.
44. Gauge Blocks	10 Nos.
45. Thread	10 Nos.
46. Safety Goggles	10 Nos.
47. Safety Helmet	10 Nos.
48. Cotton Hand – Gloves (10 * 2)	10 Nos.
49. Tools Bag	10 Nos.
50. Safety Belt	10 Nos.
51. Face Mask	10 Nos.
52. Safety Shoes (Assorted Size)	10 Nos.
53 Ear Muff	10 Nos.
54. Bevel square	10 Nos.

Plywood & Wood Consumable Cost

1 Water Proof Plywood (8’ x 4’ – 12 mm)	60 Nos
2 Water Proof Plywood (8’ x 4’ – 19 mm)	3 Nos
3 Koungu Wood Scantlings	34.6 Cft
4 Silver Wood	92.6 Cft
5 Commercial Ply & Boards	120 Nos
6 Sun mica	20 Nos

Consumable

1. Wire Nails 1 ½,	20 kgs.
2. Wire nail 2 ½ & 3 ”	75 Kgs
3. Diesel	20 Ltrs.
4. Grease	5 Kgs
5. Cotton Waste	10 Kgs
6. Glue	10 Kgs

System Components & Materials

I Heavy Duty Tower System: -

1 Basic Frame 0.9 M 25.71 4 103
2 Basic Frame 1.2 M 30.00 22 660
3 Basic Frame 1.8 M 38.82 16 621
4 Bracing D 9.152 3.56 2 7
5 Bracing D 12.152 3.88 3 12
6 Bracing D 18.152 4.73 2 9
7 Bracing H.152 3.16 8 25
8 Bracing D 9.225 4.90 2 10
9 Bracing D 12.225 5.14 35 180

10 Bracing D 18.225 7.50 14 105
11 Bracing H.225 4.62 56 259
12 H.D. Coupler 0.93 32 30
13 Tower Spindle 12.10 92 1113
14 Foot Plate 2.04 52 106
15 U Head 3.10 40 124
16 Spring Lock Pin Dia 16mm 0.24 168 40
17 Brace Stirrup 2.93 45 132
18 Beam Span 2230 21.00 36 756
19 Short Prop 11.26 20 225

II Flex Floor System: -

20 Floor Prop CT 410 (SN) 19.00 10 190
21 Folding Tripod 11.80 37 437
22 Four-way Head H 16 3.54 49 173
23 Supporting Head H 16 1.16 4 5

III Wall / Column System: -

24 Steel Waling 1.20 M 23.60 16 378
25 Steel Waling 2.40 M 47.02 20 940
26 Splice Plate 7.45 4 30
27 20 x 130 Connecting Pin 0.42 40 17
28 Universal Outside Fixing 4.78 16 76
29 Top Scaffold Bracket 60 14.10 2 28
30 Tie Rod 18 x 5 – 1.0 M Long 1.62 36 58
31 Tie Rod 18 x 5 – 1.5 M Long 2.43 8 19
32 Anchor Plate 12 x 12 – 16 Thick 1.80 136 245
33 Anchor Plate 12 x 6 0.90 16 14
34 Wing Nut 18 x 5 0.40 152 61
35 Supporting Bracket 7.17 26 186
36 Foot Adapter 9.64 26 251
37 Head Adapter 6.80 52 354
38 Swivel Coupler 50 x 40 1.25 5 6
39 Swivel Coupler 40 x 40 1.20 20 24
40 Floor Prop CT 340 (DN) 16.81 18 303
41 Floor Prop CT 410 (DN) 20.00 8 160

IV Beam Forming System: -

42 Beam Forming Support 8.00 64 512

V Stair Tower System: -

43 Stair Bracket 225 Left 21.00 4 84
44 Stair Bracket 225 Right 21.00 4 84
45 Inner Hand Railing 225 4.05 4 16
46 Intermediate Railing 225 5.20 4 21
47 Connection Angle 225 7.09 8 57
48 Grid Iron (600 x 300 mm) 4.94 32 158

Carpentry Machinery

	NAME OF THE MACHINE	**QUANTITY**
.	1 Portable power planer.	02 Nos.
	2 Portable power saw.	02 Nos.
	3 Portable power drill machine.	02 Nos.
	4 Portable power router.	01 Nos.
	5 Portable power sander	01 Nos.

REDESIGNED MODULES FOR THE SECTOR

OF

HIGHWAY WORKS SUPERVISOR (CONSTRUCTION)

Under
MODULAR EMPLOYABLE SKILLS (MES)

Redesigned in
2014

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

PREFACE

Good quality roads are considered to be the backbone of any kind of development in any country. And, development is always, a continuous process. Hence, there are vast opportunities for Highway Works Supervisors in getting employment. The trainees who successfully complete this Module, which is of 300 hours' duration, can independently supervise the construction of highways.

GENERAL INFORMATION

Name of Sector	Construction
Name of Module	**Highway Works Supervisor**
MES Code	CON711
Qualification Pack Code	
Competency as per NCO Code	
Duration of Course	500 Hrs
Entry Qualification of Trainee	Inter pass, ITI, 3rd year Diploma appeared + CON704
Age	18 years & above
Unit Size	20

Power Norms	2 KW
Space Norms	60 sqm
Job Role	To supervise the construction of various components of road, such as sub-grade, sub-base, bituminous base, wearing coat, cement concrete base, bridges & culverts.
Instructor's Qualification	3 years Diploma in Civil Engg.
Desirable Qualification	CITS

Course Contents for the Module of

Highway Works Supervisor (CON221)

1. HIGHWAYS

Theory	Practical Components
Sub-grade soils	Types of sub-grade soils, types of tests, behavior of soils in moisture conditions, suitable soils.
Components	Sub-grade, sub-base, bituminous base/wearing coat, cement concrete base/wearing coat, bridges, culverts.
Mix designs	Normal mix, design mix, target strength, procedure for mix designs, Research lab/Universities.
Construction	Construction of various components of roads, sub-grade, sub-base, bituminous base, wearing coat, cement concrete base, bridges, culverts.
Embankment/sub-grade construction	Suitable soils for embankment, thickness of layers, side earth/barrowed earth, testing destiny of soils, compaction of soils.
Sub-grade construction	Suitable materials, suitable soils for embankment, thickness of layers, side earth/barrowed earth, testing destiny of soils, compaction of soils, equipment for compaction.
Sub-base courses	Types of sub-bases, materials used for sub-base, granular sub-base, purposes, drainage layers, gradation of GSB, coarser/closely graded, density, CBR values.
Base courses	Types, gradation, layers, compaction/density.
Bituminous base & surface courses	Bituminous base courses, semi-grout, bituminous macadam, dense bituminous macadam, bituminous wearing coat, bituminous carpet BC, SDBC, MSS, OGPC.
Cement concrete roads	Base courses, dry lean concrete mix, PCC 1:3:6. M30/M35, mixing & placing, compaction, curing, expansion joints & construction joints.
Shoulders	Earthen/gravel, side earth/barrowed earth, testing density of soils, compaction of soils.
Hot mix production	Hot mix plant, bituminous tank, loading, transporting, heating, pumping, belt conveyor, placing, laying compacting & finishing.
Compaction	Equipments, rollers-static, vibratory, sheep foot, smooth finish, soil compactor, pneumatic tired roller, density checking.

Equipments	Construction equipments, machinery, compaction equipments, spreading/ laying, transporting, production plant, quality control.

2. BRIDGES & CULVERTS

Bridges	Types of bridges-T beam, bowstring girder, suspension, movable steel, masonry arch, pre-stressed concrete, steel.
Culverts	Types of culverts-pipe, cut stone slab, box, arch, slab.
Components of bridge	Sub-structure-foundations, piers, abutments, wing walls, returns. Superstructure-girders, deck slab, backing walls, wearing coat, approach slabs, hand rails, drainage, bearings, expansion joints.
Foundations	Open foundation, shallow, deep, pile, well & raft.
Construction of sub-structure	Excavation of foundation, construction of foundation, construction of abutments, piers, sinking of wells, driving of piles.
Construction of superstructure	Bed blocks, slabs,-solid deck slab, girder slab, segmental block, backing wall, construction, etc.
Form work	Wooden, casuarinas, steel, fibre.
Revetment	Thickness, gravel packing, slopes, road side slopes, culverts, bridges, protective works like rigid aprons, loose aprons, cutoff walls.
Procedure of backfilling	Filling backside of the abutments, materials, compaction, weep holes, fitters.

3. ROAD APPURTENANCES

Road appurtenances	Sign boards, road markings, traffic signs, Kilometer stones, road delineators, fencing, tubular steel railing, concrete crash barrier, metal beam crash barrier, traffic signals, junction boards, guide stones, guard stones, boundary stones, studs.

4. QUALITY CONTROL

Quality control tests	Soil testing, tests for aggregate, cement, bitumen, extraction test, density of compacted layers.

MAINTENANCE

Maintenance	Maintenance of bituminous pavements, pot holes, patch repairs, maintenance of concrete roads clearing drainage spouts, pre-monsoon & post monsoon inspection of cross drainage works, silt clearance, inspection of bearings.

5. MORT&H SPECIFICATION

MORT&H Specification	300, 400, 500, 600, 900, 1500, 1600, 1700, 2200, 2300.

List of Tools & Equipments for the Module Of HIGHWAY WORKS SUPERVISOR

Testing and Certification

List of Trade Committee Members

REDESIGNED MODULES FOR THE SECTOR

OF

JUNIOR RURAL ROAD LAYER (CON119) (CONSTRUCTION)

Under
MODULAR EMPLOYABLE SKILLS (MES)

Redesigned in
2014

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

PREFACE

Good quality roads are considered to be the backbone of any kind of development in any country. And, development is always, a continuous process. Hence, there are vast opportunities for Junior Rural Road Layers in getting employment. The trainees who successfully complete this Module, which is of 300 hours' duration, can do most of the work related to construction of roads, independently. They also have the option for joining the next higher Module, namely, "Senior Rural Road Layer"

GENERAL INFORMATION

Name of Sector	Construction
Name of Module	**Junior Rural Road Layer**
MES Code	CON713
Qualification Pack Code	
Competency as per NCO Code	
Duration of Course	500 Hrs
Entry Qualification of Trainee	5th Passed
Age	18 years & above
Unit Size	20
Power Norms	2 KW
Space Norms	60 sqm
Job Role	To assist in construction of road.
Instructor's Qualification	NCVT in relevant trade Or 3 years Diploma in Civil Engg.
Desirable Qualification	CITS

Course Contents for the Module of

Junior Rural Road Layer

1. MEASUREMENTS AND MENSURATION

Theory	Practical Components
Linear & angular measurements.	Reading various measuring tools for calculating linear & angular measurements.
Areas & volumes of different shapes.	Problems on calculation of areas & volumes.
Identification of tools & equipments used in construction work.	Care & maintenance of tools & equipments.
Different construction materials.	Systems of units and their conversion.
-do-	Measurement of length, width 7 depth in MKS, FPS & SI systems.

2. MARKING OF ROADS

Road laying, needs, types & uses of roads.	Marking road width for rural road.
Technical terms & fixing of alignment.	Marking centre line of road.
Tools, equipments & materials used in road laying.	Acquainting tools.
Duties of Labour & Maistry in road making.	Visit to nearby road site.
Marking of height of embankment using 12 mm steel rods.	
Marking of formation width using steel rods & rope. Top 24’ & bottom 27’ wide.	
Clearing the shrub jungle.	
Marking a gap land width between toe of road and borrow pits on either sides of road.	
Marking depth & width of borrow pits.	

EXCAVATION OF ROADS

Tools for excavation.	Excavation of earth in borrow pits up to a depth of 1’ 6” and doing formation.
Classification of soil.	Excavation with SS 20A specification & rate.
Rates of excavation as per prevailing SSR.	Excavation with SS 20B specification & rate.
Leaving thandhus in borrow pits for measurement.	-do-
Wages under NREGS. Breaking of clods & dressing of road as per SS 20A.	Quantum of excavation & formation for getting full wages under NREGS.

3. CAMBER & CURVES IN ALIGNMENT

Importance of providing camber & use camber rods.	Making curves in alignment.
Importance of super elevation.	Minor CD works using hume pipes, leaving gaps in formation.
Making curves in alignment, minor CD works using hume pipes, leaving gaps in formation.	

4. STONE QUARRIES

Standard specifications, gravel for sub-base, blindage.	Identification of gravel/stone quarries nearby to worksite.
Standard specification of HG metal/trap metal.	Transporting good gravel & good quality stone boulders to road site and stacking required quantity hectometer-wise.
Tools for breaking stone.	Breaking of stones, providing sieves.
Sieve designations.	Sieving.
Size of metal required as per standard specification & as per estimate.	Pas through sieve No...& retain on sieve No...

CONSTRUCTION OF CD WORKS

Design of ventage for construction of CD works.	Acquainting measuring tools, method of taking measurements.
Construction details of hume pipe culverts & RCC 1 vent & 2 vent culverts.	Calculating quantities & working out value of work done.
General rules for measurement.	Verification of correctness of formation as per mark out & rectification, if required.

5. VERIFICATION OF CAMBER

Verification of camber & correction.	Providing sub-base with good granular gravel, spreading gravel with hollow boxes for loose thickness of gravel proposed.
Consolidation with power roller.	Consolidation of gravel sub-base with power roller 8-10 T and watering.
Making diversion of traffic.	-do-

6. VERIFICATION OF QUANTITIES

Calculation of quantity of 60-75 mm size metal& blindage gravel for 100 m length.	Spreading of metal using hollow boxes of 100 mm height to maintain consolidated thickness of 75 mm with camber correction, if any.
Verification of quantities, collection of short fall of quantities.	Consolidation of metal with power road roller 8-10 T.
Watering & spreading of blindage gravel and consolidation, providing berms & consolidation.	
Spreading metal using hollow boxes of 150 mm height to maintain consolidated thickness of 75 mm with camber correction, if any,	

7. QUALITY CONTROL TESTS

Quality control aspects.	Tests required for quality control.
Material and test standards.	-do
Interaction with trainees-giving topics for group discussion-formation of groups.	

List of Tools & Equipments for the Module
Of
JUNIOR RURAL ROAD LAYER

Sl. No.	Description	Quantity
1	Measuring steel tape 3 m	6
2	Measuring steel tape 15 m & 30 m	6 each
3	Compacting/vibrating roller	4
4	Excavator	6
5	Dumper	6
6	Water tanker	4
7	Dozer	5
8	Grader	5
9	J C B (Excavator/ Loader)	1
10	Crow bar	6
11	Spade	6
12	Panja	6
13	Mortar Pan	6
14	Pegs	20
15	Straight edge	6
16	Peacocks	6

MES

SYLLABUS FOR THE TRADE OF MASON

Name :	Mason
Sector :	Construction
Code :	CON 714
Entry Qualification :	Vth Standard
Age :	18 Years & above
Duration :	500 hours

Terminal Competency

- Should be able to identify, select and practically use the masonry tools.
- Should be able to identify, select and know the use of building materials used in masonry works.
- Should be well versed with the safety procedures with selection and use of safety tools and equipments.
- Should have knowledge of good housekeeping practices, Handling of materials and waste disposal.
- Should be able to construct one brick corner and T junction wall up to 3 feet.
- Should be able to construct one and half brick corner wall up to height of 3 feet.
- Should be able to construct one and half brick and one brick T junction up to height of 3 feet.
- Should be able to fix door and window frame in line, level and plumb.
- Should be able to construct attached and detached piers in brick masonry.
- Should be able to plaster a straight wall and make drip course with cement sand mortar.
- Should be able to perform foundation work up to DPC level.
- Should be able to construct a junction manhole.
- Should be able to lay IPS and mosaic floor in panels with neat finish.
- Should be able to construct block work for corner and T junction.
- Should be able to assess the requirement of materials for a specific work.
- Should be able to calculate the quantum of work done.

COURSE CONTENTS:-

Practical Competencies	**Underpinning Knowledge(Theory)**
• Identification of tools and equipments used in masonry work • Use of protective clothing, boots, goggles and equipment as applicable to a task • Good house keeping practices, proper handling of materials and waste disposal. • Safety precautions and safety belts while working at site • Store/lay materials at work in safe manner • Use and store of tools and equipments in a safe • manner • Measurement length, breadth and height in MKS & FPS system	• Role of Mason. • Description of trade • Different types of tools and equipments used in masonry work. • Safety precautions • While using different hand tools • While using raw materials • With co-workers • On the machines & equipments • Study of various types of building • materials used in masonry work • Knowledge of measurements and its conversion to other system
• 1 Brick Wall `T' Junction English	• Basic marking out bonding, cutting bricks,

Bond From a simple sketch or drawing build a 1 brick wall square junction of approximately 250 bricks 3‟ 9” x 3‟ 0” high within permissible tolerances	brick stacks, wheel barrows, mortar pan, safety, eye protection site tidiness.
• 1 ½ Brick Wall Corner English Bond From a simple sketch or drawing build a 1 ½ brick wall corner of 6‟ 0” x 6‟ 0” x 2‟ 0” high of approximately 320 within permissible tolerances	• Marking out, bonding, cutting bricks, hand tools, brick stacks, mixing platform, wheelbarrow, safety, eye protection, site tidiness.
• **1 x 1 ½ Brick Wall `T' Junction English Bond** From a simple sketch or drawing build a 1 x 1 ½ brick wall square junction of approx. 175 bricks 4‟ 9” x 2‟ 3” and 2‟ 0” high within permissible tolerances	• Marking out, loading, cutting bricks, hand tools, brick stacks, mixing platform, safety, eye protection & site tidiness.
• **Skill consolidation – Fixing Window Frames & Door Frames** From a layout plan and working with another trainee, build a cubicle 10‟0” x 8‟0” and 10‟0” high, fixing from layout plan a door frame and window frame so that frames are in correct specified position , frames are plumb to a tolerance of 1/16, head of frames to be leveled in relationship of threshold to finished floor level.	• Reading basic layout plan, setting out, handing frames, fixing frames, fixing wood pads, M/S hold fast, rawl plugs, fixing and checking for squareness and taking remedial action. Stores requisition and information sheets. Sills and lintels. Working at heights, ladders / scaffold
• Plastering Plaster a wall with 1:6 cement mortar of 12 mm thickness on a wall of 10 ft x 8 ft including surface preparation and temporary staging	• Measuring rule of plaster
• Construction of Attached Piers Construct from simple sketch a brick attached pier to ½ brick wall of approx. 150 brick within a tolerance of + (-) 1/16 level to gauge and plumb one end stopped and one end toothed.	• Simple drawings of attached piers. Cutting squint bricks, use of gauge, bonding methods, plumbing points, setting out.
• Construction of Detached Pier Construct from simple sketcher brick free standing pier on 2 brick and 1 ½ brick footing of approx. 60 bricks, within a tolerance of + (-) 1 /16 level to gauge, plumb and square.	• Plumbing points, simple drawings, setting out using gauge, bonding arrangements.
• Foundation work up to DPC Set out and level to a sketch brick foundation for a 1 ½ brick plinth with 3 footings up to DPC check by	• 3, 4, 5 method measuring tape, use of pegs, line and pins. Simple footing sketches / drawings.

bricks squares and diagonals, no tolerance permitted	
• **Building Junction Manhole** Construct from simple drawings manhole 3‟0” x 3‟ 0” and 3‟ 0” deep (approx. size only and finish by fixing pipes and channels, bench manhole with lime concrete, positioning step iron, corbelling, lifting and fixing precast cover. Standard to met local practice to correct fall levels and each corbel into project more than ¼ brick. Complete with rendering internal surfaces leaving all pipes and channels clean.	• Calculation of corbel courses, fixing of step irons to correct position; GSW pipes. Safety in building new and working in existing manholes.
• IPS and Mosaic Flooring with skirting Lay IPS (1:2:4, 50 mm thick) and mosaic floors of (1:2:4, 38 + 12 mm thick) in panel of 2 ft x 2 ft in given slope and including base course of PCC and perfect finish within tolerances	• Various types of flooring
• Drip Course Make a drip course with 1:4 cement mortar	
• Block work Make a enclosure of internal size 6 ft x 6 ft x 3 ft in 1:4 cement mortar	
• Industry and construction site visit	

PLUMBER

Name : Plumber

Sector : Construction

Code : CON 715

Entry Qualification : Vth Standard

Age : 18 Years & above

Duration : 500 hours

Terminal Competency

1. Should be able to identify& select the plumbing tools.
2.Capable to identify & select the plumbing materials and fittings.
3.Capable to performed work with safety following safety procedures with suitable PPE..
4.Capable to cutting in wall as per drawing using suitable tools & equipments and filling the wall with same replaced material with new finish.
4.Capable to select waste disposal place as categories.
5.Capable to perform cutting, threading of GI pipes. Should be able to tighten the GI pipe line .Capable be able to perform supporting activities on wall like drilling, nailing, clipping and hammering.
6.Capable to fix Sanitary Pipeline, including gas pipe waste pipe line horizontally and vertically .
7. Capable to fill mortar in the joints of RCC pipes (After fixing done by plumber)
8. Capable to handling sanitary bathroom fitting.
9. Knowledge about concrete mixture proportion.
9. Capable to encase light weighed pipes with concrete
10. Capable to replace broken sanitary and bathroom fittings with new one.
11. Capable to fix PVC pipes ,sanitary, Over head tank fittings.
12. Capable to install water pumps and connect to supply lines with minimum bend
13. Capable to assess the requirement of materials for a specific work.
14.Knowledge about fitting sequence[to protect water Pressure fall .
15. Capable to check the rough digging done by the assistance, before fitting installation.

Course content

Practical Competencies	Underpinning Knowledge(Theory)
Identification of tools and equipments used in plumbing work Use of protective clothing, boots, goggles and equipment as applicable to a task Good house keeping practices, proper handling of materials and waste disposal. Safety precautions and safety belts while working at site Store/lay materials at work in safe manner Use and store of tools and equipments in a safe manner Measurement length & dia in MKS & FPS system	Role of Plumber. Description of trade Different types of tools and equipments used in plumbing work. Safety precautions ▪ While using different hand tools ▪ While using raw materials ▪ On the machines & equipments Study of various types of plumbing materials used in plumbing work Knowledge of measurements and its conversion to other system

Taps & Valves Given a selection of taps and valves and following demonstration by instructor the trainee will dismantle taps & Valves, inspect packing glands and washers, replace packing gland and washers, adjust locking nuts ensuring no leaks when tested.	Working principles and methods of testing. Use of basic tools and bench vice. Safe handling of tools and fittings. Types of gland packing.
Cutting/Threading/Bending G.I. Pipes	
From a given sketch, calculate and measure length of G.I. pipe required. Mark out and cut to size. Thread and Bend G.I. Pipes to within given tolerances:- Marking out & Cutting to ± 1mm Bending/off Setting to the following Quality & Tolerances:- Free from throating, rippling and abnormal marks. Pipe diameter to be maintained, no distortion. Angle of bends and off sets, accurate to ± 1°.	Use of Hand tools, Measuring & Mark out tools, Cutting Tools, Bending Machine, Stock & Dies, Pipe Vice, Lubrication, Interpreting basic sketches & drawings.
Jointing/Assembling G.I. Pipes Using completed items of above activity and from given drawing, assemble G.I. Pipe with fittings supplied:- Final assembly to be within a dimensional tolerance of ± 2mm. Excess traces of jointing material to be removed. Not more than three threads to be variable after tightening of fittings. All fittings to be assembled square. Surface of pipe & fittings must not be damaged.	Knowledge of various types of pipes with colour code and selection of pipe as per work specific uses Pipe fittings, methods of joint. Types of pipe and fittings. Chain Wrench.
P.V.C. Pipe Bending From a given sketch, calculate and measure length of pipe required, mark out and cut to size. Bend P.V.C. pipe to 5 times diameter of pipe:- Pipe diameter to be maintained no distortion. Free from abnormal marks.	Knowledge of operations with G I Pipes selection of Die method of cutting ,Threading. Use of blowlamp and flame control. Uniform heating. Avoidance of burning. Bending on former.
P.V.C. Jointing From a given sketch and with necessary tools join p.v.c. pipe with socket joints so that joint length is not less 1.5 time pipe diameter. Assemble exercise and secure with solvent cement to tolerance of ± 2mm & square to ± 1°.	Use of hand tools, beveling reamer, applying heat with blow lamp. Preparation of Socket, Cleanliness. Application of solvent cement assembly methods. How pressure of liquid increase or decrease depends on selection of
S.W. Pipe Laying / Jointing Working with another trainee in his group, from a given sketch and with necessary tools, lay and join S.W. Pipes to correct fall and alignment. Remove surplus materials and test to meet local custom & practice.	Leveling and joining methods. Drain gradients use of sight rails. Testing methods, smoke / ball/air/water tests.
Cast Iron Cutting & Joining. Working with another trainee in his group and from a given sketch cut and Join Cast Iron pipe, Set up and secure to correct alignment. Seal using lead on one joint and cement or putty on others.	Safety in handling lead. Methods of jointing cast iron pipes. Reasons for joining methods, when and where to use. Use of chain wheel, melting pots, ladle, splash stick, caulking chisel. Introduction to gasket.
Fixing Sanitary Fixtures Fix low level water closet and connect to solid stack, seal connections and test to meet By – laws in local authority.	Handling and lifting sanitary fixtures. Care in fitting & leveling. By – laws in local authority.

Installing Water Pump, Connecting Supply Pipe Position, level, fix and secure pump to pump base. Connect supply pipes, foot valves etc to ensure air tight connections. Test to meet by-laws in local authority.	Working principles of water pump and foot valve. Methods of connection.
Industry and construction site visit	

LIST OF TOOLS AND MATERIALS

For and Plumber"

S.No.	Description	Unit	Quantity		Total
1	Traditional & ratchet typePipe Die Set - 1/2" to 1" & 1 1/4" to 2"	Set		3 each	6
2	Pipe Wrench (Size No.8) & (Size No.12) Chain wrench 1”---4”	Set		6 each 2 Each	12 4
3	Pipe Vice (Size No.2) & (Size No.3)	Nos		4 each	8
4	Wooden Bench (3' x 6' height - 4')	Nos		3	3
5	Hammer Sledge (2 pound) & (1 pound)	Nos		4 each	8
6	Flat Chisel (1') & Point Chisel (1')	Nos		5 each	10
7	Flat Punch (1/2') & Point Punch (1/2')	Nos		5 each	10
8	Rawel Jumper Bit set (6 mm) & (8 mm)	Nos		5 each	10
9	Pipe Wheel Cutter (upto 2" cutting)	Nos		5	5
10	Spanner Set (Double End)	Set		2	2
11	Spirit Level (length 2 feet)	Nos		5	5
12	Tube Level (1/4" Hose White)	Mtr		30	30
13	Screw Spanner (Size No.12)	Nos		5	5
14	Screw Driver (1 1/2 feet) & (1 feet)	Nos		5 each	10
15	Grip Plier (266 - 10)	Nos		5	5
16	Pocker (Tapuria 871)	Nos		5	5
17	Cutting Pliers - Taparia	Nos		5	5
18	Hacksaw Frame with Blade	Nos		10	10
19	Try Square (small)	Nos		5	5
20	Plum Bob (Small)	Nos		5	5
21	Cocking Chisel (1 1/4")	Nos		4	4
22	Blow lamp	Nos		4	4
23	Trowel Mason (small) & (Big)	Nos		5 each	10
24	Spade with handle	Nos		5	5
25	Mortar Pan	Nos		5	5
26	Hand Drilling Machine	Nos		1	1
27	Cleaning Brush & Painting Brush (2")	Nos		5 each	10
28	Oil Can (Small)	Nos		3	3
29	Chain Wrench (upto 3")	Nos		2	2
30	Hand Bending Machine (1/2" to 1")	Nos		3	3
31	Ladder (10 feet height)	Nos		2	2
32	Measuring Tape (5m)	Nos		5	5
33	Spun Yarn	Kg		50	50
34	Hydraulic Pressure Test Pump	No		1	1

36	Safety Shoes & Safety Helmet			20 each	40
37	Cotton Hand Gloves			20	20
1	GI Pipe $^1/_2$", $^3/_4$", 1", 1 $^1/_4$", 1 $^1/_2$", 2"	m		50 each	300
2	PVC Pipe $^1/_2$", $^3/_4$", 1", 1 $^1/_4$", 1 $^1/_2$", 2"	m		50 each	300
3	CI Pipes 4", 6" 2 M length	Nos		10	20
4	Lead and lead wool	kg		25	25
5	Stone Ware Pipe 4"	Nos		20	20
6	White Wash Basin	Nos		2	2
7	White I.W.C Cistern	Nos		2	2
8	White E.W.C (Normal)	Nos		2	2
9	White `p' Trap 4"	Nos		2	2
10	White `s' Trap 4'	Nos		2	2
11	White kitchen Sink	No		1	1
12	White Urinal (Flat)	No		1	1
13	White Urinal (magnon)	No		1	1
14	1/2" Bibcock (l) & (s)	Nos		5 each	10
15	1/2" Pillar cock & Angle Cock	Nos		5 each	10
16	1/2" Ball Valve	Nos		5	5
17	1" Gate Valve, Globe Valve & Check Valve	Nos		5 each	10
18	1" NRV	Nos		5	5
19	1" Foot Valve & 2” Foot Valve	Nos		3 each	6
	Pipe Fittings				
20	$^1/_2$" G.I. Elbow	Nos		10	10
21	$^3/_4$" G.I Elbow	Nos		10	10
22	1" G.I Elbow	Nos		10	10
23	$^1/_2$" $^3/_4$" G.I. Tee	Nos		30	30
24	1"x $^3/_4$", $^1/_4$" x $^1/_2$", 1"x $^1/_2$"	Nos		30	30
25	G.I Reducer Elbow 1"x $^3/_4$", 1" x $^1/_2$"	Nos		10 each	20
26	G.I Reducer Elbow $^3/_4$"x $^1/_2$"			10	10
27	G.I Coupling $^1/_2$" x $^3/_4$" x 1"	Nos		30	30
28	G.I Straight Reducer 1" x $^3/_4$" x 1 $^1/_2$"	Nos		30	30
29	G.I Bend $^1/_2$", $^3/_4$", 1"	Nos		30	30
30	G.I union $^1/_2$", $^3/_4$", 1"	Nos		30	30
	PVC Fittings				
31	All types pasted thread each	Nos		10	10
32	Solvent Cement	Litre		2	2
33	Shellac	Nos		20	20
34	Thread Ball	Nos		50	50

SCAFFOLDER

Name : Scaffolder
Sector : Construction
Code : CON716
Aligned to NCO- 2004/ 9312.10
Entry Qualification : Vth Standard and above
MES course on ' Assistant Shuttering Carpenter & Scaffolder'
Age : 18 Years & above
Duration : 300 hours

Terminal Competency

 Should be able to identify, select and use the scaffolding tools. Should be well versed with the safety procedures with selection and use of safety tools and equipments. Should have knowledge of good housekeeping practices, Handling of materials and waste disposal. Should be able to check, prepare, erect and dismantle the scaffolding for staging, stair case, access tower with walkways, platforms, railing and bracings. Should be able to assess the requirement of materials for a specific work. Should be able to calculate the quantum of work done.

COURSE CONTENTS:-

Practical Competencies Underpinning Knowledge(Theory)

Identification of tools and equipments used in scaffolding work Use of protective clothing, boots, goggles and equipment as applicable to a task Good house keeping practices, proper handling of materials and waste disposal. Safety precautions and safety belts while working at site. Measurement length, width & depth in MKS & FPS system.	Role of Scaffolder. Description of trade Different types of tools and equipments used in shuttering works. Safety precautions While using different hand tools While using raw materials With co-workers Knowledge of measurements and its conversion to other system
Handling, Erecting and Dismantling System FW-Staging Given the staging materials consumables and tools, erect staging as per sketch / oral instructions to tolerances up to + or – 25 mm for a height of 10 m. **Handling, Erecting and Dismantling System FW-Staging**	Knowledge of staging components, tools, principles & sequence of assembly & bracing, sole plates, supporting strata, tolerances in verticality and dimension, height to base ratio, safety for erection & dismantling, precautions at heights working platforms, handrails; house keeping.
Handling. Erecting and Dismantling System FW – Stair Tower Given stair tower materials and tools, erect stair tower as per sketch / oral instructions to tolerances of +/- 25 mm for a height of 10 m with platforms, handrails, stairs and landing complete	Knowledge of stair tower components, tools, principles & sequence of assembly & bracing, soleplates, supporting strata, tolerances in vertically and dimension, bracing levels, safety for erection & dismantling, precautions at heights, working platforms, handrails, house keeping.

Handling, Erecting and Dismantling System FW – Access Scaffold Form Given the L&T components of scaffolding materials and tools, erect scaffolding as per sketch/oral instructions to tolerances up to +/- 25mm for a height of 10 m including lateral supports, walkway platforms, handrails and toe boards.	Knowledge of L&T components; knowledge of marking layout; techniques of assembly, alignment, supporting, deshuttering; pockets embedment; tackling formwork; house keeping problems during concrete placing; release agents; repetitions of formwork; tolerances in line, level and dimensions.

Industry and construction site visit

LIST OF TOOLS AND EQUIPMENTS

FOR COURSES:-

Scaffolder

LIST OF TOOLS AND EQUIPMENTS-CARPENTER

NAME OF THE TOOLS	QUANTITY
1 Claw Hammer 2 Lb.	10 Nos.
2 Ball Pin Hammer 2 Lb.	10 Nos.
3 Handsaw 18”	10 Nos.
4. Tenon Saw 12”	10 Nos.
5 Wooden Jack Planner 15”	10 Nos.
6, Iron Jack Planner 12 ”	10 No.
7.Wooden Marking Gauge cum Mortise Gauge	10 Nos.
8.Spirit Level 12” Long	10 Nos.
9.Tri-square 12”	10 Nos.
10. Auger – 1/2”, 3/4”, 1”	3 Nos. each
11.Steel Measuring Tape – 3 Mtr. & 5 Mtr.	5 Nos. each
12 Farmer Chisel – 1/2”	10 Nos.
13Farmer Chisel 1”	10 Nos.
14. Mortise Chisel ¼”	10 Nos.
15. Mortise Chisel ¾”	10 Nos.
16. Bevel edge Chisel 1”	10 Nos.
17. Bevel edge Chisel 1/4”	10 Nos.
18. Bevel edge Chisel 1/2”	10 Nos.
19. Cutting Pliers 8”	10 Nos.
20. Screw Driver 10”	10 Nos.
21.Star Screw Driver 10”	10 Nos.
22 Marking Knife	05 Nos.
23. Scriber	05 Nos.
24.Wooden Mallet	10 Nos.
25.Oil Stone (curborundum)	10 Nos.
26.Cutting Chisel 4”	10 Nos.

27.Centre Punch	10 Nos.
28. Bench Vice 10”	10 Nos.
29.Hacksaw Frame with blade 12”	10 Nos.
30. Triangular file – 6 mm (Medium)	10 Nos.
31. Half Round File 1” x 12” Long (Smooth)	10 Nos.
32. Flat File 1” x 12” (Smooth)	10 Nos.
33. Heavy duty electrical drill machine with Bit 8” Dia.	03 Nos.
34. Drill Bit – 8, 12, 16, 18, 22 mm (Straight Shaft) (5*2 Nos.)	10 Nos.
35. Plumb Bob – 200 g	10 Nos.
36. Ring Spanner – 21 / 23, 20 / 22, 18 / 19 (3 each in a set)	10 sets.
37. Double End Spanner – 21 / 23, 20 / 22, 18 / 19 (3 each in a set)	10 sets.
38.Screw Spanner 12” LM	10 Nos.
39.” L “ Square	05 Nos.
40.” T ” Bar Cramp (04 ft.)	04 Nos.
41.” T ” Bar Cramp (02 ft.)	04 Nos.
42 Gimlet	10 Nos.
43. “ G “ or “ C “ Cramp (8 “)	05 Nos.
44. Gauge Blocks	10 Nos.
45. Thread	10 Nos.
46. Safety Goggles	10 Nos.
47. Safety Helmet	10 Nos.
48. Cotton Hand – Gloves (10 * 2)	10 Nos.
49. Tools Bag	10 Nos.
50. Safety Belt	10 Nos.
51. Face Mask	10 Nos.
52. Safety Shoes (Assorted Size)	10 Nos.
53 Ear Muff	10 Nos.
54. Bevel square	10 Nos.

Plywood & Wood Consumable Cost

1 Water Proof Plywood (8’ x 4’ – 12 mm)	60 Nos
2 Water Proof Plywood (8’ x 4’ – 19 mm)	3 Nos
3 Koungu Wood Scantlings	34.6 Cft
4 Silver Wood	92.6 Cft
5 Commercial Ply & Boards	120 Nos
6 Sun mica	20 Nos

Consumable

1. Wire Nails 1 ½,	20 kgs.
2. Wire nail 2 ½ & 3 ”	75 Kgs
3. Diesel	20 Ltrs.

4.	Grease	5 Kgs
5.	Cotton Waste	10 Kgs
6.	Glue	10 Kgs

System Components & Materials

I Heavy Duty Tower System: -

1 Basic Frame 0.9 M 25.71 4 103
2 Basic Frame 1.2 M 30.00 22 660
3 Basic Frame 1.8 M 38.82 16 621
4 Bracing D 9.152 3.56 2 7
5 Bracing D 12.152 3.88 3 12
6 Bracing D 18.152 4.73 2 9
7 Bracing H.152 3.16 8 25
8 Bracing D 9.225 4.90 2 10
9 Bracing D 12.225 5.14 35 180
10 Bracing D 18.225 7.50 14 105
11 Bracing H.225 4.62 56 259
12 H.D. Coupler 0.93 32 30
13 Tower Spindle 12.10 92 1113
14 Foot Plate 2.04 52 106
15 U Head 3.10 40 124
16 Spring Lock Pin Dia 16mm 0.24 168 40
17 Brace Stirrup 2.93 45 132
18 Beam Span 2230 21.00 36 756
19 Short Prop 11.26 20 225

II Stair Tower System: -

43 Stair Bracket 225 Left 21.00 4 84
44 Stair Bracket 225 Right 21.00 4 84
45 Inner Hand Railing 225 4.05 4 16
46 Intermediate Railing 225 5.20 4 21
47 Connection Angle 225 7.09 8 57
48 Grid Iron (600 x 300 mm) 4.94 32 158

III Climbing Scaffold System: -

49 Floor Form 1200 x 600 30.86 64 1975
50 Lapping Plate 1200mm 18.63 4 75
51 Floor Form Corner 1200 5.10 4 20
52 Floor Form Clamp 0.12 108 13
53 Pipe Waler Clamps 1.11 24 27
54 Waler Connector 1.80 16 29

IV Access Scaffolding System: -

55 Scaffold Frame 1.80 M 20.49 4 82
56 L.D. Coupler (for Frame) 1.04 4 4
57 Scaffold Spindle 5.22 4 21

58 L.D. Foot Plate 1.91 4 8
59 Bracing 2H-225 13.47 2 27
60 Scaffold Board 2250 x 300 M 20.50 20 410
61 H-16 Timber Beam – 2.40 M 50
62 H-16 Timber Beam – 3.60 M 40
63 H-16 Steel Beam – 1.80 M 40
64 H-20 Timber Beam – 1.80 M 20
65 H-20 Timber Beam – 2.40 M 4
66 H-20 Steel Beam – 1.8 M 10
67 H-20 Steel Beam – 2.4 M 46
68 C.T. Props – 410 S/N (G.I) 19 31 589
69 Ledger Pipe – 40mm – 10 RM 3
70 Ledger Pipe – 40mm – 6 RM 1
71 Ledger Pipe – 40mm – 5 RM 8
72 Flange Claw Assembly 100
73 M6bolt with wing nut 75 mm 250
74 Ledger Pipe – 40mm – 3 RM 10

Carpentry Machinery

	NAME OF THE MACHINE	**QUANTITY**
.	1 Portable power planer.	02
N	o	s .
	2 Portable power saw.	02 Nos.
	3 Portable power drill machine.	02 Nos.
	4 Portable power router.	01 Nos.
	5 Portable power sander	01 Nos.

REDESIGNED MODULES FOR THE SECTOR

OF

SENIOR LAND SURVEYOR (CONSTRUCTION)

Under
MODULAR EMPLOYABLE SKILLS (MES)

Redesigned in
2014

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

PREFACE

Good qualities are considered to be the backbone of any kind of development in any country. And, development is always, a continuous process. Hence, there are vast opportunities for **Senior Land Surveyor** in getting employment. The trainees who successfully complete this Module, which is of 500 hours' duration, can independently carryout survey/ levelling work needed for the different types of sites for construction.

GENERAL INFORMATION

Name of Sector	Construction
Name of Module	**Senior Land Surveyor**
MES Code	CON718
Qualification Pack Code	
Competency as per NCO Code	
Duration of Course	500 Hrs
Entry Qualification of Trainee	**10th passed and passed the course of Junior Land Surveying under MES**
Age	18 years & above
Unit Size	20
Power Norms	2 KW
Space Norms	60 sqm.
Job Role	After completion of the course one should be able to perform and survey work and handling of different types of tools, equipments and instruments used in

	surveying and application of Total station, different types of Leveling and Theodolite.
Instructor's Qualification	3 years Diploma in Civil Engg.
Desirable Qualification	CITS

Course Contents for the Module of Senior Land Surveyor

Sl. No.	PRACTICAL	Sl. No.	THEORY
1	Identification and handling of tools equipments and Instruments	1	Role of Surveyor
2	Practicing of measurements with Tape	2	Introduction and importance of survey
3	Measurement of Length, Width,Depth in M.K.S and F.P.S system	3	Objective and principle of Survey
4	Safety precautions to be taken while handling the Instrument	4	Safety Precautions I) While using different equipments 2) Adjustments to be made while handling certain tools
5	Practice of conversion from one system to others	5	Knowledge of units of measurements and their conversions to other systems.

Total Station

Sl. No.	PRACTICAL	Sl. No.	THEORY
1	Measurement of area, elevation, traversing, contour, etc. by using latest software	1	Function of total station equipments, method of plotting, levelling and traversing

THEODOLITE

Sl. No.	PRACTICAL	Sl. No.	THEORY
1	**Operating and setting up the Instrument**	1	Identification and understanding of parts in the equipment
2	Observation of readings and sighting the points from the Instrument	2	Technical terms used in the Theodolite
3	Measurement of horizontal angles by a) Repetition method b)Reiteration method	3	Temporary adjustments of the Instrument
4	Fixing of Curves	4	Procedure for measurement of Horizontal and Vertical angles
5	Measuring of horizontal angles	5	Methods of measuring horizontal angles
6	Drawing of curves	6	Types of Curves
7	Practice of curve settings	7	Methods of Curve setting

LEVELING

SL.NO.	PRACTICAL	SL.NO.	THEORY
1	Operating and setting up the Instrument	1	Identification and Equipments and their tools.
2	Observation of readings and sighting the points from the Instrument	2	Understanding of technical terms used in leveling
3	Transferring of Bench marks from one place to another place	3	Types and methods of leveling
4	Profile leveling	4	Calculation of reduced levels by using height of instrument and rise and Fall method
5	Cross sectioning.	5	Field procedures adopted in profile and cross section leveling
6	Calculation of areas and volumes from trapezoidal and Prismoidal formula	6	Calculation of areas and volumes from trapezoidal and Prismoidal formula
7	Practice of permanent adjustment of levelling Instruments	7	Procedure of permanent adjustment of levelling Instruments

Tools & Equipment

1. Theodolite Transit …… 4 nos.
2. Micrometre Theodolite Transit …… 2 nos.
3. Computer with latest configuration …… 4 nos.
2. Software for surveyors …… as required
3. Total Station (Digital Theodolite)
   For Educational purpose …… 1 no.

SYSTEM SHUTTERING CARPENTER (MES)

Name : **System Shuttering Carpenter Sector**
Construction Code : **CON719**
Aligned to N.C.O. – 2004 / 9312.10
Entry Qualification **:** preferably equivalent to 5th (normal literacy of reading , Writing and understanding) up to 10th standard.
MES course on „Assistant Shuttering Carpenter & Scaffolder"
Age : 18 Years & above.
Duration : 300 hours
Terminal Competency Should be able to identify, select and practically use the carpentry tools. Should be well versed with the safety procedures with selection and use of safety tools
and equipments. Should have knowledge of good housekeeping practices, Handling of materials and
waste disposal. Should be able to layout the foundation plan, identify the foundation system formwork,
handle, erect and dismantle the same within the tolerances. Should be able to layout the column plan, identify the column system formwork,
handle, erect and dismantle the same within the tolerances. Should be able to layout the straight and curved wall plan, identify the wall system
formwork, handle, erect and dismantle the same within the tolerances. Should be able to identify the beam and slab system formwork, handle, erect and
dismantle the same within the tolerances. Should be able to assess the requirement of materials for a specific work. Should be able to calculate the quantum of work done.

COURSE CONTENTS:-

Practical Competencies Underpinning Knowledge(Theory)

Identification of tools and equipments used in shuttering work. Use of protective clothing, boots, goggles and equipment as applicable to a task. Good house keeping practices, proper handling of materials and waste disposal. Safety precautions and safety belts while working at site. Store/lay materials at work in safe manner Use and store of tools and equipments in a safe manner Measurement length, width & depth in MKS & FPS system.	Role of System Shuttering Carpenter. Description of trade Different types of tools and equipments used in shuttering works. Safety precautions While using different hand tools While using raw materials With co-workers On the machines & equipments. Study of various types of system components used in system formwork. Knowledge of measurements and its conversion to other system
Handling, Erecting and Dismantling System Formwork- Foundation Form Given the system shutters, consumables and tools, assemble and dismantle foundation form	Knowledge of L&T components; knowledge of marking layout; techniques of assembly, alignment, supporting, deshuttering; pockets embedment; tackling formwork; house

including props and tie rods for a foundation as per sketch to a tolerance of -6mm / +25mm overall dimension, 2.5% of height and out-of-line not more than 1% of foundation width or 25mm which ever is less.	keeping problems during concrete placing; release agents; repetitions of formwork; tolerances in line, level and dimensions.
Handling, Erecting and Dismantling System Formwork – Column Form Given the components, shutters, consumables and tools, assemble and dismantle column form including props and tie rods for a column as per sketch to a tolerances of +/- 3mm in cross sectional dimensions and +/- 3mm for a height of 3m or +/-12mm over entire height whichever is less.	Knowledge of L&T components; knowledge of marking layout; techniques of assembly, alignment, supporting, deshuttering; pockets embedment; tackling formwork; house keeping problems during concrete placing; release agents; repetitions of formwork; tolerances in line, level and dimensions.
Handling, Erecting and Dismantling System FW – Wall Form Given the components, shutters, consumables and tools, assemble and dismantle wall form including pros and tie rods for a wall as per sketch with the variation in plumb not exceeding 3m over 6m height or 6mm over entire height whichever is less, variation in thickness not exceeding –3mm/+6mm and variation in linear line not exceeding +/- 12mm.	Knowledge of L&T components; knowledge of marking layout; techniques of assembly, alignment, supporting, deshuttering; pockets embedment; tackling formwork; house keeping problems during concrete placing; release agents; repetitions of formwork; tolerances in line, level and dimensions.
Handling, Erecting and Dismantling System FW – Curved Wall Form Given the components, shutters, consumables and tools, assemble and dismantle wall form including pros and tie rods for a wall as per sketch with the variation in plumb not exceeding 3m over 6m height or 6mm over entire height whichever is less, variation in thickness not exceeding –3mm/+6mm and variation in linear line not exceeding +/- 12mm.	Knowledge of L&T components; knowledge of marking layout; techniques of assembly, alignment, supporting, deshuttering; pockets embedment; tackling formwork; house keeping problems during concrete placing; release agents; repetitions of formwork; tolerances in line, level and dimensions.
Handling, Erecting and Dismantling System FW – Beam Form Given the components, shutters, consumable and tools, assemble and dismantle beam form over the erected staging including props and tie rods for a beam as per sketch with the variation in level not exceeding 3mm over 3m length or 10mm over entire length whichever is less, variation in cross sectional dimension not exceeding –3mm / + 6mm and Variation in linear line not exceeding +/- 3mm in 3m.	Knowledge of L&T components; knowledge of marking layout; techniques of assembly, alignment, supporting, deshuttering; pockets embedment; tackling formwork; house keeping problems during concrete placing; release agents; repetitions of formwork; tolerances in line, level and dimensions.
Handling, Erecting and Dismantling System FW – Beam/Slab Form	

Given the components, shutters, consumables and tools, assemble and dismantle beam form over the erected staging including props and tie rods for a beam as per sketch with the variation in level not exceeding 3mm over 3m length or 10mm over entire length whichever is less, variation in cross sectional dimension not exceeding –3mm / + 6mm and variation in linear line not exceeding +/- 3mm in 3m. Given the components, shutters, consumables and tools, assemble and dismantle slab form including props for a slab as per sketch with the variation in level not exceeding 3m over 3m length or 10mm over entire length whichever is less and variation in linear line not exceeding +/- 12mm.	Knowledge of L&T components; knowledge of marking layout; techniques of assembly, alignment, supporting, deshuttering; pockets embedment; tackling formwork; house keeping problems during concrete placing; release agents; repetitions of formwork; tolerances in line, level and dimensions.

Industry and construction site visit

LIST OF TOOLS AND EQUIPMENTS

FOR COURSES:-

System Shuttering Carpenter

LIST OF TOOLS AND EQUIPMENTS-CARPENTER

NAME OF THE TOOLS	QUANTITY
1 Claw Hammer 2 Lb.	10 Nos.
2 Ball Pin Hammer 2 Lb.	10 Nos.
3 Handsaw 18”	10 Nos.
4. Tenon Saw 12”	10 Nos.
5 Wooden Jack Planner 15”	10 Nos.
6, Iron Jack Planner 12 ”	10 No.
7.Wooden Marking Gauge cum Mortise Gauge	10 Nos.
8.Spirit Level 12” Long	10 Nos.
9.Tri-square 12”	10 Nos.
10. Auger – 1/2”, 3/4”, 1”	3 Nos. each
11.Steel Measuring Tape – 3 Mtr. & 5 Mtr.	5 Nos. each
12 Farmer Chisel – 1/2”	10 Nos.
13Farmer Chisel 1”	10 Nos.
14. Mortise Chisel ¼”	10 Nos.
15. Mortise Chisel ¾”	10 Nos.
16. Bevel edge Chisel 1”	10 Nos.
17. Bevel edge Chisel 1/4”	10 Nos.
18. Bevel edge Chisel 1/2”	10 Nos.
19. Cutting Pliers 8”	10 Nos.
20. Screw Driver 10”	10 Nos.
21.Star Screw Driver 10”	10 Nos.
22 Marking Knife	05 Nos.
23. Scriber	05 Nos.
24.Wooden Mallet	10 Nos.
25.Oil Stone (curborundum)	10 Nos.
26.Cutting Chisel 4”	10 Nos.
27.Centre Punch	10 Nos.
28. Bench Vice 10”	10 Nos.

29.Hacksaw Frame with blade 12”	10 Nos.
30. Triangular file – 6 mm (Medium)	10 Nos.
31. Half Round File 1” x 12” Long (Smooth)	10 Nos.
32. Flat File 1” x 12” (Smooth)	10 Nos.
33. Heavy duty electrical drill machine with Bit 8” Dia.	03 Nos.
34. Drill Bit – 8, 12, 16, 18, 22 mm (Straight Shaft) (5*2 Nos.)	10 Nos.
35. Plumb Bob – 200 g	10 Nos.
36. Ring Spanner – 21 / 23, 20 / 22, 18 / 19 (3 each in a set)	10 sets.
37. Double End Spanner – 21 / 23, 20 / 22, 18 / 19 (3 each in a set)	10 sets.
38.Screw Spanner 12” LM	10 Nos.
39.” L “ Square	05 Nos.
40.” T ” Bar Cramp (04 ft.)	04 Nos.
41.” T ” Bar Cramp (02 ft.)	04 Nos.
42 Gimlet	10 Nos.
43. “ G “ or “ C “ Cramp (8 “)	05 Nos.
44. Gauge Blocks	10 Nos.
45. Thread	10 Nos.
46. Safety Goggles	10 Nos.
47. Safety Helmet	10 Nos.
48. Cotton Hand – Gloves (10 * 2)	10 Nos.
49. Tools Bag	10 Nos.
50. Safety Belt	10 Nos.
51. Face Mask	10 Nos.
52. Safety Shoes (Assorted Size)	10 Nos.
53 Ear Muff	10 Nos.
54. Bevel square	10 Nos.

Plywood & Wood Consumable Cost

1 Water Proof Plywood (8’ x 4’ – 12 mm)	60 Nos
2 Water Proof Plywood (8’ x 4’ – 19 mm)	3 Nos
3 Koungu Wood Scantlings	34.6 Cft
4 Silver Wood	92.6 Cft
5 Commercial Ply & Boards	120 Nos
6 Sun mica	20 Nos

Consumable

1. Wire Nails 1 ½,	20 kgs.
2. Wire nail 2 ½ & 3 ”	75 Kgs
3. Diesel	20 Ltrs.
4. Grease	5 Kgs

5. Cotton Waste 10 Kgs

6. Glue 10 Kgs

System Components & Materials

I Heavy Duty Tower System: -

1 Basic Frame 0.9 M 25.71 4 103
2 Basic Frame 1.2 M 30.00 22 660
3 Basic Frame 1.8 M 38.82 16 621
4 Bracing D 9.152 3.56 2 7
5 Bracing D 12.152 3.88 3 12
6 Bracing D 18.152 4.73 2 9
7 Bracing H.152 3.16 8 25
8 Bracing D 9.225 4.90 2 10
9 Bracing D 12.225 5.14 35 180
10 Bracing D 18.225 7.50 14 105
11 Bracing H.225 4.62 56 259
12 H.D. Coupler 0.93 32 30
13 Tower Spindle 12.10 92 1113
14 Foot Plate 2.04 52 106
15 U Head 3.10 40 124
16 Spring Lock Pin Dia 16mm 0.24 168 40
17 Brace Stirrup 2.93 45 132
18 Beam Span 2230 21.00 36 756
19 Short Prop 11.26 20 225

II Flex Floor System: -

20 Floor Prop CT 410 (SN) 19.00 10 190
21 Folding Tripod 11.80 37 437
22 Four-way Head H 16 3.54 49 173
23 Supporting Head H 16 1.16 4 5

III Wall / Column System: -

24 Steel Waling 1.20 M 23.60 16 378
25 Steel Waling 2.40 M 47.02 20 940
26 Splice Plate 7.45 4 30
27 20 x 130 Connecting Pin 0.42 40 17
28 Universal Outside Fixing 4.78 16 76
29 Top Scaffold Bracket 60 14.10 2 28
30 Tie Rod 18 x 5 – 1.0 M Long 1.62 36 58
31 Tie Rod 18 x 5 – 1.5 M Long 2.43 8 19
32 Anchor Plate 12 x 12 – 16 Thick 1.80 136 245
33 Anchor Plate 12 x 6 0.90 16 14
34 Wing Nut 18 x 5 0.40 152 61
35 Supporting Bracket 7.17 26 186
36 Foot Adapter 9.64 26 251
37 Head Adapter 6.80 52 354
38 Swivel Coupler 50 x 40 1.25 5 6
39 Swivel Coupler 40 x 40 1.20 20 24

40 Floor Prop CT 340 (DN) 16.81 18 303
41 Floor Prop CT 410 (DN) 20.00 8 160

IV Beam Forming System: -

42 Beam Forming Support 8.00 64 512

V Stair Tower System: -

43 Stair Bracket 225 Left 21.00 4 84
44 Stair Bracket 225 Right 21.00 4 84
45 Inner Hand Railing 225 4.05 4 16
46 Intermediate Railing 225 5.20 4 21
47 Connection Angle 225 7.09 8 57
48 Grid Iron (600 x 300 mm) 4.94 32 158

Carpentry Machinery

	NAME OF THE MACHINE	**QUANTITY**
1.	Portable power planer.	02 Nos.
2	Portable power saw.	02 Nos.
3	Portable power drill machine.	02 Nos.
4	Portable power router.	01 Nos.
5	Portable power sander	01 Nos.

REDESIGNED MODULES FOR THE SECTOR

OF

JUNIOR LAND SURVEYOR (CON712) (CONSTRUCTION)

Under
MODULAR EMPLOYABLE SKILLS (MES)

Redesigned in
2014

By

Government of India

Ministry of Labour & Employment (DGE&T)

PREFACE

After successful completion of the Module “Junior Land Surveyor”, one can opt for joining the next level Module, namely, “Senior Land Surveyor”. One can do surveying independently, using chain, compass, cross staff, plane table, level, theodolite and other survey instruments, once he/she completes both these courses.

GENERAL INFORMATION

Name of Sector	Construction
Name of Module	**Junior Land Surveyor**
MES Code	CON712
Qualification Pack Code	
Competency as per NCO Code	
Duration of Course	500 Hrs
Entry Qualification of Trainee	10^{th} Passed
Age	18 years & above
Unit Size	20
Power Norms	2 KW
Space Norms	60 sqm
Job Role	To perform land survey for different types of construction and for measurement.
Instructor's Qualification	3 years Diploma in Civil Engg.
Desirable Qualification	CITS

Course Contents for the Module of
Junior Land Surveyor (CON712)

1. CHAIN SURVEY

Theory	Practical Components
Role of surveyor	Identification & handling of tools, equipments & instruments.
Importance of survey	Practicing measurements with tape.
Objectives & principles of survey	Measurement of length, width 7 depth in MKS & FPS systems.
Safety precautions, handling tools-adjustments to be made.	Taking measurements using chain.
Terms used in chain survey.	-do-
Systems of units & their conversion	Erecting of offsets with cross staff & chain.
Mensuration- area of rectangle, triangle, trapezium.	Location of boundaries & determination of area of a field using cross staff.
Types of chain	-do-
Locating ground features with offset.	Locating ground features.
Entering measurements in field book.	Chain survey of small plots by triangulation, booking & plotting.
Symbols used in plotting.	-do-
Calculation of area in cross staff survey.	Chain survey of an extensive area.

2. COMPASS SURVEY

Terms used in Compass survey.	Setting up a compass.
Types of compass & their adjustment.	Measurement of angles & bearings.
Bearings & angles.	Open & closed traverse.
Calculation & Conversion of bearings from one system to another.	More practice in compass survey.
Calculation of included angles in open & closed traverse.	-do-

3. PLANE TABLE SURVEY

Terms used, handling of tools.	Setting up a plane table.
Use of tools in plane table survey.	Sighting of points.
Procedure in plane tabling.	Radiation method
Methods plane tabling.	Intersection method
Errors in plane tabling.	More practice in plane tabling.

List of Tools & Equipments for the Module
Of
JUNIOR LAND SURVEYOR

Sl. No.	Description	Quantity
1	Abney level	2
2	Box sextant	4
3	Boning rod set	2
4	Binocular	8
5	Engg. Instrument box	20
6	Computing scale set-two hectares	6
7	-do-four hectares	6
8	Card board scale set	20
9	Drawing board	20
10	Engineers chain	8
11	Gunter's chain	4
12	Metric chain- 20 m & 30 m	8 each
13	Proportionate compass	20
14	Prismatic compass	4
15	Plan meter (Digital)	20
16	Metallic tape-20 m & 30 m	4 each

General Information

Name : Assistant Technician Dry Wall and False-Ceiling

Sector : Construction

Code : CON 720

Prequalification : Helper Level Certificate (desired)

Qualification : 5^{th} standard

Age : 18 years

Duration : 500 hrs

Faculty Qualification : ITI / Diploma in Construction related trades or equivalent having experience of conducting training of similar kind for minimum 2 to 3 years

Batch Size : : 20 Students

Power Norms : 1) Theory Room : 01 KW

2) Practical Room : 02 KW

Space / Size : Theory Room : 30 Sq Mtr.

: Practical Room : 60 Sq Mtr.

Programme Overview : This programme would make the learners qualified to take up jobs in construction sector for installing Dry Wall and False-Ceiling

Career Benefits : This course helps to equip an individual to understand the various systems in Dry Wall and False-Ceiling installation. With experience there will be a natural progression from an installer to contractor.

Placements : People who pass out / undergo this training can look for a job in the following construction segments (specific to Gypsum work)

- Hotel
- Hospital
- Residential
- Entertainment
- Industrial

- Infrastructure
- Commercial
- Employers - Medium to large contracting firms

Terminal Competency -

- After completion of the training period, the trainee would be able to understand the steps involved in installation of Dry Wall.
- Identification of material Installation of Fire-wall as per specification.
- Should be able to do planned and un-planned loading on Dry Wall, Curve-Partition, creation of niche and Dry wall skimming.
- Should be able to erect Twin frame Dry wall, ledge wall for WC, install vanity counter / wash basin, tiling work. Knowledge of passing services and water proofing. Estimation of labour and material.
- After completion of the training period, the trainee would be able to understand the steps involved in installation of False-Ceiling,
- Should be able to erect Gypliner, Step Ceiling, combination of plain ceiling with Grid ceiling.
- Able to do designer ceiling with skimming, acoustical ceiling and estimation of labour and material.

Safety, House Keeping and Material Handling

- Would have knowledge of working safely at site, good housekeeping practices, Handling of materials and waste disposal.

General information about Dry Wall and False Ceiling -

Practical Competencies	**Underpinning Knowledge (Theory)**
▪ Identification of tools and equipment's. ▪ Use of protective equipment safety shoes, goggles, ear plugs, safety jacket, helmet and gloves. ▪ Good housing keeping practices, proper handling of materials and waste disposal ▪ Safety precautions and safety belts while working at site ▪ Store/lay materials at work in safe manner. ▪ Measurement of length and width of components ▪ Understand usage of measurement tape.	▪ Role of Assistant Technician Dry wall and False-ceiling. ▪ Description of trade ▪ Different types of tools and equipment's. o Safety precautions o While using different hand tools o While using raw materials o With co-workers ▪ Information about Gypsum and its properties
Health & Hygiene ▪ Keeping work area clean.	▪ Importance of personal cleanliness and Hygiene ▪ Prohibition of alcohol, consuming tobacco products, spitting etc while working at site.
About site Understand the instruction of superiors and work in coordination with others. Reporting of wrong practices at work places Reporting of theft of material etc.	▪ Importance of Project, Time management, increasing productivity.

Course – False Ceiling

Identification & Selection ▪ Identification of different boards / tiles used in Ceiling system. ▪ Identification of different metals and accessories with sizes and specific use and jointing compound	▪ Description of boards / tiles used in ceiling system. ▪ Description of metals and accessories used in false-ceiling system. ▪ Description of compounds used in jointing and finishing.
Erection of Frame-Work and boarding -False-Ceiling ▪ Level marking, frame-work suspension from ceiling, staggered boarding and screwing with specific use Gypsum board.	▪ Study of False-ceiling framework, types of boards used for ceiling, level marking, metals to be used, screw distance on the metals and staggering. Screw distance to be maintained on gypsum board.
Jointing and Finishing – False Ceiling ▪ Identification of tools, compounds and accessories used in Jointing and Finishing. ▪ Undertake jointing and finishing	▪ Description about different types of tools, compounds and accessories used in Jointing and Finishing, 03 types of different coats
Making Cutouts in Plain Ceiling ▪ Making cut-outs for lights fixtures, Ac Ducts and Access Panels with edge bead.	▪ Study the requirement of marking on metal, for lights fixtures, ac ducts and access panel.
Gypliner Ceiling ▪ Identification of metal components used in Gypliner ceiling, Level marking, frame-work suspension from ceiling, staggered boarding and screwing with specific use Gypsum board.	Information about Gyp-liner ceiling and its usage.
Step Ceiling ▪ Identification of metal	Application area of step-ceiling.

components used in step ceiling, Level marking, frame-work suspension from ceiling, screwing with specific use Gypsum board.	
Plain Ceiling with Grid Ceiling ▪ Identification of metal components used in plain and grid ceiling, Level marking, frame-work suspension from ceiling, screwing with specific use Gypsum board.	About Grid Ceiling, benefits of Grid ceiling, components used in Grid ceiling.
▪ **Designer Ceiling.** Installation of designer ceiling as per given design and costing of material. Measurement of ceiling.	▪ Types of designer ceiling like geometric, curve, steps etc and material costing.
▪ **Skimming of designer ceiling.** Undertake skimming coat.	▪ Why skimming is required, material and process of skimming.
Estimation Calculation of labour and material for the project	▪ Estimation of different Ceiling systems.

Course – Dry Wall

Identification & Selection ▪ Identification of different boards with specific use. ▪ Identification of different metals and accessories with sizes and specific use ▪ Identifications of compounds used in dry wall.	▪ Description of boards used in dry wall system. ▪ Description of metals and accessories used in dry-wall. ▪ Description of compounds used in jointing and finishing.
Erection of Dry-Wall Frame and boarding (Single Layer)	▪ Introduction to marking, types of floor channel, ceiling channel, types of

▪ Marking the area, fixing of floor channel, ceiling channel, fasteners, studs, fixing of Noggin Channel, screws and staggered boarding.	boards, fasteners, studs and their alignment, noggin channel, different types of screws, staggering of boards and their spacing on metals and boards.
Door and Window Opening in Dry wall ▪ Make Door and Window Frame opening in Dry wall.	▪ Description about marking for making opening, overlapping of stud, placing wooden batten inside stud.
Making T-Junction and L-Junction ▪ Make T-Junction and L-Junction for single layer drywall	▪ Description about T-Junction and L-Junction
Drywall – System ▪ Make Skirting, identify type of planned and un-planned loading based on weight required to be held, undertake switch board fixing using noggin channel, angle bead fixing, using glass wool in dry wall for insulation, sealant application, pass services and make baffling of boards.	▪ Description about skirting, planned and un-planned loading, curve, switch board fixing, angle bead fixing, Tile fixing, Insulation using glass wool, sealant and its usage, passing services, baffling of boards.
Identification of Firewall Materials ▪ Should be able to physically identify material used in fire-stop walls.	Information about fire and its causes, benefit of fire stop material. Identification of material used in fire-wall
Firewall Installation ▪ Marking the area, fixing of floor channel, ceiling channel with deflection head, fasteners, studs, fixing of Noggin Channel, ac duct opening, door opening, screws,	Introduction to marking, types of floor channel, ceiling channel with deflection head, types of fire-stop boards, fasteners, studs and their alignment, noggin channel, different types of screws, staggering of boards and their spacing on

staggered boarding, jointing / finishing and fire-stop sealant application	metals and boards, fire stop sealant application.
▪ **Twin frame Dry wall.** Marking the area, fixing of floor channel, ceiling channel, fasteners, studs, fixing of Noggin Channel, screws and staggered boarding.	▪ Area of application, material used in twin frame dry wall
Jointing and Finishing – Dry wall ▪ Jointing and Finishing of Dry wall ▪ Finishing of internal and external corners of Dry wall. ▪ Undertake jointing and finishing	▪ Description about different types of compounds and accessories used in Jointing and Finishing, Types of 03 different coats.
Planned and Un-planned Loading ▪ Installation of planned loading with plywood and loading brackets and unplanned loading with different types of cavity toggles.	Materials used in planned loading and unplanned loading.
Curve Partition ▪ Installation of curve partition, niche and skimming	Area of application of curve partition, niche, metal frame and boarding for curve partition.
▪ **Ledge wall for WC.** Should be able to install ledge wall.	▪ About ledge wall and why ledge wall is required.
▪ **Install Vanity Counter, Wash Basin.** Should be able to install vanity counter and wash Basin as per specification.	▪ About installation of Vanity Counter and Wash Basin with plywood and loading brackets.
▪ **Passing the services.** Should be able to pass services	▪ About the services passed through drywall and its fixing mechanism

through cavity of Dry Wall with fixing mechanism.	
▪ **Process of water proofing.** Should be able to do water-proofing on board in wet areas.	▪ About the process of water proofing and its importance
▪ **Tiling work on board.** Installation of tiling and marble with clits on board.	▪ Information about types of finishes in bath room like tiles, marbles etc
Repairing of Dry Wall Board ▪ Should be able to cut and replace the damaged board portion, fixing and jointing and finishing.	▪ Should be able to identify the size of damage, marking and cutting of damaged board, fixing of new board, jointing and finishing.
Estimation Calculation of labour and material for the project	▪ Estimation of different Dry wall systems.

LIST OF EQUIPMENTS AND TOOLS for a Batch of 20 trainees

1.	Hammer Machine with Drill Bits	01
2.	Battery operated drill machine with clutch attachment	04
3.	Regular drill Machine	02
4.	Paper cutting knife	10
5.	Crimping tool	02
6.	Hammer	02
7.	Vertical and Horizontal spirit level	04
8.	Metal cutter	04
9.	Stapler for fixing angle beads with Pins	02
10.	Measuring tape 5 mtr with magnet	10
11.	Laser Tools	02
12.	Right Angle Small / Big	06
13.	Clutch Attachment	04
14.	Plumb	06
15.	Hacksaw (Medium size)	04
16.	Screw driver Set	04
17.	Line Dori	04
18.	Plier	04
19.	Silicon Gun	04
20.	Corner Tool	02

List of Training Material for Dry-Wall and False-Ceiling

Item Description	Item UOM	Demand
Gypsum Board 12.5x1219x1829 mm	No	As required
GI-PERIMETER CHAN	No	As required
GI-INTERMEDIATE CHAN	No	As required
GI-CEILING SECTION	No	As required
RAWL PLUG 50/Box	No	As required
SOFIT CLEAT 50/Box	No	As required
GI-CEILING ANGLE 10x25x3660	No	As required
SCREW 25mm 1000/Box	Box	As required
CONNECTING CLIP 100/Box	No	As required
SCREW Metal to Metal 4.2x13mm 500/Box	Box	As required
JOINT PAPER TAPE 90M	No	As required
Jointing compound (25 Kg)	BAG	As required
Gypsum Board PL 12.5x1219x2438 mm	No	As required
GI-STUD 0.50x48x3050	No	As required
GI-CHANNEL F&C 0.50x50x3660	No	As required
GI Noggin channel 0.5x48x40x695 mm	No	As required
GI-CEILING ANGLE 25x25x3660	No	As required
GLASS WOOL BRACKET	No	As required
GI-ANGLE BEED	No	As required
GI-SHADOW LINE SECTION}	No	As required
SCREW 35mm 500/Box	No	As required

GLASS WOOL SLAB	Sq Mtr	As required
FIRE AND ACOUSTIC SEALANT	can	As required
TIMBER WOOD FOR DOOR SUPPORT	RFt	As required
GYPLINER CHANNEL	EA	As Required
GYPLINER BRACKET	EA	As Required
WALL ANGLE	EA	As Required
FIRE LINE BOARD 8x4	EA	As Required
CHAMPION PUTTY	BAG	As Required
PLYWOOD 8 x 4 (12 MM)	EA	As Required
MAIN-TEE 3600 X 24 MM	EA	As Required
CROSS-TEE 600 X 24 MM	EA	As Required
CROSS-TEE 1200 X 24 MM	EA	As Required
LEVEL CLIP WITH 4 MM WIRE ROD	EA	As Required
WALL ANGLE	EA	As Required
TILES 600 X 600	BOX	As Required
MR Ultra Board	No	As Required
WASH BASIN	No	AS REQUIRED
LOADING BRACKET	No	AS REQUIRED
WC WITH CHAIR BRACKET	No	AS REQUIRED
PVC PLUMBING PIPES	No	AS REQUIRED
CERAMIC TILES 1 FT X 1.5 FT	BOX	AS REQUIRED
WATER PROOFING KIT	EA	AS REQUIRED

REDESIGNED MODULES FOR THE SECTOR

OF

ARCHITECTURAL AND CIVIL 2D DRAFTING WITH AUTOCAD

Under

MODULAR EMPLOYABILITY SKILLS (MES)

Redesigned in

2014

By

Government of India

Ministry of Labour & Employment

Directorate General of Employment & Training (DGE&T)

ARCHITECTURAL AND CIVIL 2D DRAFTING WITH AUTOCAD

Name of Sector	**Construction**
Name of Module	**Architectural and civil 2D drafting with autocad**
Code	CON 721
Duration of Course	750 Hours
Entry Qualification of Trainees	10^{th} Passed
Age	18 years above
Unit Size	20 trainees
Power Norms	4 KW
Space Norms	50 sqm
Terminal competency	•Do the work on 2D Engineering drafting for Architectural and civil Visualization •To apply this knowledge to understand the engineering design work flow Process in the Industry •Understand the basic of design and convert into cad •Prepare the layout and print the cad drawing •Prepare isometric view of objects
Instructor's qualification	3 years Diploma in Civil Engineering or 3 years Diploma in Architecture or CITS in civil / architectural draughtsmanship
Desirable Qualification	CITS

Practical Competencies	Underpinning Knowledge (Theory)
• Practice on Drawing basics • Geometrical Drawing Practice • Making plan of Projection. • Creation Multi-view Orthographic projection. • Drafting views in First angle & Third angle Projection. • Creating Auxiliary views & Sections. • Freehand Sketching. • Representing Standard base 2D drafting. • Drawing Elementary CADD command – Line, Polyline, Polygon, Circle, Polyline, arc, ellipse, Text-Single Text, Multitext, Dtext. • Modifying Elementary Commands – Erase, Move, Copy , Mirror, Offset, Scale, Stretch, Chamfer, fillet & explode. • Making layers, line type &Lineweight. • Different menus of Auto-Cad, Function keys, Shortcut keys, Paper size. • Making Title Block, Writing it & inserting it in any drawing file with scale, angle & explode options. • Creating a new template file (.Dwt file) & applying it to every drawing file. • Drafting of building plan , Elevation , Section Views. • Applying dimensions to various views by using dimension style. • Creating Revolved, Ruled, and Tabulated & Edge surfaces. • Creating Isometric drawing with the Isoplane (Left, Top & Right Plane) Shaded it from visual style. • Making Solid Model – Box, Polysolid, Cylinder, Cone, Pyramid, Wedge,	**Introduction** • Principle of drafting, Terminology, & fundamentals. • Size & shape descriptions. • Geometric Construction. **Views** • Plan views, Auxiliary views, Section Views. **Projection** • Method of Projection. • Multi-view Orthographic Projection. • Projection Techniques. **CADD** • Introduction of CADD (Computer Aided Drafting & Designing). • Function keys, Shortcut keys, • Different sizes of paper. • Application of CADD – Automatic Drafting , Geometric Modeling • Geometric Modeling – Wire frame Modeling, Surface Modeling, and Solid Modeling. • CADD Application & it's feature • Introduction to Standard based 2D drafting (Based on International standard for representation & conformation)

Torus. • Project – Site Visit • Building Model.	

LIST OF TOOLS & EQUIPMENTS

Sl.no	Description	quantity
1.	Hardware: Pentium IV PCs with 4 GB RAM, (Multimedia Enabled, and Windows XP), NVIDIA GeForce 7300 GT	20
2.	Inkjet/ Laser Jet Printer (A3 size) with latest configuration	1
3.	A4 Color Scanner/printer with Latest Configuration	1
4.	800VA or higher Offline UPS	20
5.	Printer Table (module type)	2
6.	Operator's revolving chair	22
7.	Instructor 's Lab table	1
8.	Air conditioner 1.5 / 2.0 tons (preferably split type) for CAD lab	3
9.	Internet connection	1
10.	Software: 20 licenced Autocad software	20

REDESIGNED MODULES FOR THE SECTOR

OF

ARCHITECTURAL DRAFTING AND BASIC 3D DESIGN WITH AUTODESK REVIT

Under

MODULAR EMPLOYABILITY SKILLS (MES)

Redesigned in

2014

By

Government of India

Ministry of Labour & Employment

Directorate General of Employment & Training (DGE&T)

ARCHITECTURAL DRAFTING AND BASIC 3D DESIGN WITH AUTODESK REVIT

Name of Sector	**Construction**
Name of Module	**Architectural drafting and 3D design with autodesk revit**
Code	CON 722
Duration of Course	500 Hours
Entry Qualification of Trainees	10^{th} Passed and having completed Course in Architecture & civil 2D drafting with AutoCAD (CON 721) Or ITI/CTS passed in architectural draughtsmanship or civil draughtsmanship or architectural assistant
Age	18 years above
Unit Size	20 Trainees
Power Norms	4 KW
Space Norms	50 sqm
Terminal competency	•Apply this knowledge to understand the Architectural design work flow process in the industry. •To acquire knowledge of advanced 3D modeling concept. •Prepare drawing in REVIT of different types of designing by Autodesk Revit
Instructor's qualification	3 years Diploma in Civil Engineering with knowledge of REVIT or 3 years Diploma in Architecture with knowledge of REVIT or CITS in civil / architectural draughtsmanship with knowledge of REVIT
Desirable Qualification	CITS

Practical Competencies	Underpinning Knowledge (Theory)
• Preparing Architectural working drawing • Representing Standard base 2D drafting • Planning, designing & measuring of drawing • Drawing Elementary CADD commamd - Line, Polyline, Polygon, Circle, Polyline, arc, ellipse, Text- Single Text, Multitext, Dtext • Modifying Elementary Commands - Erase, Move, Copy, Mirror, Offset, Scale, Stretch, Chamfer, fillet & explode • Making layers, line type & Line weight • Preparing of the color drawing • Preparing utilization of architectural working drawing • Practice on 3D drawing & designing • Rendering of 3D model (Light, Material & Landscaping) • Purpose & presentation of working drawing with building course. • Project -e.g.Case study & measuring of hotel suite or bed room or living room or similar small scale projects Designing of related Project Detail layout plan in revit Sectional elevation in revit Perspective view in revit Electrical planning & other furnishing details in revit	**Architecture Drafting & Design I** • Introduction to the preparation of architectural working drawing • Drawing conventional signs • Design consideration. • Different types of Architectural drawing. • Construction technique - Residential . • Introduction & Applications of revit, • Shortcut keys, Function keys. **Architecture Drafting & Design II** • Methods of utilized in the preparation of architectural working drawing. • Analysis of the Material& construction details of commercial & Industrial building **Architecture Design theory.** • Introduction to the creative thinking process & its application to basic Architectural design theory. • Basic skill & presentation technique use in the design of simplified architectural Project. • Focus on the investigation theoretical concept, color, space form & texture in emphasized

LIST OF TOOLS & EQUIPMENTS

Sl.no	description	quantity
1.	Hardware: Pentium IV PCs with 4 GB RAM, (Multimedia Enabled, and Windows XP), NVIDIA GeForce 7300 GT	20
2.	Inkjet/ Laser Jet Printer (A3 size) with latest configuration	1
3.	A4 Color Scanner/printer with Latest Configuration	1
4.	800VA or higher Offline UPS	20
5.	Printer Table (module type)	2
6.	Operator's revolving chair	22
7.	Instructor 's Lab table	1
8.	Air conditioner 1.5 / 2.0 tons (preferably split type) for CAD lab	3
9.	Internet connection	1
10.	Software: 20 licenced Autodesk REVIT software	20

REDESIGNED MODULES FOR THE SECTOR

OF

ADVANCED ARCHITECTURAL DRAFTING AND 3D DESIGN WITH AUTODESK REVIT

Under

MODULAR EMPLOYABILITY SKILLS (MES)

Redesigned in

2014

By

Government of India

Ministry of Labour & Employment

Directorate General of Employment & Training (DGE&T)

ADVANCE ARCHITECTURAL DRAFTING AND 3D DESIGN WITH AUTODESK REVIT

Name of Sector	**Construction**
Name of Module	**Advance architectural drafting and 3D design with Autodesk REVIT**
Code	CON 723
Duration of Course	500 Hours
Entry Qualification of Trainees	10^{th} Passed and having completed Course in Architectural drafting and basic 3D design with AUTODESK REVIT (CON 722)
Age	18 years above
Unit Size	20 Trainees
Power Norms	4 KW
Space Norms	50 sqm
Terminal competency	•Apply this knowledge to understand the architectural design work flow process in the industry. •To acquire knowledge in advanced 3D architectural modeling and REVIT •Prepare working drawing of different types of design building by Autodesk
Instructor's qualification	3 years Diploma in Civil Engineering with knowledge of REVIT Or CITS in civil / architectural draughtsmanship with knowledge of REVIT
Desirable Qualification	CITS

Practical Competencies	Underpinning Knowledge (Theory)
• Production of parametric three-dimensional building design models & working drawing using Revit software • Generating building elevation and sections • Annotating & documenting the drawing • Surface modeling–Revolved , Ruled, Tabulated & Edge surfaces. • Solid modeling Box , Polysolid , Cone , Pyramid ,Wedge & Torus • Creating professional quality rendering • Creating & modifying three - dimensional objects • Placing of cameras & lights • Computer rendering technique • Creating professional quality output Applying light (point, distance & spot light) to 3 D Model Applying material & landscaping to the model • Showing exteriors & interiors in the correct setting with appropriate lighting & coloring • Hands- on-exercises will be used to reinforce • Practice on 3 D drawing & designing • Electrical and plumbing layout design & drafting • Project: e.g. Commercial building or similar scale buildings	**Advanced Architecture Design** • Fundamental of creating,& modifying three dimensional topography & building mass object • Parametric building wall with floor & roof slabs • Creating floor & reflected ceiling plans • Function of Revit • Fundamentals of creating,& modifying three dimensional objects • Creation & application of materials **Introduction of Structure drafting and MEP** • Structural requirements • Analysis of the Material & construction details of commercial & Industrial building • Electrical plumbing layout design & drafting

LIST OF TOOLS & EQUIPMENTS

Sl.no	description	quantity
1.	Hardware: Pentium IV PCs with 4 GB RAM, (Multimedia Enabled, and Windows XP), NVIDIA GeForce 7300 GT	20
2.	Inkjet/ Laser Jet Printer (A3 size) with latest configuration	1
3.	A4 Color Scanner/printer with Latest Configuration	1
4.	800VA or higher Offline UPS	20
5.	Printer Table (module type)	2
6.	Operator's revolving chair	22
7.	Instructor 's Lab table	1
8.	Air conditioner 1.5 / 2.0 tons (preferably split type) for CAD lab	3
9.	Internet connection	1
10.	Software: 20 licenced Autodesk REVIT software	20

REDESIGNED MODULES FOR THE SECTOR

OF

3D VISUALISATION IN ARCHITECTURE

Under

MODULAR EMPLOYABILITY SKILLS (MES)

Redesigned in

2014

By

Government of India

Ministry of Labour & Employment

Directorate General of Employment & Training (DGE&T)

3D VISUALSATION IN ARCHITECTURE

Name of Sector	**Construction**
Name of Module	**3D visualization in Architecture**
Code	CON 724
Duration of Course	500 Hours
Entry Qualification of Trainees	10th Passed and having completed Course in Architecture & civil 2D drafting with AutoCAD (CON 721) Or ITI/CTS passed in architectural draughtsmanship or civil draughtsmanship or architectural assistant
Age	18 years above
Unit Size	20
Power Norms	4 KW
Space Norms	50 sqm
Terminal competency	• Understand the concept of sketching and rendering • do the work on perspective views • Do the work on 3D Production for Architectural Visualization •Gain Knowledge of AutoCAD drawing and converting them into 3D visualization • Render the scenes in photoshop
Instructor's qualification	3 years Diploma in Civil Engineering or architecture with Knowledge of 3d max and photoshop Or CITS in civil / architectural draughtsmanship with knowledge of 3d max and photoshop
Desirable Qualification	CITS

Practical Competencies	Underpinning Knowledge (Theory)
• Lay out of drawing sheets. Drawing conventional lines. • Free hand sketching of geometrical models. • Printing of single stroke & double stroke lettering • Methods of Perspective and Design Fundamentals**.** • Coloring & shading, Rendering & Presentation. • To create an image area using an image map. • Viewing Image Maps. • Working with Slice tool, working with Layers in Rollovers & Using the Rollover palette. • Viewing animation in Image ready. • Drafting layout of Architectural Drawing. • Sectional View of Layout. • Convert AutoCAD files to 3DX Max format. • Modeling level design for building. • Creating primitive object. • Using the modifier to alter an object's shape. • Creating & editing spline object. • Converting spline into geometry using modifiers. • Setting up viewports with background images. • Editing a model at sub-object levels. • Using Merge and XREF to bring external	**Drawing Basics** • Drawing instruments, equipments and materials their use, care & maintenance, safety precautions. Code of practice for general and architectural drawings. • Importance of lettering and figures sizes, proportion etc. **Perspectives and Design Fundamentals** o Technical relation with Perspectives and Design Fundamentals. o Rules & Classification of Perspectives and Design Fundamentals. **Architecture Design** • Rendering & Presentation. • Principal of Planning • Method of Drawing, Rules & regulation • General Information and table. • Rules of Architecture in Designing and approach of planning • Building types, Zoning Regulation. **Digital Imaging** • Application & usages of Digital Image. • Image Mapping, Viewing Animation. **AutoCAD** • Introduction & Applications of Auto-Cad. • UCS Co-ordination System. • Shortcut keys, Function keys. **Modeling**

object. • Generating texture map for real – time application. • Generating texture element and exporting to real – time 3D engine & rendering it. • Using architectural material on the wall. • Creating a scene is in interiors & exterior design with the help of fly camera & save it. • Calculating required no. of frames. • Creating a free & Target camera. • Adding a light with a preset value to the entryway. • Positioning the light & fixture assemblies. • Adding default light to the scene. • Render the final image with trees and sky in Photoshop • Project.	• Introduction of Modeling. • Features of Modeling. • Modifiers – Bend Modifier, Extrude, and Surface vertex weld Modifier. • Scene – Built a 3D environment with material, light and cameras. **Texturing** • Different types of Texture. • Render to texture tool. • Various scene elements into texture. **Lighting** • Uses of Lighting, Types of light Categories of lighting situation.

LIST OF TOOLS & EQUIPMENTS

Sl.no	description	quantity
1.	Hardware: Pentium IV PCs with 4 GB RAM, (Multimedia Enabled, and Windows XP), NVIDIA GeForce 7300 GT	20
2.	Inkjet/ Laser Jet Printer (A3 size) with latest configuration	1
3.	A4 Color Scanner/printer with Latest Configuration	1
4.	800VA or higher Offline UPS	20
5.	Printer Table (module type)	2
6.	Operator's revolving chair	22
7.	Instructor 's Lab table	1
8.	Air conditioner 1.5 / 2.0 tons (preferably split type) for CAD lab	3
9.	Internet connection	1
10.	Software: Autocad, adobe photoshop, 3D max (latest version)	20

1. Crane Operator – Overhead EOT & Mobile Cranes

Name	Crane Operator – Overhead EOT & Mobile Cranes
Sector	Construction
Code	CON 725
Entry Qualification	10th passed
Age	18 years and over
Duration	100 hours (Theory) , 50 hours (Soft skills), 200 hours (Practical)
Power Norms	Class Room: 1 KW Work Shop: 35 KW
Space Norms	Class Room: 30 Sq. Mtrs Workshop: 200 Sq. Mtrs and open 300 Sq. Mtrs
Trainers qualification	Diploma/ Degree in Mechanical Engg. with 2 – 5 years of Industrial experience
Batch Size	10 no's

Terminal Competency:

After completion of the course the trainee will be able to be-

- Operate EOT cranes for manufacturing unit with standard procedures.
- Operate Mobile cranes for manufacturing & construction site with standard procedures.
- Able to work under EHS standards.
- Able to perform inspection & preventive maintenance of cranes.

COURSE CONTENTS

Practical Competencies	Hours (200)	Underpinning Knowledge(Theory)	Hours (150)
EOT Crane & Mobile Crane: • Crane Operations • Clamping, lifting & swing operations, travel	100	• Definition: Crane definition, purpose of crane and basic terminology. • Types of crane – Overhead EOT and Mobile cranes • Crane Parts –	20

directions.		**EOT Crane:** Steel girders (bridge) – single/ double, End carriages, Crabs, Hooks, hoist, trolleys, crane runway beams (gantry) and rails, pendant, shafts, motors, etc. **Mobile Crane:** Telescopic boom, elevating cylinder, operator's cabin, Outrigger, console, central unit, sensor, force transducer, tensiometer, hooks, driving unit – meters, brakes, gears, motors, etc.	
• Load chart – capacity lift, operation limitations, stability limits, range diagram study, work area chart/operational plan, safe working load hoist line. • Radio communication & hand signaling.	50	**EOT Crane:** • Operation: Manuals, Pendant keys information, travel directions – Cross travel, Long travel, hook up & down and end approach, radio communication & signaling. • Speeds: Cross, long travel and Hoisting speeds (min/ max) • Working load, Stability & safety: Safe weight load, Load chart study. Pendulum action of load (swing out), limit switches & brakes. Wire rope,	100

		slings, spreader beam capacity, Test Certificates/ third party certificates. Load share, load transfer in multi crane lifts. • Lifting & Rigging tools: Assembly & dis assembly procedures, lifting equipment's -Spreaders, Rigging tools – Sling, synthetic belts, link chains, de shackles, clamps, etc. **Mobile Crane:** • Operation: Manuals, Switches function, gear operations, boom extension, pressure meter readings, hook lowering & rising, radial movement, radio communication & signaling etc. • Speeds: Hook lowering and rising speed, radial movement speed, etc. • Working load, Stability & safety: Safe weight load, Load chart study. Pendulum action of load (swing out), brakes. Wire rope, slings, spreader beam capacity, Test Certificates/ third party certificates. • Lifting & Rigging tools: Assembly & dis assembly	

		procedures, lifting equipment's -Spreaders, Rigging tools – Sling, synthetic belts, link chains, de shackles, clamps, etc.	
• Safety switches & indicators observations.	20	• Electrical: orientation of electrical control panels system, cabling, etc. • Safety Measurements: Wearing Personal protective equipment's – helmets, safety shoes, gloves, aprons, etc.	15
• Preventive maintenance • Industrial visits- Factory & construction site	10 20	• Preventive maintenance: Inspection of cranes, maintenance – oiling, greasing, etc.	15

LIST OF TOOLS AND MACHINERY

S.No	Description	Quantity
1	Wire rope lifting sling: (32mm/25mm) 10,12,15, 18 ton	One set
2	D shackle: 2.5, 5, 8, 10 ton	One set
3	Lifting chain sling: (16mm/20mm) 10, 12, 15,18ton	One set
4	Web Sling, Synthetic belts: (6mtr/8mtr) 6,8 ton	One set
5	Chain block: 3,5 ton	One set
6	Spreader beams	One set
7	EOT & Mobile crane of element lifting capacity of 20 tons.	One set

2. Batching Plant Operators

Name	Batching Plant Operators
Sector	Construction
Code	CON 726
Entry Qualification	10th passed
Age	18 years and over
Duration	100 hours (Theory) , 50 hours (Soft skills) , 200 hours (Practical)
Power Norms	Class Room: 1 KW Work Shop: 125 KW
Space Norms	Class Room: 30 Sq. Mtrs Workshop: 700 Sq. Mtrs Covered or Open
Trainers qualification	Diploma/ Degree in Civil/Mechanical Engg. with 2 – 5 years of Industrial experience
Batch Size	20 no's

Terminal Competency:

After completion of the course the trainee will be able to -

- Operate batching plant for RMC plant, manufacturing unit & construction site.
- Operate batching plant for wet and dry mix concrete production with standard procedure.
- Able to perform inspection & preventive maintenance of batching plant.

COURSE CONTENTS

Practical Competencies	Hours (200)	Underpinning Knowledge(Theory)	Hours (150)
• Trial run study on planetary mixer for dry & wet mix concrete, concrete slump & consistency, moisture reading and adjustments.	100	• Application & Purpose of Batching of plant. • Types of batching plants – Twin shaft, pan mixer and planetary mixer. • Batching plant Parts – Inline silos/ compartments, mixer drum, cement silos, blowers, compressors, moisture probes, admixture pumps, skip buckets, cement feeders – screws, water/admixture containers, control cabin, mixing device, computers & printers, etc. • General concrete information – workability/ slump, durability, strength, temperature and setting time, raw material identification – cement/sand/aggregates/ admixtures/ water and basic quality identification, different Concrete grades & design mix – wet/dry. Production criteria, Transit time.	50
• Design mix, batching, tolerance adjustments, scaling of devices.	30	• Function knowledge – operations keys, computer & printing operation, Scales – water measuring, admixture	70

		dispensers, moisture readings, Mixer – central mixer, truck, cold & hot weather concreting, acceptance and rejection, Report generation	
• Quality lab inspection for raw material test – slump, strength & durability.	30	• Cleaning & preventive maintenance of mixers, batching plant tolerance adjustment, calibration, certifications, and approvals. Greasing & oiling of motors skip, weigh belts, chambers-water & admixtures, pumps & blowers, compressor. Water pressure cleaning.	15
• Results & record maintenance. • Calibration – weights.	20	• Control panel identification, sensors.	10
• Industrial visits- Factory & construction sites	20	• Safety measurements.	5

LIST OF TOOLS AND MACHINERY

S.No	Description	Quantity
1	Batching plant – Planetary mixer- 0.5 cum cap	One set
2	Weights for Calibration.	One set
3	Computer with batching plant software installed.	One set
4	Slump cone, UTM, Vibrator.	One set
5	Spanners & set, High pressure water pumps, drilling & Chipping hand Machines	One set

3. Riggers

Name	Riggers
Sector	Construction
Code	CON 727
Entry Qualification	8th passed
Age	18 years and over
Duration	100 hours (Theory) , 50 hours (soft skills) , 200 hours (Practical)
Power Norms	Class Room: 1 KW Work Shop: 35 KW
Space Norms	Class Room: 30 Sq. Mtrs Workshop: 300 Sq. Mtrs Covered or Open
Trainers qualification	Diploma/ Degree in Civil/ Mech Engg. with 2 – 5 years of Industrial experience
Batch	20 no's

Terminal Competency:

After completion of the course the trainee will be able to -

- Riggers for manufacturing unit and construction sites.
- Perform Lifting, handling & installation with safe manual techniques.
- Able to work under EHS standards.
- Able to demonstrate safe body and hand positions, radio communication during the rigging and lifting operations.

COURSE CONTENTS

Practical Competencies	Hours (200)	Underpinning Knowledge(Theory)	Hours (150)
• Hand signaling/ radio communication.	50	• Role and responsibilities, Knowledge on rigging equipment – hooks, wire ropes, synthetic slings. Rigging basics – lift planning and stability. Structural drawing reading knowledge. Understanding measurement & units.	40
• Clamping & de clamping of hooks, wire rope & slings. Sling strength.	80	• Sling configuration, load capacity, sling angle, safe working limits, sling handling. Clamping, unbinding loads.	40
• Safety – PPE usage and its benefits.	50	• Procedures & precautions – inspection, lifting operations, sling/ sockets inspection. Product inspection. Inventory & equipment.	40
• Industrial visits- Factory & construction sites	20	• PPE usage and benefits, signaling – hand and radio etiquette communication.	15
		• Planning, supervisory and safety practices.	15

LIST OF TOOLS AND MACHINERY

S.No	Description	Quantity
1	Wire rope lifting sling: (32mm/25mm) 10,12,15, 18 ton	One set

2	D shackle: 2.5, 5, 8, 10 ton	One set
3	Lifting chain sling: (16mm/20mm) 10, 12, 15,18ton	One set
4	Web Sling: (6mtr/8mtr) 6,8 ton, Synthetic belts	One set
5	Chain block: 3,5 ton	One set
6	Spreader beams- 5-15 ton cap	One set
7	EOT/Gantry/ Mobile crane	One set
8	Other Erection Equipment: Big Bari, Small Bari, Hammers: 2.5/3kg,Plumb bob: 1/1.5kg, Chalk line marker with chalk line powder, Nylon line dori, Spirit level patti: 0.5/1/2 m, Punch, Spanners: Combination spanner/ratchet handle with box spanner 24No., Marker pens, Masking tape, Shim pads: 2mm,3mm,5mm & 10mm, Measuring tapes, Electrical cables with Industrial sockets & Junction box, PVC buckets, Mortar pans, Ladders: Height - 2mtr/3mtr/6mtr, Wooden wedges, Drop in anchors: 16mm dia, Bolts: 16mm, Washers with 18mm dia hole, Right angle, Push pull props: 2.0 mtrs Centre pipe (Extension up to 4.0 mtrs), Counter weights: 10 Nos. (5 ton), Wire cutter, Mason trowel & Gurmal.	One set

4. Quality Inspector – Concrete

Name	Quality Inspector – Concrete
Sector	Construction
Code	CON 728
Entry Qualification	Passed ITI/ Diploma/ Degree in Civil Engg
Age	18 years and over
Duration	100 hours (Theory) ,100 hours (soft skills) , 200 hours (Practical)
Power Norms	Class Room: 1 KW Work Shop: 2 KW
Space Norms	Class Room: 30 Sq. Mtrs Workshop: 32 Sq. Mtrs
Trainers	Diploma/Bachelor Degree in civil Engg with 5 +years of

qualification	Industrial experience

Terminal Competency:

After completion of the course the trainee will be able to -

- Quality Inspector for manufacturing and construction site.
- Able to perform materials handling and management as per standards
- Maintain records, conduct material & concrete tests, monitors equipment settings, preventive maintenance and operating requirements for safe usage.

COURSE CONTENTS

Practical Competencies	Hours (200)	Underpinning Knowledge(Theory)	Hours (200)
• Test – raw material, concrete – slump/ UTM/ NDT.	120	• Shop drawing reading and understanding – dimension/ shape of product.	50
• Curing procedures.	30	• Raw material identification – cement, sand, aggregates, water and admixtures.	30
• Pre stressing machine orientation.	30	• Quality standard & Procedures – practice of pre-pour/ post – pour checklist, numbering of elements. Record maintenance of production.	50
• Industrial visits- Factory	20	• Test of material & concrete – basic test on cement & aggregates. Concrete tests-workability – slump cone, concrete hardened - cube strength. Using sieve analysis/ UTM and	50

		Nondestructive test	
		• Inspection of steel cages, mould dimensions, consumables and inserts-lifting/ handling. Pre stressing machine readings.	20

LIST OF TOOLS AND MACHINERY

S.No	Description	Quantity
1	Slump cone, UTM/ NDT hammer.	One set
2	Sieves machines	One set
3	Flat vibrators	One set
4	Cubes, pokers.	One set
5	Weigh machine	One set
6	Trolley	One set
7	Measuring tapes	One set
8	Thermometer, etc.	One set

5. Production Supervisors

Name	Production Supervisors
Sector	Construction
Code	CON 729
Entry Qualification	Passed ITI/ Diploma/ Degree in Civil Engg
Age	18 years and over
Duration	100 hours (Theory) , 100 hours (soft skills) , 200 hours (Practical)
Power Norms	Class Room: 1 KW Work Shop: 80 KW
Space Norms	Class Room: 30 Sq. Mtrs Workshop: 225 Sq. Mtrs

Trainers qualification	Diploma/Bachelor Degree in Civil Engg. with 5 +years of Industrial experience

Terminal Competency:

After completion of the course the trainee will be able to -

- Production supervisor for Reinforced/ Prestressed concrete manufacturing unit.
- Production management as per procedures, quality, standards & schedules.
- Able to supervise the production activities of precast prestressed concrete using moulds & specialized machinery.

COURSE CONTENTS

Practical Competencies	Hours (200)	Underpinning Knowledge(Theory)	Hours (200)
• Production machinery operation knowledge, Production Methodology of various concrete elements. • Orientation of Quality test – raw material & concrete. • Repairing concrete. • Industrial visits- Factory	200	• Shop drawing reading & understanding. Work distribution to teams. • Reinforced & Pre stressed concrete – raw materials, production methodology, molds/ machinery used. Special concrete. • Stressing/ de stressing of prestressing cables	100
		• Concrete performance, principles of concrete design, drawing knowledge.	25
		• Time management, planning & coordination with cleaning, moulding & Demoulding team, concrete team, rebar team, fabrication, and quality	50

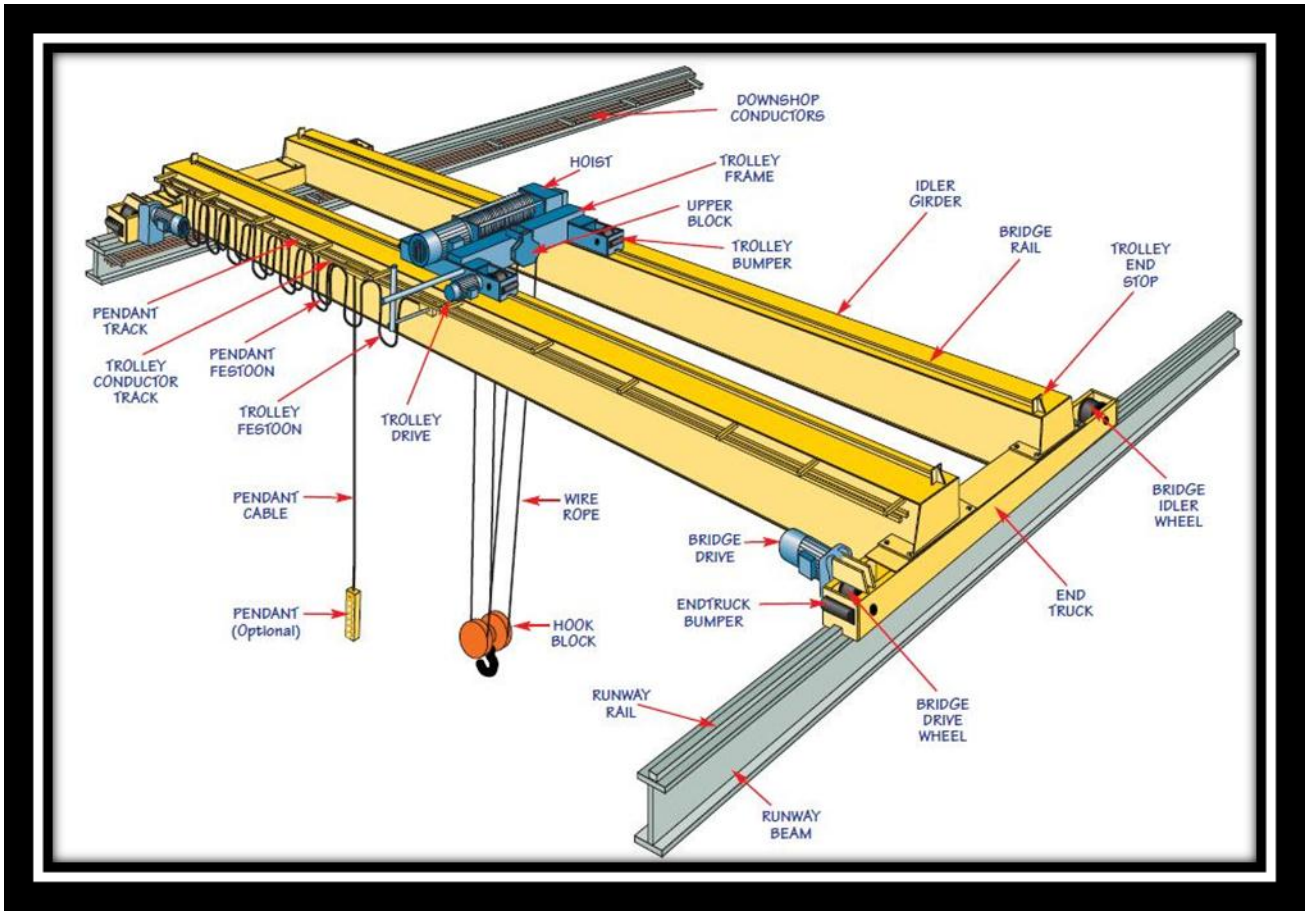
		teams, batching plant and crane operator.	
		• Quality standards, specifications, concepts and control.	25

LIST OF TOOLS AND MACHINERY

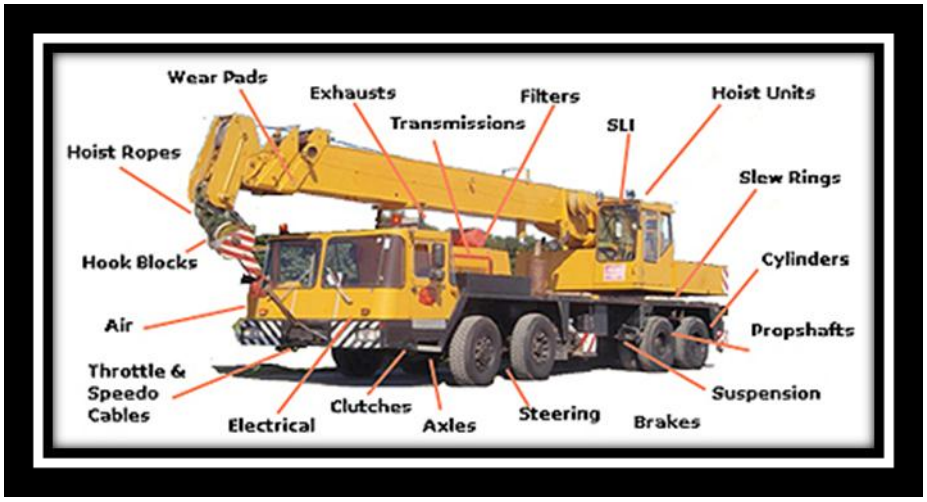
S.No	Description	Quantity
1	Production machinery – Extruder machine for Prestressed hollow core slab production, cutting machine – precast slabs, wire pulling machine – Prestressing cable laying on bed, Bed cleaning	One set
2	Stressing machine – for prestressing cable tensioning.	One set
3	Demoulding spreader beams, Other concrete production and placing tools.	One set

PLANT & MACHINERY PICTURES: REGULAR & SPECIAL MACHINERY

EOT
CRANE:



MOBILE CRANE:

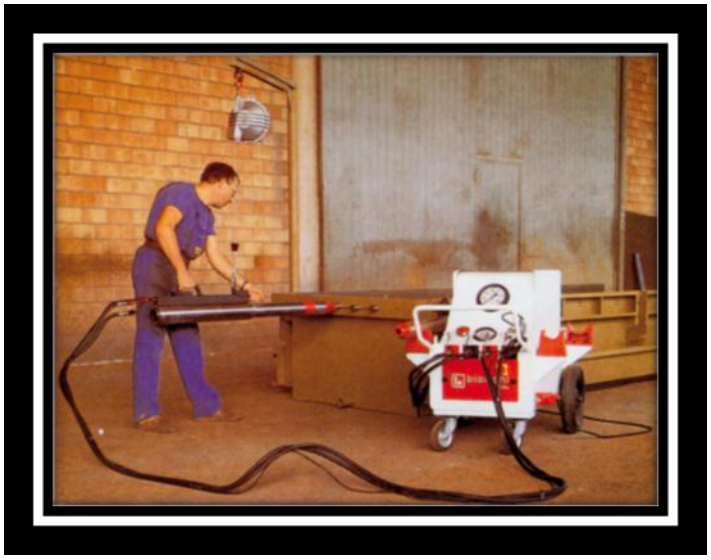


PLANETARY MIXER & BATCHING PLANT:

CONCRETE PRODUCTION MACHINERY:

CASTING MACHINE- EXTRUDER

STRESSING MACHINE: PRESTRESSING



SAW MACHINE: SLABS CUTTING MACHINE

BED CLEANER MACHINE:

WIRE PULLING MACHINE: PRESTRESS CABLE LAYING

SLAB DEMOULDING MACHINE: PRECAST SLABS

Block Masonry Work

Name	: Block Masonry Work
Sector	: Construction
Code	: CON 730
Entry Qualification	: 5th standard pass or higher (Preferred)
Age	: 18 years and over
Duration	: 350 hours; 44 days (8 hours per day)
Trainer Qualification	: Graduate or Diploma holder in Civil Engineering with 2/4 years of experience in block masonry activities.
Power Norms	Class Room: 1 KW (6000 lumens) Work Shop: 2 KW (30,000 lumens)
Space Norms	Class Room: 30 Sq. Mtrs Workshop: 80 Sq. Mtrs

Terminal Competency:

- Should be able to identify types of bonds, carry out mixing and lay brick and blocks accordingly.

- Should be able to describe the fundamentals of block work.
- Should be able to identify types of brick, blocks and describe the elements of brick and block work.
- Should be able use the tools, materials and equipment required for brick and block work.
- Should be able to ensure proper maintenance of tools and equipment used for brick and block work.
- Should be able to handle, store and stack the tools and materials as per the standard procedures.
- Should be able to follow safe work practices while carrying out brick and block works.
- Should be able to erect, dismantle 3.6m scaffold and carryout earthworks viz; cutting, filling and levelling.

COURSE CONTENTS

Practical Competencies	Theory in Hours	Underpinning Knowledge(Theory)	OJT in Hours
Soft Skills	20	-	30
• Identify, categorize and classify different types of bricks and blocks used	4	• Introduction to brick and block work, purposes and applications of bricks and blocks,	4

for masonry.		classification and elements of brick and block work.	
• Demonstrate and use PPE effectively. • Follow and deed the Do's and Don'ts during working at heights • Carry out safety measures and drills. • Practice first aid with identification and use of basic dressing materials. • Ensure proper waste disposal and pollution control. • Carry out Environment, Health and Safety performance.	4	• Importance of PPE, types of PPE • Working at heights • Safety drills • First aid • Waste disposal and pollution control	24
• Identify, select and use of Hand & measuring tools such as Mason trowel, brick hammer, bluster chisel, comb hammer, straight edge, plumb bob, spirit level etc. • Identify, select and use of construction materials such as blocks, fine aggregates, course aggregates, cement, wood, paint and water. • Identify and select basic power tools such as drill machines, compactor, vibrator, stone cutting machine etc. • Clean and maintain tools and equipment required to perform brick and block work.	4	• Tools, materials and equipment used for block work • Maintenance and care of equipment used for brick and block work.	28

• Lift & shift the materials by involving push and pull in accordance with workplace EHS requirement. • Follow methods and sequence of loading, unloading of materials such as cement, sand, aggregate, bricks and blocks. • Maintain proper Storing and stacking of cement, steel, wood, aggregate, paints, inflammable and other construction materials. • Handle and lift different materials such as sand, bricks, blocks & metals • Recognize individual work and team work for lifting, loading and unloading of materials • Carry loose and fluid materials like chemicals, form-oil, fuel & admixtures.	4	• Material handling • Loading and unloading materials • Material storing and stacking	24
• Select Proper mixing platform by ensuring surface to be clean, dry, smooth & Hard. • Measure the dry ingredients correctly by using appropriate measuring / weighing scales • Open use & stack cement bag properly. • Mix the mortar or concrete uniformly within stipulated time.	6	• Preparation of cement mortar and concrete mix	72

• Make 0.245 cum cement mortar mix in 30 minutes with one helper • Move, place and operate the hand operated concrete mixtures • Pour the material into the concrete mixture • Place and transport the concrete • Make 0.25 cum cement concrete mix in 30 minutes with one helper. • Do curing for the elements for the minimum stipulated time.			
• Arrange, shift, and stack the required materials, tools and tackles. • Mark the header/ stretcher/ English bond layout • Assist to construct the brick and block wall by making layer by layer to avoid vertical joints with appropriate closures • Follow the trade safety & construction techniques up to completion. • Aware of overall length of wall, heights of wall, regular joint thickness, plumb and wall alignment as per the requirement. • Complete the task as per the Productivity and housekeeping requirement.	6	• Bonds in basic brick and block works	72
• Arrange, shift, and	4	• Erect and dismantle 3.6 meter	28

stack the required materials, tools and tackles at the identified location. • Use the required safety gadgets • Follow the trade safety in erecting and dismantling 3.6 meter temporary scaffold. • Erect and dismantle 3.6 meter temporary scaffold • Shift the materials such as brick, sand, mortar, concrete, etc. • Complete the task within the time limit • Maintain the site tidiness accordingly		scaffold	
• Identify Tool & tackles required for the job • Cut & fill the earth as per the markings and layout • Leveling & compaction of earth at desired level & location. Operate the hand roller. • Help & support to the concerned tradesman prevent the collapse of the trench. • Use of PPE & take protective action before and after during hazards.	4	• Cutting, filling, leveling and compaction.	12

LIST OF TOOLS AND EQUIPMENT FOR BLOCK MASONRY WORK (batch of 20)

Hand Tools	Specification	Quantity
Mason Trowel	Metal with wooden handle	20
Concrete Finishing Trowel	Metal with wooden handle	20
Gauging Trowel	Metal with wooden handle	20
Margin Trowel	Metal with wooden handle	20
Pointing Trowel	Metal with wooden handle	20
Round Trowel	Metal with wooden handle	20
Mason/Brick hammer	With wooden handle	20
Comb hammer	With wooden handle	20
Blocking chisel	Steel handle	20
Plumb bob	Made of Steel	20
Spirit level	Standard	20
Straight Edge	Steel or aluminium 8 feet long	20
Jointer	Standard	20
Masonry pan	Standard size Metal Pan	20
Steel measuring Tape	10 meters	20
Weighing Machine	100 gms to 25 kgs	5

Power Tools	Specification	Quantity
Angle Grinders	Bosch GWS 100 series	5
Circular Saw	Bosch GKS 190 Circular saw	5
Power Drill	Bosch GBH 2-20 RE, 600 W Motor	5
Vibrator	Bosch GVC 20 EX Concrete Vibrator 35mm 1400w	5

Consumables

Materials	Specification	Quantity
Bricks	Standard size	1 Truck Load (or as needed)
Blocks	Standard size	1 Truck Load (or as needed)
Stones	Coarse aggregates	1 Truck Load (or as needed)
Sand	Fine aggregate	1 Truck Load (or as needed)
cement	43 Grade	10 Bags (or as needed)
Water		As needed

SAFETY ITEMS		
1	Safety helmet	20
2	Safety vest	20
3	Safety shoes	20
4	Safety gloves	20
5	Safety harness	20

Glass Fitter (Glass Panelling and Glazing)

Name	: Glass Fitter
Sector	: Construction
Code	: CON 731
Entry Qualification	: 5th standard pass or higher (Preferred)
Age	: 18 years and over
Duration	: 350 hours; 44 days (8 hours per day)
Trainer Qualification	: Graduate or Diploma holder in Civil Engineering with 2/4 years of experience in glass panelling and glazing activities.
Power Norms	Class Room: 1 KW (6000 lumens) Work Shop: 2 KW (30,000 lumens)
Space Norms	Class Room: 30 Sq. Mtrs Workshop: 80 Sq. Mtrs

Terminal Competency:

- Should be able to perform glass glazing
- Should be able to install framed partitions, frameless partitions, single and double glass panels.

- Should be able to describe the trade fundamentals such as types, applications and classifications of glass panelling and glazing.
- Should be able to ensure safety while performing the glass panelling and glazing activities.
- Should be able to identify tools, equipment and materials used for glass panelling, glazing and use the right tools for the right job.
- Should be able to handle, store and stack the tools and materials as per the standard procedures.
- Should be able to carry out housekeeping operations and ensure proper maintenance of tools and equipment.

COURSE CONTENTS

Practical Competencies	Theory in Hours	Underpinning Knowledge(Theory)	OJT in Hours
Soft Skills	20	-	30
• Identify, categorize and classify different types of glass panelling and	4	• Introduction to glass panelling and glazing, benefits, classification of glass and most	4

glazing		common types of glass panelling and glazing	
• Demonstrate and use PPE effectively. • Follow and deed the Do's and Don'ts during working at heights • Carry out safety measures and drills. • Practice first aid with identification and use of basic dressing materials. • Ensure proper waste disposal and pollution control. • Carry out Environment, Health and Safety performance.	4	• Importance of PPE, types of PPE • Working at heights • Safety drills • First aid • Waste disposal and pollution control	24
• Identify, select and use of Hand tools such as diamond cutting tool, glass cutting tool, scarper, chisels, cutting machine, etc, . • Identify, select and use of different types of aluminium shutters, aluminium outer frames, single glass, double glass panels, laminated glass, clear glass etc. • Identify and select basic power tools such as drilling machines, hammering machine, etc	4	• Tools, materials and equipment used for glass panelling and glazing	28
• Lift & shift the materials by involving push and pull in accordance with workplace EHS requirement. • Follow methods and	4	• Material handling • Loading and unloading materials • Material storing and stacking	24

sequence of loading, unloading of materials such as aluminium shutters, aluminium outer frames, single glass and double glass panels • Maintain proper Storing and stacking of aluminium shutters, aluminium outer frames, single glass, double glass panels, laminated glass, clear glass etc., and other construction materials. • Handle and lift different types of aluminium shutters, aluminium outer frames, single glass, double glass panels, laminated glass, clear glass etc with suction cups and other equipment			
• Install U-Channel on finished surface top and bottom • Insert single glass between top and bottom • Fill gaps with clear silicon	6	• Process – Install Single Glass Panel and Frameless Partitions	80
• Install brackets on surface • Install vertical mullions • Install horizontal transoms • Install frameless – single/ double glass between vertical and horizontal members	6	• Process – Install Double Glass Panels and Framed Partitions	80
• Perform housekeeping before, during and after glass panelling and glazing operations • Clean and maintain the tools and equipment used	4	• Housekeeping – handling and storing of materials, tools and equipment • Maintenance and care of tools and equipment	28

for glass panelling and glazing.		required to perform glass panelling and glazing.	

LIST OF TOOLS AND EQUIPMENT FOR GLASS PANELLING AND GLAZING (batch of 20)

S.No	Description	Quantity
1	Diamond cutting tool	20
2	Glass cutting tool	20
3	Scrapper	20
4	Chisels	20
5	Heavy duty scissors	20
6	Metal rulers	20
7	Glass lifting suction cups	20
8	Broom with dust pan	20
9	Sturdy container	20
10	Soft cloth	20
11	Cutting Pliers	20
12	Screw Drivers	20
13	Hammer	20
14	Rubber Gadgets	20
15	Rivet Guns	20
16	Drilling gun	20
CONSUMABLES		
1	Single Glass Panels	5
2	Double Glass Panels	5
3	U Channel Panels	5
4	Rivets	10 Boxes (as required)
SAFETY ITEMS		
1	Safety helmet	20
2	Safety vest	20
3	Safety shoes	20
4	Safety gloves	20
5	Safety harness	20

Cladding

Name	: Cladder
Sector	: Construction
Code	: CON 732
Entry Qualification	: 5th standard pass or higher (Preferred)
Age	: 18 years and over
Duration	: 350 hours; 44 days (8 hours per day)
Trainer Qualification	: Graduate or Diploma holder in Civil Engineering with 2/4 years of experience in cladding activities.
Power Norms	Class Room: 1 KW (6000 lumens) Work Shop: 2 KW (30,000 lumens)
Space Norms	Class Room: 30 Sq. Mtrs Workshop: 80 Sq. Mtrs

Terminal Competency:

- Should be able to carry out basic cladding operations such as cutting, marking, routing and assembling of panels.
- Should be able to install aluminium runners and composite panels

- Should be able to describe the trade fundamentals such as types, applications and classifications of cladding.
- Should be able to ensure safety while performing the cladding activities.
- Should be able to identify tools, equipment and materials used for cladding and use the right tools for the right job.
- Should be able to handle, store and stack the tools and materials as per the standard procedures.
- Should be able to carry out housekeeping operations and ensure proper maintenance of tools and equipment.

COURSE CONTENTS

Practical Competencies	Theory in Hours	Underpinning Knowledge(Theory)	OJT in Hours
Soft Skills	20	-	30
• Identify, categorize and classify different types cladding	4	• Introduction to cladding, purposes and applications of cladding, categories and classifications of	4

		cladding, most common types of cladding	
• Demonstrate and use PPE effectively. • Follow and deed the Do's and Don'ts during working at heights • Carry out safety measures and drills. • Practice first aid with identification and use of basic dressing materials. • Ensure proper waste disposal and pollution control. • Carry out Environment, Health and Safety performance.	4	• Importance of PPE, types of PPE • Working at heights • Safety drills • First aid • Waste disposal and pollution control	24
• Identify and demonstrate usage of different types of hand tools used for cladding such as Hammer (Plastic & Steel), Sprit level, Spanner, screw drivers (Flat and Star), Cutting Plier & Gripping Plier, Measuring Tape, Hack Saw, Files (Flat, Round, Rash & Smooth), Plum bob, Sealant Gun, Scrapper etc. • Identify and select basic power tools such as Drilling & Tighter Machine, Jig	4	• Tools, materials and equipment used for cladding	28

Saw, routing machine, Rivet Gun • Identify, select and use Materials and used for cladding such aluminium composite panel, clits, brackets, rivets and runners			
• Lift & shift the materials by involving push and pull in accordance with workplace EHS requirement. • Follow methods and sequence of loading, unloading of materials such as aluminium composite panels, clits, brackets, rivets and runners • Maintain proper Storing and stacking of aluminium composite panels, clits, brackets, rivets and runners and other construction materials. • Handle and lift different materials aluminium composite panels • Recognize individual work and team work for lifting, loading and unloading of materials	4	• Material handling • Loading and unloading materials • Material storing and stacking	24
• Cut aluminium panels to size	6	• Processes – fabrication	80

• Mark routing lines • Perform routing using routing machine • Cut corners of aluminium composite panels • Assemble panels after sheets are folded • Fix brackets to edges of the panels		on site	
• Perform marking • Fix brackets • Install aluminium runners • Remove protection tape on sides of panel • Install Aluminium Composite panels • Fix ACP to aluminium runners • Perform cut-out of ACP for MEP and other services • Apply silicon between panels • Remove protection tapes on approval	6	• Processes – Installation	80
• Perform housekeeping before, during and after cladding operations • Clean and maintain the tools and equipment used for cladding.	4	• Housekeeping – handling and storing cladding materials, tools and equipment • Maintenance and care of tools and equipment required to perform cladding	24

LIST OF TOOLS AND EQUIPMENT FOR CLADDING (batch of 20)

S.No	Description	Quantity
1	Drilling machine	20
2	Power Jig Saw	20
3	Rivet Gun	20
4	Sealant Gun	20
5	Hammer (Steel)	20
6	Sprit level	20
7	Spanners Set	20
8	Screw Drivers Set (Flat and Star)	20
9	Cutting Plier	20
10	Gripping Plier	20
11	Measuring Tape	20
12	Files (Flat, Round, Rash & Smooth)	20
13	Plum bob	20
14	Right Angle	20
15	Scrapper	20
16	Knife	20
17	Chisel	20
CONSUMABLES		
1	Aluminium composite panels	60 No.s (as required)
2	Clits	10 Boxes (as required)
3	Rivets	10 Boxes (as required)
4	Runners	10 Boxes (as required)
5	Sealant	10 Boxes (as required)
SAFETY ITEMS		
1	Safety helmet	20
2	Safety vest	20
3	Safety shoes	20
4	Safety gloves	20
5	Safety harness	20