Course Curricula

For

Short Term Courses based on Modular Employable Skills (MES)

in

Construction Sector

DIRECTORATE GENERAL OF EMPLOYMENT AND TRAINING
MINISTRY OF LABOUR & EMPLOYMENT
GOVERNMENT OF INDIA

Course Curricula for Short Term Courses based on Modular Employable Skills (MES) in the Construction Sector

CONTENTS

Skill Development based on Modular Employable Skills (MES)

Background

The need for giving emphasis on the Skill Development, especially for the less educated, poor and out of school youth has been highlighted in various forums. The skill level and educational attainment of the work force determines the productivity, income levels as well as the adaptability of the working class in changing environment. Large percentage of population in India is living below poverty line. One of the important causes is lower percentage of skilled persons in the workforce

The skill development at present is taking place mostly in the informal way, i.e. persons acquire skill at the work-place when they help their parents, relatives and employers etc. Such persons do not have a formal certificate and thus earn lower wages and are exploited by employers. They have come through informal system due to socio-economic circumstances of the family and the compulsions of earning a livelihood rather than attending a formal course. While their productivity is low, their contribution to the national GDP cannot be ignored. If the country can create a system of certification which not only recognizes their skills but also provides education and training in a mode that suits their economic compulsions, it will not only benefit the workforce to earn a decent living but also contribute to the national economy by better productivity of this workforce.

Another related problem to be tackled is large number of students drop outs (About 63% of the school students drop out at different stages before reaching Class-X).

Frame work for Skill Development based on 'Modular Employable Skills (MES)'

Very few opportunities for skill development are available for the above referred groups (out of school youth & existing workers especially in the informal sector). Most of the existing Skill Development programmes are long term in nature. Poor and less educated persons can not afford long term training programmes due to higher entry qualifications, opportunity cost etc. Therefore, a new frame work for Skill Development for the Informal Sector has been evolved by the DGET to address to the above mentioned problems. The **key features of the new frame work for skill development** are:

- Demand driven Short term training courses based on modular employable skills decided in consultation with Industry
- Flexible delivery mechanism (part time, weekends, full time)
- Different levels of programmes (Foundation level as well as skill up gradation) to meet demands of various target groups
- Central Government will facilitate and promote training while Vocational Training (VT) Providers under the Govt. and Private Sector will provide training
- Optimum utilization of existing infrastructure to make training cost effective.
- Testing of skills of trainees by independent assessing bodies who would not be involved in conduct of the training programme, to ensure that it is done impartially.
- Testing & certification of prior learning (skills of persons acquired informally)

The Short Term courses would be based on 'Modular Employable Skills (MES)'.

The **concept for the MES** is:

- Identification of 'minimum skills set' which is sufficient to get an employment in the labour market.
- It allows skills up-gradation, multi-skilling, multi entry and exit, vertical mobility and life long learning opportunities in a flexible manner.
- It also allows recognition of prior learning (certification of skills acquired informally) effectively.

- The modules in a sector when grouped together could lead to a qualification equivalent to National Trade Certificate or higher.
- Courses could be available from level 1 to level 3 in different vocations depending upon the need of the employer organizations.
- MES would benefit different target groups like :
    - Workers seeking certification of their skills acquired informally
    - workers seeking skill up gradation
    - early school drop-outs and unemployed
    - previously child labor and their family

Age of participants

The minimum age limit for persons to take part in the scheme is 18 years but there is no upper age limit.

Curriculum Development Process

Following procedure is used for developing course curricula

- Identification of Employable Skills set in a sector based on division of work in the labour market.
- Development of training modules corresponding to skills set identified so as to provide training for specific & fit for purpose
- Organization of modules in to a Course Matrix indicating vertical and horizontal mobility. The course matrix depicts pictorially relation among various modules, pre requisites for higher level modules and how one can progress from one level to another.
- Development of detailed curriculum and vetting by a trade committee and by the NCVT

(Close involvement of Employers Organizations, State Governments, experts, vocational training providers and other stake holders is ensured at each stage).

Development of Core Competencies

Possession of proper attitudes is one of the most important attribute of a competent person. Without proper attitudes, the performance of a person gets adversely affected. Hence, systematic efforts will be made to develop attitudes during the training programme.

The trainees deal with men, materials and machines. They handle sophisticated tools and instruments. Positive attitudes have to be developed in the trainees by properly guiding them and setting up examples of good attitudes by demonstrated behaviors and by the environment provided during training.

Some important core competencies to be developed are:

1. Safety consciousness and safe working practices
2. Care of equipment and tools
3. Punctuality, discipline and honesty
4. Concern for quality
5. Respect for rules and regulations
6. Concern for health and hygiene
7. Cordial relationship and Cooperation with co-workers and team Work
8. Positive attitude and behavior
9. Responsibility and accountability
10. Learn continuously
11. Communication Skills

12. Concern for environment and waste disposal

Following competencies should also be developed during level-II and higher courses:

1. Ability for planning, organizing and coordinating
2. Creative thinking, problem solving and decision making
3. Leadership
4. Ability to bear stress
5. Negotiation

Duration of the Programmes

Time taken to gain the qualification will vary according to the pathway taken and will be kept very flexible for persons with different backgrounds and experience. Duration has been prescribed in hours in the curriculum of individual module, which are based on the content and requirements of a MES Module. However, some persons may take more time than the prescribed time. They should be provided reasonable time to complete the course.

Pathways to acquire Qualification:

Access to the qualification could be through:

- An approved training programme; **Or**
- A combination of an approved training programme plus recognition of prior learning including credit transfer; **Or**
- The recognition of prior learning that provides evidence of the achievement of the competencies for the qualification.

Methodology

The training methods to be used should be appropriate to the development of competencies. The focus of the programme is on “performing” and not on “Knowing”. Lecturing will be restricted to the minimum necessary and emphasis to be given for ‘hands on training’.

The training methods will be individual centered to make each person a competent one. Opportunities for individual work will be provided. The learning process will be continuously monitored and feedback will be provided on individual basis.

Demonstrations using different models, audio visual aids and equipment will be used intensively.

Instructional Media Packages

In order to maintain quality of training uniformly all over the country, instructional media packages (IMPs) will be developed by the National Instructional Media Institute (NIMI), Chennai.

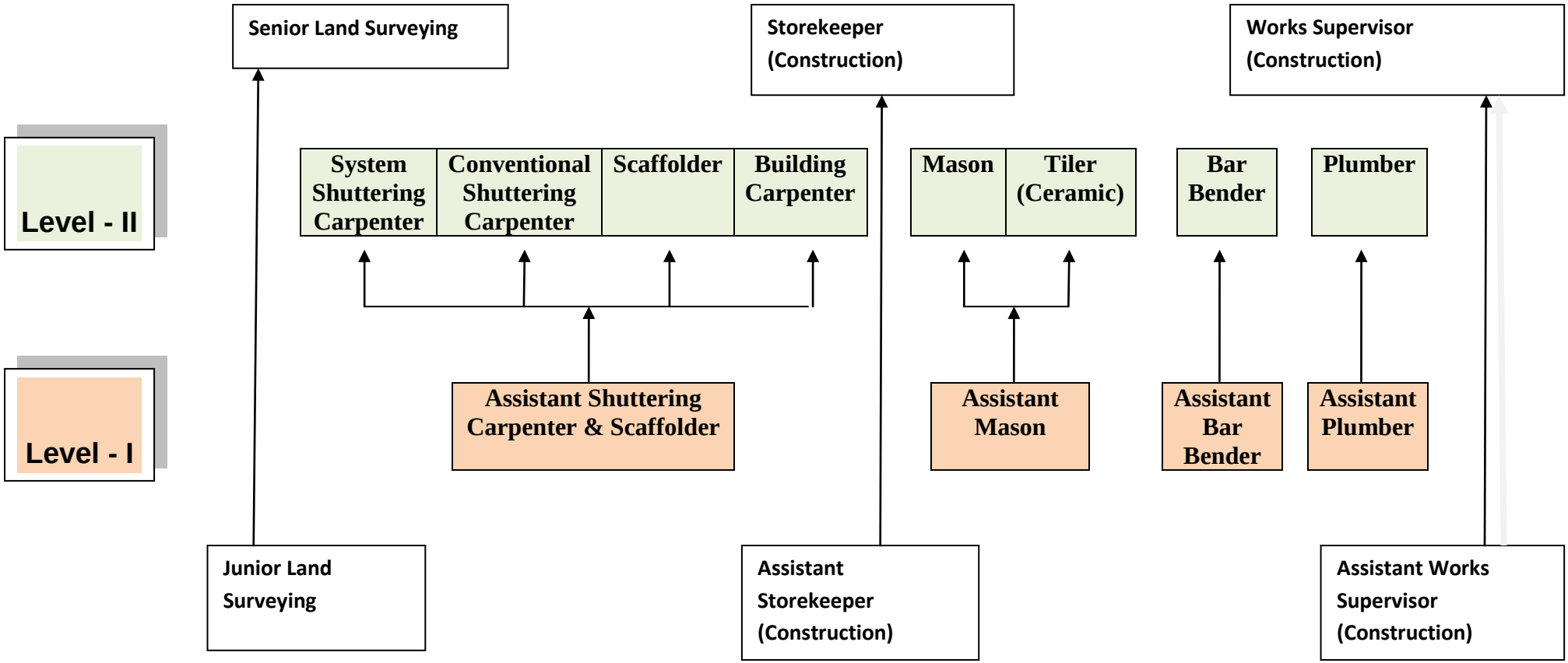
Assessment

DGE&T will appoint assessing bodies to assess the competencies of the trained persons. The assessing body will be an independent agency, which will not be involved in conducting the training programmes. This, in turn, will ensure quality of training and credibility of the scheme. Keeping in view the target of providing training/testing of one million persons through out the country and to avoid monopoly, more than one assessing bodies will be appointed for a sector or an area.

Certificate

Successful persons will be awarded certificates issued by National Council for Vocational Training (NCVT).

VOCATIONAL TRAINING MATRIX - Construction Sector



ASSISTANT "SHUTTERING CARPENTER & SCAFFOLDER"

Name : **Assistant Shuttering Carpenter & Scaffolder**
Sector **: Construction**
Code **: CON 101**
Entry Qualification : **Vth 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, platforms, railing and bracings.

COURSE CONTENTS:-

Practical Competencies	Underpinning Knowledge(Theory)
Common Basic Competencies	
• Identification of tools and equipments used in carpentry & shuttering • 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 Assistant "carpenter and scaffolder". • Description of trade • Different types of tools and equipments used in shuttering and scaffolding. • 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 shuttering and carpentry • Knowledge of measurements and its conversion to other system
• Size a raw timber using proper tools to measure, mark, cut and drill holes within required tolerances and standards.	• Identification of timber as per quality and classification, care and safe uses of tools. • Understanding tolerances & house keeping

• Preparation of a ply piece out of plywood sheet using proper tools to measure, mark, cut and drill holes within required tolerances and standards.	• Identification of plywood as per quality, use and classification, care and safe uses of tools. Understanding tolerances. Storage & maintenance of plywood.
• 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	• Identification, care and safe uses of timber jointing tools, knowledge of various joints and appropriate applications, their relative merits and demerits.
• Preparation of a straight shutter with sized timbers and plywood using proper tools to measure, mark, cut and fit within required tolerances and standards	• Identification, care and safe uses of timber framing tools, knowledge of various shutters and appropriate applications, handling and maintenance of ply shutters.
• Erection of conventional type scaffolding using bamboos/ wooden poles, empty drums, ropes, wooden planks etc within required safety norms and practices	• Identification of different types of conventional scaffolding materials & their uses. • Industry and construction site visit
• **Only one of the following three optional Basic competencies to be choosen**	
A - Optional Basic Competencies – L&T System	
• Identification of L&T system 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.
• Erection and dismantling of system straight shutters using system components and proper tools within the tolerances and standards	• Knowledge of system components and its applications, safety while handling and stacking, methods of stacking and maintenance.
• Identification of L&T system Foundation Form components, stacking them separately as per stacking norms and their maintenance	• Knowledge of L&T system Foundation Form components and its applications, safety while handling and stacking, methods of stacking and maintenance.
• Identification of L&T system Column Form components, stacking them separately as per stacking norms and their 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	• Identification, care and safe uses of timber framing tools, knowledge of various shutters and appropriate applications, handling and maintenance of ply shutters.
• Erection & dismantling of conventional straight shutters using appropriate supports and proper tools within the tolerances and standards	• Knowledge of erection & dismantling of straight shutters, safety while erection & dismantling, handling and stacking, methods of stacking and maintenance.
• Familiarization with conventional column and raft 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	• Types of scaffolding :- wooden and steel (brick layers scaffold, Needle scaffold, Mason's scaffold, tubular scaffold
• Make different types of scaffolding using scaffolding pipes and couplers including bracing within the tolerances and standards	• Handling and stacking of scaffolding materials, maintenance of couplers and scaffolding materials.
• Make different types of walkways and platforms including side bracing, side railings and toe board.	• Types of walkways and platforms and their appropriate use.

SYSTEM SHUTTERING CARPENTER

Name : **System Shuttering Carpenter**
Sector : **Construction**
Code : **CON 202**
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, 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 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.	• 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 Formwork – Column Form** Given the components, shutters, consumables and tools, assemble and dismantle column form	• Knowledge of L&T components; knowledge of marking layout; techniques of assembly, alignment, supporting,

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.	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	

CONVENTIONAL SHUTTERING CARPENTER

Name : Conventional Shuttering Carpenter
Sector : Construction
Code : CON 203
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 more than 1% of foundation width or 25mm which ever 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 – 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.
• Industry and construction site visit	

SCAFFOLDER

Name : Scaffolder

Sector : Construction

Code : CON 204

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 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.	• 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	

BUILDING CARPENTER

Name	: Building Carpenter
Sector	: Construction
Code	: CON 205
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 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	• 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

on quality and seasoning. Identification of carpentry hardware with sizes and specific use. Identification of hard & soft wood and its use.	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 work. • Knowledge of marking
• **Shutters** Make framed, paneled, glazed, wire mesh, door, window and ventilator shutters.	• Knowledge of Marking framed, paneled, glazed, wire mesh, door, window and ventilator shutters
Industrial and site visits.	

LIST OF TOOLS AND EQUIPMENTS
For courses –

- **Assistant Shuttering Carpenter & Scaffolder**
- **System Shuttering Carpenter**
- **Conventional Shuttering Carpenter**
- **Scaffolder**
- **Building Carpenter**

LIST OF TOOLS AND EQUIPMENTS-CARPENTER

S.No	Description	Quantity		Total
		Display	Training	
1	Claw Hammer 2 Lb	1	20	21
2	Ball Pin Hammer 2 Lb	1		1
3	Handsaw 18” & Tenon Saw 12”	1 each	10 each	22
4	Wooden Jack Planner 15” & Iron Jack Planner 12”	1 each	5 each	12
5	Wooden Marking Gauge & Mortise Gauge	1 each	5 each	12
6	Spirit Level 12” Long & Tri-square 5”	1 each	5 each	12
7	Auger – 1/2”, 3/4”, 1”		5 each	15
8	Steel Measuring Tape – 3 Mtr & 5 Mtr	1 each	10 each	22
9	Farmer Chisel – 1/2”	1	20	21
10	Farmer Chisel 1”, 1 1/2” & Mortise Chisel 1/2”,1/4”		5 each	20
11	Cutting Pliers 8”	1	5	6
12	Screw Driver 10” & Star Screw Driver 10”	1 each	5 each	12
13	Marking Knife / Scriber	1	5	6
14	Wooden Mallet	1	10	11
15	Oil Stone (Rough/Smooth)	1	5	6
16	Cutting Chisel 4” & Centre Punch	1 each	2 each	6
17	Bench Vice 10”	1	1	2
18	Hacksaw Frame with blade 12”	1	2	3
19	Triangle file – 6 mm (Medium)	1	5	6
20	Half Round File 1” x 12” Long (Smooth)	1		1
21	Flat File 1” x 12” (Smooth)	1		1
22	Jumper with Bit 8” Dia	1	1	2
23	Drill Bit – 8, 12, 16, 18, 22 mm (Straight Shaft)	1	1 each	6
24	Plumb Bob – 200 g	1	5	6
26	Ring Spanner – 21 / 23, 20 / 22, 18 / 19	1	5 each	16
27	Double End Spanner – 21 / 23, 20 / 22, 18 / 19	1	5 each	16
28	Screw Spanner 12” LM	1	2	3
29	L Square	1	5	6
30	Cramp	1	5	6
31	Gimlet	1	10	11

32	Gauge Blocks	1	20	21
33	Thread		20	20
34	Safety Goggles	1	5	6
35	Safety Helmet	1	20	21
36	Cotton Hand – Gloves	1	20	21
37	Tools Bag	1	5	6
38	Safety Belt	1	10	11
39	Face Mask	1	2	3
40	Safety Shoes (Assorted Size)		20	20
41	Ear Muff		2	2

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				
5	Wire Nails 1 ½, 2 ½ & 3”			75 Kgs
6	Diesel			20 Ltrs
7	Grease			5 Kgs
8	Cotton Waste			10 Kgs
9	Glue			10 Kgs

System Components & Materials

S.No.	Item	Weight/ No. in Kgs.	Total Qty.	Total weight in Kgs
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	M6 Ø bolt with wing nut 75 mm		250	
74	Ledger Pipe – 40mm – 3 RM		10	

Carpentry Machinery				
S.No.	Item		Qty.	
1	Portable power planer.		02	
2	Portable power saw.		02	
3	Portable power drill machine.		02	
4	Portable power router.		01	
5	Portable power sander		01	

ASSISTANT BAR BENDER & STEEL FIXER

Name : Assistant Bar Bender & Steel Fixer
Sector : Construction
Code : CON 106
Entry Qualification : Vth Standard
Age : 18 Years & above
Duration : 300 hours

Terminal Competency

- Should be able to identify, select and practically use the bar bending and fixing 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 straighten measure, mark and cut to given size the steel.
- Should be well versed with various types of ties and their specific use. Should be able to perform tying using various ties.
- Should be well versed with functioning of binding machine and its operation.
- Should be able to prepare hooks, links, chairs, spacers, cranks and simple stirrups.
- Should be able to make steel mesh for precast slab.

COURSE CONTENTS:-

Practical Competencies	Underpinning Knowledge(Theory)
• Identification of tools and equipments used in masonry 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 and diameter in MKS & FPS system	• Role of Assistant Bar Bender & Steel Fixer • Description of trade • Different types of tools and equipments used in steel works. • Safety precautions ▪ While using different hand tools ▪ While using raw materials ▪ With co-workers ▪ On the machines & equipments • Knowledge of measurements and its conversion to other system
• Methods to stack steel at work place. • Methods to transport steel by head load and by mechanical means	• Identification of steels as per quality and classification, care and safe uses of tools. • Understanding tolerances & house keeping
• Identification and straightening of steel from coils	• Storage of steel in store and at work place.
• Practice with marking on steel and cutting manually or by rod cutting machine	• Knowledge of marking on steel • Safety precaution with rod cutting machine
• Practice with tying of steel with binding wire manually or by binding machine	• Knowledge of various ties used for binding steel • Safety precaution with tying machine
• Preparation of hooks, links and chairs / spacers within the tolerances	• Knowledge of hooks, chairs and links with their uses in steel work
• Preparation of cranks and stirrups within the tolerances	• Knowledge of cranks and stirrups with their uses in steel work
• Preparation of steel mess for precast slab cover within the tolerances	• Knowledge of protective painting on steel
• Practice to crank the steel for overlapping with other piece	• Knowledge of steel / bar overlapping
• Industry and construction site visit	

BARBENDER

Name : Barbender

Sector : Construction

Code : CON 207
Entry Qualification : Vth Standard and MES course on 'Assistant Barbender and Steel fixer'
Age : 18 Years & above

Duration : 300 hours

Terminal Competency

- Should be able to identify, select and practically use the bar bending and fixing 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 measure, mark, cut and tie to make prefabricate precast element (slabs).
- Should be able to measure, mark, cut and tie to make cage for beams with shear bars.
- Should be able to measure, mark, cut and tie to erect column with base.
- Should be able to measure, mark, cut and tie to erect column with corbels and cranks.
- Should be able to measure, mark, cut and tie to make cage for beam with alteration in beam section.
- Should be well versed with functions and operations of bar cutting machine, manual bar bending machine and binding machine.
- Should be able to measure, mark, cut and tie to make cage for staircase.
- 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 Bar Bending 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 & 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 ▪ While using raw materials ▪ 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	• Read and understand pre-cast drawing schedule no. Repetition mirror images if any and spacers.

in flat plane.	
• **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 Corbals** 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 in-situ, required angle, slope 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
• Industry and construction site visit	

LIST OF TOOLS AND EQUIPMENTS
For courses
'Assistant Bar Bender & Steel Fixer' and '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, 8 mm, 10 mm and 12 mm)	1	20	21
6	Lever (900 mm long) -16, 20, and 25 mm)		12 Nos.	
7	Plumb Bob		4 Nos.	
8	Measuring Tape – 3 Mtr	1	20	21
	15 m & 30 m		1 each	2
9	Tri-Square		4 Nos.	
10	Pin Plate		20 Nos.	
11	Bull Head Rail Pieces (90 Lbs) 600 mm length		6 Nos.	
12	Chalk box		5 Box	
13	Binding Wire (18 guage)		125 Kgs	
14	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	
15	Wooden Planks (3 m x 25 cm x 5 cm)		10 Nos.	
16	Wooden Posts (1.5 m x 10 cm x 10cm)		40 Nos.	
17	Paint (Smoke Grey)		10 litres	
18	Wood Primer		10 litres	
Safety Items				
1	Safety Helmet		21 Nos	
2	Safety Shoes		21 Nos	
3	Goggles		21 Nos	
4	Hand Gloves		21 Nos	
Machineries				
01	Bar Cutting Machine		02 No	
02	Bar Binding Machine		02 No	
03	Bar Bending Machine (Manual)		02 No	

ASSISTANT MASON

Name : Assistant Mason

Sector : Construction

Code : CON108

Entry Qualification : Vth Standard

Age : 18 Years & above

Duration : 300 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 prepare cement sand mortar of any mix.
- Should be able to construct straight half brick and full brick wall up to height of 3 feet.
- Should be able to perform chase cutting, raking of joints, mortar filling, hacking concrete surface
- Should be able to construct straight block wall up to height of 3 feet.
- Should be able to prepare concrete of any mix manually or by mixer machine.
- Should be able to construct brick on edge flooring with sand grouting.
- Should be able to erect and dismantle staging using local materials like empty drums, bamboos, ballies and pipes.

COURSE CONTENTS:-

Practical Competencies	Underpinning Knowledge(Theory)
• Identification of tools and equipments used in masonry 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 & depth in MKS & FPS system	• Role of assistant mason • Description of trade • Different types of tools and equipments used in masonry works. • Safety precautions ▪ While using different hand tools ▪ While using raw materials ▪ With co-workers ▪ On the machines & equipments • Knowledge of measurements and its conversion to other system
• Methods to stack bricks at work place. • Methods to water bricks before use. • Methods to screen coarse sand • Methods to transport bricks by head load	• Identification of sand and bricks as per quality and classification, care and safe uses of tools. • Understanding tolerances & house keeping

• Preparation of cement sand mortar of specific mix manually or by hand mixer including measuring the ingredients and platform making	• Identification of cement and water as per quality, use and classification. • Storage of cement in store and at work place.
• Build half brick wall (1:4) cement mortar with corner wall – stretcher bond within the permitted tolerances and standards	• Knowledge of stretcher and header bond • Use of bond
• Build full brick wall (1:4) cement mortar with corner wall – English bond within the permitted tolerances and standards	• Knowledge of English bond.
• Performing chase cutting, raking of joints, mortar filling, hacking concrete surface	• Knowledge of chase cutting, raking the joints, mortar filling, hacking on concrete surface
• Build block wall (1:4) cement mortar	• Use and store of tools and equipments in a safe manner
• Preparation of cement concrete of specific mix manually or by hand mixer.	• Knowledge of cement concrete and its use
• Performing brick on edge soling on sand bed and grouted with clean sand	•
• Making staging with help of pipe / empty drums, bamboos and ballies.	•
• Industry and construction site visit	

MASON

Name : Mason

Sector : Construction

Code : CON 209

Entry Qualification : Vth Standard and MES course on 'Assistant Mason'

Age : 18 Years & above

Duration : 300 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	• 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

manner • Measurement length, breadth and height in MKS & FPS system	materials used in masonry work • Knowledge of measurements and its conversion to other system
• **1 Brick Wall `T' Junction English 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	• Basic marking out bonding, cutting bricks, 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 bricks squares and diagonals, no tolerance permitted.	• 3, 4, 5 method measuring tape, use of pegs, line and pins. Simple footing sketches / drawings.
• **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	• Calculation of corbel courses, fixing of step irons to correct position; GSW pipes. Safety in building new and working in existing manholes.

clean.	
• **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	

TILER (Ceramic)

Name : Tiler (Ceramic)

Sector : Construction

Code : CON 210

Entry Qualification : Vth Standard and MES course on 'Assistant Mason'

Age : 18 Years & above

Duration : 300 hours

Terminal Competency

- Should be able to identify, select and practically use the masonry tools used in tiling and cladding work.
- Should be able to identify, select and know the use of building materials used in tiling and cladding 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 well versed with function and operation of ceramic tile cutting machine.
- Should be able to fix ceramic tiles on floors, walls, skirting and staircase.
- Should be able to prepare pointing mix and point neatly ceramic tiles with the pigmented adhesive mortar as per Architectural requirement.
- 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 tiling 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 • Use and store of tools and equipments in a safe manner • Measurement length and breadth in MKS & FPS system	• Role of Tiller and Cladder. • Description of trade • Different types of tools and equipments used in tiling work. • Safety precautions ▪ While using different hand tools ▪ While using raw materials ▪ On the machines & equipments • Study of various types of tiling materials used in plumbing work • Knowledge of measurements and its conversion to other system
<u>Prepare Surface to receive ceramic Tiles:</u> From drawing / details, to check profile of base surface rendering made and to rectify if required to requirement	• Read shop drawing and to use required hand tools. • Mark tile finish profile and check levels.
<u>Mark-Out ceramic Tile Pattern</u> As per shop drawing Tile Lay-out to be marked from given base reference lines and levels	Basic lay-out marking techniques required. Should know to use level tube to transfer levels. Interpretation and understanding of

	shop drawings required.
Sorting out ceramic Tiles Enable to sort out shade. Texture and size of tiles in groups	Identify variety, size, and shape of tiles required
Transfer Spot Levels for Bed Mortar From the given datum level, transfer level and give reference points accurately to lay bed screed	Transfer levels with level tube and spirit level from datum reference
Mix bed mortar / adhesive Enable to identify material, mix proportions, setting time consistency and quantity required as per specification and detailed drawings	Size of screens to be used for sand screening. Size of measuring box to be used. Qty of water / cement / adhesive required quantity of mortar
A-Optional Basic Competencies –Floor Tiling (Ceramic-Wet Fix)	
Lay Bed Mortar to required Profile To the established spot levels with the available mixed mortar. Lay screed as per specs and detail drawing within a tolerance of ±2mm in 2 m	Techniques of uniform screed laying to the required level including keying of surface
Lay ceramic tiles to required pattern and profile: Lay selected tiles to the pattern / layout with needed cement mortar / adhesive as per drawing and spec. to an allow able tolerance of ±2 mm in 2m	Interpret shop drawing, specifications
Cutting laying end ceramic tiles/ Skirting to required size From the selected tiles with the given cutting tools / machine, cut the tiles to the required size and accuracy of ±1mm	Measure, mark and cut tiles using cutting tools/ machine
Ceramic Tile fixing around Special curt outs Around the penetrations / opening cut and fix tiles neatly to the sizes required as per shop drawings with and accuracy of ±1 mm to 1mm	Interpret / understand shop drawings, mark required size of cut with the hand tools / cutting machine from the available piece tiles
Prepare Surface / Ceramic Tile Joint and Pointing: With the necessary tools, rack out the joints, clean the surface, fill and point neatly with the pigmented adhesive mortar as per Architectural requirement	To make pointing mortar / adhesive as per spec and to neatly point
B-Optional Basic Competencies – Wall Tilling (Ceramic-Wet Fix)	
Render, Back Coat mortar to Profile To the established button marks with the available mixed mortar, apply rendering coat as per specs and details within a tolerance of± 1.5mm in im.	Able to uniformly render mortar according to button marks including keying of the surface.
Lay ceramic tiles to required pattern and profile: Lay selected tiles to the pattern / layout with needed cement mortar / adhesive as per drawing and spec. to an allow able tolerance of ±2 mm in 2m	Interpret shop drawing, specifications
Cutting laying end ceramic tiles/ Skirting to required size From the selected tiles with the given cutting tools / machine, cut the tiles to the required size and accuracy of ±1mm	Measure, mark and cut tiles using cutting tools/ machine
Ceramic Tile fixing around Special curt outs Around the penetrations / opening cut and fix tiles neatly to the sizes required as per shop drawings with and accuracy of ±1 mm to 1mm	Interpret / understand shop drawings, mark required size of cut with the hand tools / cutting machine from the available piece tiles
Prepare Surface / Ceramic Tile Joint and Pointing:	To make pointing mortar / adhesive as per

With the necessary tools, rack out the joints, clean the surface, fill and point neatly with the pigmented adhesive mortar as per Architectural requirement	spec and to neatly point

C-Optional Basic Competencies – Staircase Tilling(Ceramic-Wet Fix)	
Marking of Profile Enable to mark steps as per given detailed shop drawing using required hand tools within a tolerance limit of ±1mm.	Understand & interpret drawing and to mark stair steps profile accurately from the references.
Cutting & Chamfering of ceramic tiles to required size grooves and holes Enable to make chamfering holes, grooves accurately in tread slabs by using given core cutters and required hand tools without damaging the slab	Able to mask, and cut, chamfer, Drill holes, & Make grooves as per shop drawing by using Core cutter, Cutting machine & Polishing Machine
Fix Riser & Tread ceramic Tiles with Mortar Enable to fix tiles, made ready as per shop drawing, in mortar to line, level & plumb within allowable accuracy of ±2mm	Able to make required mortar mix as per specs and interpret shop drawing for making & fixing rises and treads in sequence
Fixing Skirting ceramic tile From the selected tiles with the given cutting tools / machine, cut the tiles to the required size and accuracy of ±1mm	Measure, mark and cut tiles using cutting tools/ machine
Pointing of Stair ceramic Tiles With the necessary tools, rack out the joints, clean the surface, fill and point neatly with the pigmented adhesive mortar as per Architectural requirement	To make pointing mortar / adhesive as per spec and to neatly point
• Industry and construction site visit	

LIST OF TOOLS AND EQUIPMENTS
for courses
TILER (CERAMIC)

Additional material required for 'Assistant Mason' and 'Mason' are mentioned at the end of the list

S.No	Description	Quantity		Total
		Display	Training	
1	Trowel , Pointing Trowel, Notch Trowel	1 each	20 each	63
2	Mortar Pan (525 mm O/D - 165 mm deep	1	20	21
3	Plumb Bob and Spirit Level	1 each	20 each	42
4	Spade and Wooden Float	1 each	20 each	42
5	Straight edge (Alu) 40 mm* 65 mm, 2.40 m long	1	20	21
6	GI Bucket 5L Capacity	1	20	21
7	200 L Drum & Shovel		5 each	10
8	18 G GI Sheet		10	10
9	Gauge Box & Sand Screen		5 each	10
10	Wooden Mallet	1	10	10
11	Tile Clipper	1	20	21
12	3 m Steel Tape		21	21
13	15 m tape		2	2
14	Ceramic Tile manual hand cutter	1	5	6
14	Wheel Barrow		6	6
15	Mortar Boards		11	11
CONSUMABLES				
16	10 mm dia 10 m PVC transparent water tube		11	11
17	Nilon Thread		20	20
18	4" Brush		21	21
19	Sponge		21	21
20	Unforeseen items			
SAFETY ITEMS				
21	Safety Helmet		21	
22	Safety Shoes		21	
23	Googles		21	
24	Hand Gloves		21	
TILER (CERAMIC) - MATERIALS				
25	Ceramic Tiles		100 Sqm	
26	River Sand & Course Sand		4 Loads	
27	Cement		10 Bags	
28	Lime powder		25 bags	

	Machineries			
29	Ceramic Tile Cutting Machine		02	
30	Ceramic Tile - Hole drilling machine		02	

MASONRY TRADE MATERIALS				
1	Bricks		6000	
2	Concrete Blocks solid (400 x 200 x 200 mm)		1500	
3	Concrete blocks solid (400 x 200 x 100 mm)		1500	
3	River Sand & Course Sand		4 Loads	
4	Cement		10 Bags	
5	Lime Powder		25 bags	

ASSISTANT PLUMBER

Name : Assistant Plumber
Sector : Construction
Code : CON111
Entry Qualification : Vth Standard
Age : 18 Years & above
Duration : 300 hours

Terminal Competency

- Should be able to identify, select and practically use the plumbing tools.
- Should be able to identify, select and know the use of plumbing materials and fittings.
- 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 prepare cement sand mortar, perform chase cutting in wall and filling the chase with mortar.
- Should be able to perform cutting, threading of GI pipes. Should be able to tighten the GI pipe line and specials after fitting done by plumber. Should be able to perform supporting activities on wall like drilling, nailing, clipping and hammering.
- Should be able to perform lead caulking in CI Pipes horizontally and vertically (Lead filling done by plumber)
- Should be able to fill mortar in the joints of RCC pipes (laying and fixing done by plumber)
- Should be able to jam floor traps with concrete.
- Should be able to encase light weighed pipes with concrete.
- Should be able to replace broken sanitary and bathroom fittings with new one.
- Should be able to fix PVC pipes and 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 in MKS & FPS system	• Role of assistant plumber • Description of trade • Different types of tools and equipments used in plumbing works. • Safety precautions ▪ While using different hand tools ▪ While using raw materials ▪ With co-workers ▪ On the machines & equipments • Knowledge of measurements and its conversion to other system
• Identification of different types of pipes & specials used in plumbing works	• Knowledge of various pipes and specials with their specific uses.
• Preparation of cement mortar and performing chase cutting and mortar filling	• Knowledge of operations with G I Pipes
• Carry out operations on GI pipes – cutting, threading & tightening	• Knowledge of various plumbing fittings
• Carry out operations on walls – drilling, nailing, clipping, finishing and hammering	•

• 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)	•
• Carry out operations of lead caulking in CI pipes in vertical & horizontal position	•
• Carry out jointing of RCC pipes and collars with cement mortar	•
• Carry out jamming traps & IWC pan with concrete	• Knowledge of cement concrete and its use
• Carry out fixing PVC pipes to fittings and prepare joints	• Encasing activity with cement concrete around SW, AC and light weight CI (Rain water) pipes
• Replacement of old/ broken fixtures and fittings	•
• Industry and construction site visit	

PLUMBER

Name : Plumber
Sector : Construction
Code : CON 212
Entry Qualification : Vth Standard and MES course on 'Assistant Plumber'
Age : 18 Years & above
Duration : 300 hours

Terminal Competency

- Should be able to identify, select and practically use the plumbing tools.
- Should be able to identify, select and know the use of plumbing materials and fittings.
- 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 fix Taps and Valves
- Should be able to perform cutting, threading, bending and jointing of GI pipes on floors and walls.
- Should be able to perform cutting, bending and jointing of PVC pipes on floors and walls.
- Should be able to lay CI pipes and perform lead filling and caulking horizontally and vertically with alignment and grade
- Should be able to lay and join SW pipes with alignment and grade
- Should be able to fix sanitary fittings.
- Should be able to install water pumps and connect to supply lines.
- 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 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
<u>Taps & Valves</u> • 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.	• Pipe fittings, methods of joint. Types of pipe and fittings. Cha 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.	• Use of hand tools, Marking out for bending. 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.
• **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 courses
'Assistant Plumber' and 'Plumber'

S.No.	Description	Unit	Quantity		Total
			Display	Training	
1	Pipe Die Set - 1/2" to 1" & 1 1/4" to 2"	Set		3 each	6
2	Pipe Wrench (Size No.8) & (Size No.12)	Set		6 each	12
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
35	Safety Belt			5	5

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

List of Expert/Trade Committee Members

1. Sh. S. Natarajan, Head-Construction Skills, L&T
2. Sh. N.B.Saxena, Regional Training Manager (Construction Skills), L&T
3. Sh. Parshuram Pundit, Training & Planning Manager, L&T
4. Representative of PUDA
5. Representative of D.L.F/Omex
6. Representative of P.W.D (B&R), Punjab
7. Sh. A. Aggarwal, DDT, DGET
8. Sh Varinder Kumar Bansal, Principal, Govt ITI, Patiala, Punjab
9. Sh Nasir Ali, Instructor, Govt ITI, Patiala, Punjab
10. Sh Malkit Singh, Instructor, Punjab

Level -I

Module -I

ASSISTANT WORKS SUPERVISOR (Construction)

Name	**: Assistant Works Supervisor**
Sector	**: Construction**
Code	**: CON113**
Entry Qualification	**: 8th pass**
Age	**: 18 years and above**
Duration	**: 300 hrs**

Terminal Competency:

After completion of the course one should be able to

- Identity the tools used in Construction Industry
- Work out conversions, Mensuration, Measurements, Angle notation etc Quantity surveying, Measurement book recording, safety norms in work area
- Work out soil conditions, Foundation bed and recognize the materials like cement, steel, fine Aggregate, Coarse Aggregate, Timber, Paints, etc ...

Course Contents:

1. Measurements and Mensuration		
Sl. No.	**Theory**	**Practical**
1	Measurements 1)Linear measurements 2)Angular measurements	To read various measuring tools for calculating Linear Measurements & Angular measurements
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 and its conversion to other systems	Measurement length, width, and Depth in M.K.S , F.P.S and S.I. system
2. Surveying (Leveling)		
	Theory	**Practical**
1	Fixing and leveling different types of Instruments	1. Identification of different types of leveling Instruments.
2	Reading of levels and instruments angles	2.Knowledge about different methods of leveling
3	Transferring the levels from one place to other	3. Calculating the levels by using different methods

3.Reading of Drawing		
Sl.no	**Theory**	**Practical**
I	Knowledge of reading the drawings for excavation, foundation	Knowledge about reading Plan, cross section, foundation elements, elevation etc,

4. Marking		
Sl.no	**Theory**	**Practical**
I	Knowledge about Pythagoras theorem and its checks	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 pillars

5. EXCAVATION		
Sl.no	**Theory**	**Practical**
I	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

6. Foundations		
Sl.no	**Theory**	**Practical**
I	Knowledge about different types of foundations	Knowledge of reading the drawings for foundation. Checking the levels while excavation of the soil

7. Concrete Works	
Theory	**Practical**
Basic Knowledge about 1) Plain Cement Concrete(PCC) 2 Reinforced cement Concrete (RCC)	Materials used in RCC and PCC & slump test
Basic Knowledge about various concrete grades	Identification of bars & their unit weights
Basic Knowledge about the Crushing Strength of the concrete	Minimum coverings and calculation the volume of work and material required.

8. Safety & Precautions		
	Theory	Practical
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

……..

Level -I

Module -II

ASSISTANT STORE KEEPER (Construction)

Name	**: Assistant Store Keeper**
Sector	**: Construction**
Code	**: CON 114**
Entry Qualification	**: Passed 12th class in 10+2 pattern**
Age	**: 18 years and above**
Duration	**: 200 hrs**

Terminal Competency

After completion of the course one should be able to perform

- Store keeping, Store Organization structure, Duties and Responsibilities
- Maintain the store records- stock Books, Stock Registers, Note books and Display records in stores
- Issue of materials from Stores and procedure for issue and control points for Issue of Materials.
- Material handling with different types of materials handling equipments.

COURSE CONTENTS

1. GENERAL DUTIES

Sl. NO	PRACTICAL	Sl.NO	THEORY
1	Should know to whom is reporting in organization	1	Stores organization structure
2	Should know about stores, receipts and issues of materials to users	2	Duties and responsibilities
3	Should know practically about the types of stores like main store and sub store to stack required material.	3	Type of stores centralized and decentralized stores and its advantages and disadvantages

2. STORE RECORDS

Sl.NO	PRACTICAL	Sl.NO	THEORY
1	Practical handling of various record books in stores	1	Knowledge of Store books, Stock registers and note books display records in stores.

3. MATERIAL STACKING AND PRECAUTIONS

	PRACTICAL		THEORY
1	Knowledge of stacking system of all construction materials	1	Knowledge of Construction materials like Cement, Steel, Bricks, Aggregate, Sand, Dust, Doors and Windows Frames plumbing and sanitary materials. Electrical materials Door fittings, C.P fittings, wooden planks and tiles

4. RECEIPT OF STORES

Sl.NO	PRACTICAL	Sl.NO	THEORY
1	Knowledge of verification of Delivery challans , Security stamps on challan time and date in correspondence with purchase order	1	Procedure for receiving of stores
2	Knowledge of inspection procedure of Goods received to stores with Documentary proof like Brand name, Company name and Specification mentioned in purchase order copy.	2	Procedure for Inspection of Stores

5. ISSUE OF STORES

	PRACTICAL		THEORY
1	Procedure of issue of materials as specified by the authority. Method of entries on the daily material Consumption chart and inventory.	1	Procedure for issuing of material.
2	Procedure for Issue / Receipt of materials from site on I.O.C (Inter Officer Correspondence). Transfer of material should be assigned to a Junior Engineer to Cross check the Quantities and Specifications issued by Store keeper to other site with Documentary evidence of GATE PASS and I.O.C	2	Procedure for issue / Receipt of material transferred from one site to other site.

1. MATERIAL HANDLING

	PRACTICAL		THEORY
1	Should know the types of material handling Equipment in stores like 1) Hand Trucks 2) Pallet trucks 3) Wheel barrow-Box type 4) Wooden pallet 5) Four Wheeled platform trolley 6) Mobile crane 7) Electric Hoist Crane	1	Types of material Handling Equipments

Tools and Equipment

1. Computer with latest configuration - 4 nos.
2. Software for Inventory control - As required
3. Fire fighting equipment - As required
4. Measuring tapes - 4 nos.
5. Weighing m/c (Digital & conventional) -one each
6. Steel Almirah - As required
7. Steel racks - As required
8. Bin card cabinet - 4 nos.
9. Vernier caliper - 2 nos.
10. Stationery books for store keeping - As required

Level –I

Module -III

JUNIOR LAND SURVEYOR

Name : Junior Land Surveyor
Sector : Construction
Code : CON 115
Entry Qualification : 10th passed
Age : 18 years and above
Duration : 400 hours

Terminal Competency

After completion of the course one should be able to perform land survey work and handling of different types of tools, equipments and instruments used in surveying

COURSE CONTENTS

Sl no.	PRACTICAL	Sl no.	THEORY
1	Identification and handling of tools equipments and Instruments	1	Role of Surveyor
2 3	Practicing of measurements with Tape Measurement of Length, Width, Depth in M.K.S and F.P.S system	2 3	Introduction and importance of survey 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	Conversion of measurement from one unit system to other	5	Knowledge of units of measurements and their conversions to other systems.

CHAIN SURVEY

Sl. No.	PRACTICAL	Sl.no	THEORY
1	Taking of measurements with the help of chain	1	Identification of Instruments for Chaining
2	Erecting of offsets with cross staff from the chain line	2	Terms used in chain survey
3	Location of boundaries and Determination of area of a field with cross staff survey	3	Types of chains to be used
4	Locating ground features	4	Locating ground features with offset
5	Chain measurement in fields	5	Entering of chain measurements in fileld book.
6 7	Use of symbols used in plotting Area calculation in cross staff survey	6 7	Conventional symbols used in plotting Area calculation in cross staff survey

COMPASS SURVEY

Sl. no.	PRACTICAL	Sl. no	THEORY
I	Setting of the Instrument	I	Identification and understanding of parts in Instruments
2	Taking of bearings from the instrument	2	Types of Compass and their adjustments
3	Observation of bearings in a) Open Transverse b) Closed Transverse	3	About bearings and angles
4	Conversion and Calculations of bearings from one system to another system	4	Conversion and Calculations of bearings from one system to another system
5	Calculation of Included angles in open and closed transverse.	5	Calculation of Included angles in open and closed transverse.

PLANE TABLE SURVEY

Sl.NO	PRACTICAL	Sl.NO	THEORY
I	Setting up the Instrument	1	Identification and Handling of tools used in plane Table
2	Sighting of points from the instrument	2	Use of tools in plane table
3	Radiation method	3	Working operations in Plane tabling
4	Intersection method	4	Field procedures adopted in Plane table methods
5	Traversing method and Resection method	5	Methods of Plane tabling

Tools & Equipment

1. Anney Level ……. 1 no.
2. Box Sextant ……. 2 nos.
3. Boning Rod ……. 1set
4. Binocular ……. 4 nos.
5. Drawing Instrument Box for Surveyor …… 1 for each student
6. Computing scales Two Hectares …… 4 nos.
7. Computing scales Five Hectares …… 4 nos.
8. Card Board Scales (8 in one box) …… 4 sets
9. Drawing Board …… 1 for each student
10. Engineers Chain …… 4 nos.
11. Grunters Chain …… 2 nos.
12 Metric Chain (20 mt. & 30 mt.) …… 4 nos. each
13. Engineers Level …… 2 nos.
14. Dumpy Level …… 2 nos.
15. Cokes Reversible Level …… 2 nos.
16. Proportionate compass …… 1 for each student
17. Prismatic Compass …… 2 nos.
18. Plan Meter (Digital) …… 1 for each student
19. Metallic tape (20 mt. & 30 mt.) …… 2 nos. each

Level -II

Module -I

WORKS SUPERVISOR (Construction)

Name	**: Works Supervisor**
Sector	**: Construction**
Code	**: CON 216**
Entry Qualification	**: 10th passed or passed Assistant works Supervisor course of MES**
Age	**: 18 years and above**
Duration	**: 300 hrs**

Terminal Competency

After completion of the course one should be able to supervise the civil construction works which includes following:

- Concrete mixing, laying, Transporting, curing etc e.g. 1: 5: 10, 1 :4:8, 1:3:6, 1:2:4, 1: 1 ½ :3 and 1: 1:2 for footing, column, lintels, Beam, Slabs, water Tanks etc ...
- Formwork for Column footing, column, lintels, Beams, Slabs, Water tanks etc ...
- Reinforcement for Column footing, column, lintels, Beams, Slab, water tanks etc.
- Brick masonry, Various bonds, Hollow and solid blocks including fly ash Bricks
- Half brick masonry, Door and Windows fixing, various types of plastering and pointing including junction plaster with Kabutar Jali.

Course Contents

1. Masonry		
	Theory	**Practical**
1	Knowledge about checking the Vertical level and Horizontal levels	Instruments used for checking levels .
2	Constructing of stone & Bricks masonry	Knowledge about all the four types of Bonds used for Construction & Curing of masonry works for specified period
2. Concrete Works		
	Theory	**Practical**
1	Knowledge about 1) Plain Cement Concrete(PCC) 2 Reinforced cement Concrete (RCC) 3)Calculation of the volume of work and material required	Materials used in RCC and PCC Slump test
2	Knowledge about various concrete grades	Identification of bars and their unit weights
3	Knowledge about the crushing strength of the concrete	Preparation of cubes for testing.

3. Formwork and Scaffolding		
	Theory	**Practical**
1	Supervision during Formwork and Scaffolding a) Steel, b) Timber c) Other materials	Stability of the shuttering, cover between rod and surface. Safety aspects and Precaution measures followed during Formwork and Scaffolding
4. Plastering and Pointing		
	Theory	**Practical**
1	Knowledge about Plastering and Pointing	Preparation of Background before plastering and pointing External plastering and Internal plastering and their number of coats
2	Different types of Pointing	Curing of plastering and pointing
3	Safety and House Keeping maintenance at site	Scaffolding on plastering and pointing before plastering
5. Fixing of Doors and windows		
	Theory	**Practical**
1	Identification of Doors, Windows and Ventilators as per the Drawing	Location of Doors, Windows and Ventilators as per the Drawing
2	Types of Doors and windows	Placing of Doors , Windows and Ventilators (above the floor level)
3	Knowledge about different sizes of Doors and Windows and various types of fittings and Hinges and Holdfasts	Identification about various types of fittings, Hinges and Holdfasts
6. safety & Precautions		
	Theory	Practical
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
7. Material Staking		
	Theory	Practical
1	Knowledge about stacking of raw materials and movement of vehicles	Proper stacking of raw materials and movement of vehicles at project site.

Note :- During the course one or two Site visit are required.

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

Level -II

Module -II

STORE KEEPER(Construction)

Name : **Store Keeper**
Sector : **Construction**
Code : **CON 217**
Entry Qualification : **Degree in Arts/ Science/Commerce**

or

passed the course of Assistant Store Keeper under MES with 3 yrs. Post qualification experience

Age : **20 years and above**
Duration : **300 hrs**

Terminal Competency

After completion of the course one should be able to work as Store Keeper at construction sites, which includes the following:

- Procedure for receiving and issue of construction materials.
- Storage systems, Storage objectives, and types of Storage Equipments.
- Security of Stores House and store yard storage at project sites.
- Precaution against fire and maintenance of fire fighting Equipments.
- Scrap, Surplus, Salvage and procedure for disposal of these items.

COURSE CONTENTS

1. PROCUREMENT OF STORES

Sl.NO	PRACTICAL	Sl.NO	THEORY
1	Knowledge about supply of store from supplier or manufacture	1	Source of supply
2	Identification of store items received to stores like cement or steel etc. as per specification.	2	Material Identification
3	Classification of items and their storage and maintenance.	3	Material classification, codification standardization

2. RECEIPT OF STORES

Sl.NO	PRACTICAL	Sl.NO	THEORY
1	Knowledge of verification of Delivery challans , Security stamps on challan time and date in correspondence with purchase order	1	Procedure for receiving of stores

2	Knowledge of inspection procedure of Goods received to stores with Documentary proof like Brand name, Company name and Specification mentioned in purchase order copy.	2	Procedure for Inspection of Stores
3	Oral test on Responsibilities of the Inspection Officer	3	Responsibilities of the Inspection Officer.

3. STORAGE METHODS

SNO	PRACTICAL	SNO	THEORY
1	STORAGE :- the physical act of storing the materials in a store on pallets. shelves, racks, boxes, and Almariah	1	Storage Techniques
2	Purpose of any stores to provide to users like as Objectives Right materials Right Quantity Right Time	2	Storage Objectives ABC system LIFO & FIFO
3	Knowledge of Storage Tools & equipment like 1) Wooden Shelves 2) Steel Shelves 3) Steel Bins and Slotted Shelves	3	Type of Storage Equipments.

4. SECURITY OF STORES

SNO	PRACTICAL	SNO	THEORY
1	Procedure to keep the assorted items in proper place.	1	House keeping of stores
2	Procedure to maintain the security of the store Knowledge about locking & sealing. Checking of pilferages.	2	Security of Stores.

3	Regular demonstration and handling on fire fighting equipments 1) Fire Extinguisher 2) Water Bucket 3) Sand Bucket 4) Fire Beater 5) Parade (Spade) 6) Pick Axe 7) Fire Bell	3	Knowledge about different types of fire fighting equipments and their maintenance, precautions against fire.

5. PRESERVATION

Sl.NO	PRACTICAL	Sl.NO	THEORY
1	Preservation involves the keeping of the material in a fresh as it was originally received condition. Preservation measures of Tools. Example. Tools like Dies, Taps, etc should be protected from dropping on Cement Floor. The threaded portion of tools can get damaged. Rusting can be taken care by applying petroleum jelly.	1	Preservation of materials in storage and preservation measures.

6. DISPOSAL OF SCRAP AND SURPLUS

Sl.NO	PRACTICAL	Sl.NO	THEORY
1	Demonstration of disposal of scrap and salvage material	1	Scrap, Salvage and Surplus procedure for disposal of these Items. The procedure for disposal is as follows. The disposal committee consists of representation from project Engineer, Design Department and Quality Control and purchase departments. **Disposal Through** Tender obtained through offers! Auctions **Salvage Hems** Which cannot be economically made suitable for which were originally designed (Declared as Scrap).

7. PURCHASE OF STORES

Sl.NO	PRACTICAL	Sl.NO	THEORY
1	Knowledge of purchase procedure	1	Preparation of materials requisition of store Demand and knowledge of purchase procedures. Procedure for calling Quotation/tender. Preparation of Comparative statement Preparation of purchase/ Supply order and

			following with suppliers

8. MATERIALS MANAGEMENT

Sl.NO	PRACTICAL	Sl.NO	THEORY
1	Oral test on materials Management system	1	Functions of materials Management like • Material planning • Material handling • Receiving the Inspection of Incoming Goods • Store Keeping • Inventory Control • Disposal of Scrap material

9. VISIT TO CONSTRUCTION SITE

Sl.NO	PRACTICAL	Sl.No	**THEORY**
1	Visit to construction site	1	Identification of construction material like Cement, Steel of all sizes, Plumbing / Sanitary materials. Electrical material. Aggregate, Brick, Sand ,Dust etc ..

Tools and Equipment

01. Computer with latest configuration - 4 nos.
02. Software for Inventory control - As required
03. Fire fighting equipment - As required
04. Measuring tapes - 4 nos.
05. Weighing m/c (Digital & conventional) -one each
06. Steel Almirah - As required
07. Steel racks - As required
08. Bin card cabinet - 4 nos.
09. Vernier caliper - 2 nos.
10. Stationery books for store keeping - As required

……..

Level -II

Module -III

SENIOR LAND SURVEYOR

Name : Senior Land Surveyor
Sector : Construction
Code : CON 218
Entry Qualification : 10th passed and passed the course of Junior Land Surveying under MES

Age : 18 years and above
Duration : 400 hours

Terminal Competency

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

COURSE CONTENTS

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

SNO	PRACTICAL	SNO	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
I	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
	Practice of curve settings	7	Methods of Curve setting

LEVELING

Sl.NO	PRACTICAL	Sl.NO	THEORY
I	Operating and setting up the Instrument	I	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.

JUNIOR RURAL ROAD LAYER

Level –I

Name : **Junior Rural Road Layer**

Sector : **Construction**

Code : **CON119**

Entry Qualification : **5th**

Age : **18 years and above**

Duration : **120 hrs**

Terminal Competency

After completion of the course one should able to

- Identify the tools used in Construction Industry
- Work out Conversions, Menstruation, Measurements, Angle notation etc Quantity surveying, Measurement book recording , safety norms in work area
- Work out soil conditions, Foundation bed and recognize the materials like cement, steel, fine Aggregate, Coarse Aggregate, Timber, Paints...

Course Contents

1. Measurements and Mensuration		
Theory		**Practical components**
1	Measurements 1)Linear measurements 2)Angular measurements	To read various measuring tools for calculating Linear measurements and Angular measurements
2	Mensuaration 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 and its conversion to other systems	Measurement length, width, and Depth in M.K.S , F.P.S and S.I system

2. Marking of Roads

Sno	Theory	Practical components
1	Road laying; Needs Types; Uses of Roads	Marking road width for rural roads
2	Technical Terminology Fixing of Alignment	Marking center line of the road
3	Marking road width for rural roads Marking center line of the road	Acquainting of tools
4	Duties of Labour and Maistry in road making	Tools, equipment , materials used in road laying
5	Tools, equipment , materials used in road laying and Acquainting of tools	Visits of Roads near by
6	Marking of Height of Embankment using 12mm steel rods (1 mt length)	Clearing the shrub Jungle
7	Marking of formation width using steel rods & Rope TOP width 24-0”/ BOTTOM width 27-0”	Marking of Height of Embankment using 12mm steel rods (1 mt length)
8	Marking a gap land width between TOE of road and borrow pits on either sides of road	Marking a gap land width between TOE of road and borrow pits on either sides of road
9	Depth of borrow pits Width of borrow pits on either side	Width of borrow pits on either side

3.Excavation of Roads

Sno	Theory	Practical components
1	Tools for excavation	Tools for excavation

2	Excavation of earth in borrow pits up to a depth of 1-6'' (45cm) and doing formation	Excavation of earth in borrow pits up to a depth of 1-6'' (45cm) and doing formation
3	Types of soils MET with Classification of soils	Excavation with SS 20 A specification & Rate
4	Rates of excavation as per prevailing SSR	Excavation with SS 20 B specification & Rate
5	To leave thandhus in borrow pits for measurement	
6	Excavation with SS 20 A specification & Rate	
7	Excavation with SS 20 B specification & Rate	
8	Wages under NREGS: Breaking of clods & dressing of road as per SS 20 A	
9	Quantum of Excavation to be done and doing formation for getting full wages under NREGS (Model pit) by each couple (WIFE & Husband) or (a Man & a woman)	

4. Camber and Curves in Alignment

Sno	Theory	Practical components
1	Importance of camber Providing & use of camber rods	Making curves in Alignment
2	Importance of Super elevation	Minor CD works using Hume Pipes; Leaving gaps in formation
3	Making curves in Alignment, Minor CD works using Hume Pipes; Leaving gaps in formation.	

5. Stone Quarries

Sno	Theory	Practical components
1	Standard specification Gravel for Sub base Blindage	Identification of Gravel / Stone Quarries near by to work site approval of materials
2.	Standard specification of HG metal /Trap metal	Transporting good gravel & good quality stone boulders to road site and stacking required quantity hectometer wise to do excavation &

	Quality and Quantity Aspects	formation
3	Identification of Gravel / Stone Quarries near by to work site approval of materials	Tools required for breaking of stone
4	Transporting good gravel & good quality stone boulders to road site and stacking required quantity hectometer wise to do excavation & formation	Breaking of stone, Providing sieves
5	Tools required for breaking of stone Supply of tools	Sieve designations & to do sieving
6	Size of metal required as per standard specification as per sanctioned estimate	Pass through Sieve No…. & retain on sieve No
10	Breaking of stone, Providing sieves	
11	Sieve designations & to do sieving Pass through Sieve No…. & retain on sieve No	

8.Construction of CD works

Sno	**Theory**	**Practical components**
1	Design of ventage for construction of CD works	Tools required for measuring , Method of taking measurements- Arriving quantities- Working out value of work done
2	Construction details of Hume pipe culverts & RCC 1 vent & 2 vent culverts	
3	To verify whether formation is carried out as per mark out and to do rectification if required	
4	Tools required for measuring , Method of taking measurements- Arriving quantities- Working out value of work done	
5	General Rules for measurement	

8.Verification of Camber

Sno	**Theory**	**Practical components**

1	Verification for camber required & correction	I) Providing sub base with good granular gravel spreading of gravel using Hollow boxes for loose thickness of gravel proposed
2	To undertake consolidation with power roller	II) Consolidation of Gravel sub base with power roller 8-10 T & Watering
3	To make diversion of traffic arrangements	
4	In BC reaches only I) Providing sub base with good granular gravel spreading of gravel using Hollow boxes for loose thickness of gravel proposed II) Consolidation of Gravel sub base with power roller 8-10 T & Watering.	

9. Verification of Quantities

Sno	**Theory**	**Practical components**
1	Required quantity of 60-75 mm size metal and blindage gravel for 100 mts length	Spreading of metal using wooden hollow boxes of height 100 mm to maintain consolidated thickness of 75mm with camber correction if any
2	Verification of Quantities To collect short fall quantities	To undertake consolidation of metal with power road roller 8-10 tones
3	Spreading of metal using wooden hollow boxes of height 100 mm to maintain consolidated thickness of 75mm with camber correction if any	To provide Watering spreading of blindage gravel and consolidation, Providing berms & consolidation
4	To undertake consolidation of metal with power road roller 8-10 tones	
5	Spreading of Metal using wooden hallow boxes of height 150 mm to maintain consolidated thickness of 75 mm with camber correction if any	
7	To undertake consolidation of metal with power road roller 8-10 Tones	
8	To provide Watering spreading of blindage gravel and consolidation, Providing berms &	

	consolidation	
10. Quality Control Tests		
Sno	**Theory**	**Practical components**
1	Quality control aspects	QC Tests required
2	QC Tests required	Material and Test Standards
3	Material and Test Standards	
4	Interaction with trainees – giving topics for group discussion Formation of Groups- Group Discussion;	

Equipments & Tools

1. Measuring flexible steel tape 3 mtr
2. Measuring flexible steel tape 15mt & 30 mtr
3. Compacting / Vibrating Roller
4. Excavator
5. Dumpers
6. Water Tankers
7. Dozers
8. Grader
9. J.C.B (Excavator / Loader)
10. Crowbar
11. Spade
12. Panja
13. Mortar pans
14. Pegs(to fix Road level)
15. Straight edge
16. Peacocks

List of members of the Trade Committee for designing the course curriculum under **Skill Development Initiative Skill (SDIS)** based on **Modular Employable Skills (MES)**

S / Shri,

1.	**Anil Kumar, Joint Director**	**Central Staff Trg. & Res. Instt., Kolkata**	**Chairman**
2.	**Shubhendu Poddar, Dy. G.M.(HRD)**	**Ambuja Realty, Kolkata**	**Member**
3.	**Swapan Kumar Baw**	**C.P.W.D., Kolkata**	**Member**
4.	**S.P.Ghosh**	**Bridge & Roof Co. (I) Ltd.**	**Member**
5.	**P.K.Singh**	**Signal Workshop, Eastern Railway, Howrah**	**Member**
6.	**Priyatosh Mazumder Consultant**	**Bengal Perk Chamber**	**Member**
7.	**R. Gangopadhyay**	**Eastern Railway, Kanchrapara**	**Member**
8.	**Brother T.V.Mathew**	**Don Bosco, SERI, Bhattanagar, Howrah**	**Member**
9.	**K.K.Roy**	**Signal Workshop, Eastern Railway, Howrah**	**Member**
10.	**T.K.Chowdhury**	**Bridge & Roof Co. (I) Ltd.**	**Member**
11.	**Smt. Sanjukta Sarkar**	**George Telegraph Trg. Institute, Kolkata**	**Member**
12.	**Parimal Kumar Pal**	**Industrial Training Institute, Kalyani**	**Member**
13.	**Purnendu Adhikary**	**Industrial Training Institute, Howrah Homes**	**Member**
14.	**Ishwar Singh, Joint Director**	**Reg. Directorate of App. Trg.(ER), Kolkata**	**Member**
15.	**L.K.Mukherjee, Dy. Director of Trg.**	**Central Staff Trg. & Res. Instt., Kolkata**	**Member**
16.	**Abhinoy Nandi, Dy. Director of Trg.**	**Central Staff Trg. & Res. Instt., Kolkata**	**Member**
17.	**Mrinal Hazra**	**Industrial Training Institute, Howrah Homes**	**Member**
18.	**S.B.Sardar Training Officer**	**Central Staff Trg. & Res. Instt., Kolkata**	**Member**
19.	**P.K.Dutta Training Officer**	**Central Staff Trg. & Res. Instt., Kolkata**	**Member**
20.	**R.N.Manna Training Officer**	**Central Staff Trg. & Res. Instt., Kolkata**	**Member**
21.	**M.K.Batabyal Jr. Tech. Asstt.**	**Central Staff Trg. & Res. Instt., Kolkata**	**Member**

Level –I

Module -I

ASSISTANT HIGHWAY WORKS SUPERVISOR

Name	**:**	**Assistant Highway Works Supervisor**
Sector	**:**	**Construction**
Code	**:**	**CON120**
Entry Qualification	**:**	**Inter pass, ITI, GWS, III Year diploma appeared.**
Age	**:**	**18 years and above**
Duration	**:**	**300 hrs**

Terminal Competency

After completion of the course one should be able to :

- 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.

Note

- **Highways:-** Definition & Types of Roads
  - 'Highways' are one of the major means of surface transport.
  - 'Highways' of a country indicate
  - the Civilization of that country. Highways help us in movement of pubic commodities, Agricultural Produce, Industrial Produce etc., from one place to another place.
  - During wars, epidemics, natural calamities etc., the highways play important role.
  - For the development of a country, good quality and good network of highways are necessary.
  - Through this course you are going to be a part of construction and Maintenance of a good Highway.

The types of roads are:-

(1) Earthen Roads
(2) Gravel Roads
(3) Metal Roads (WBM)
(4) Bituminous Roads
(5) Cement Concrete Roads

Course Contents

1. MEASUREMENTS AND MENSURATION		
Theory		Practical
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		
Sno	Theory	Practical
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		
Sno	Theory	Practical
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		
Sno	Theory	Practical
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		
Sno	Theory	Practical components
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		
Sno	Theory	Practical components
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		
Sno	**Theory**	**Practical components**
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.**

Level –II

Module –I

HIGHWAY WORKS SUPERVISOR(Construction)

Name	**: Highway Works Supervisor**
Sector	**: Construction**
Code	**: CON221**
Entry Qualification	**: Inter pass, ITI, III Year Diploma appeared+ CON120**
Age	**: 18 years and above**
Duration	**: 300 hrs**

Terminal Competency

1. **Able to completely understand construction procedures, usage of right equipment, Tools & Plants, Machinery etc., and quality of materials duly conducting process control tests to achieve the quality standards.**
2. **the construction procedures and methodologies about the different components of Highways and Bridges.**
3. **Construction of various components of roads, Sub-Grade, Sub-Base, Bituminous Base, Wearing Coat, Cement Concrete bases, Bridges, Culverts.**

Course Contents

1. HIGH WAYS

	Theory	Practical Components
1	**Sub-grade Soils**	**Types of Sub-Grade soils, Types of Tests, Behaviour of soils in moisture conditions, Suitable Soils.**
2	**Components**	**Sub-Grade, Sub-Base, Bituminous Base / Wearing Coat** **Cement Concrete bases / Wearing Coat Bridges , Culverts**
3	**Mix Designs**	**Normal mix, De** **sign mix, Target Strength, Procedure for mix designs, Research lab / Universities**

4	**Road Construction**	**Construction of various components of roads, Sub-Grade, Sub-Base, Bituminous Base, Wearing Coat, Cement Concrete bases, Bridges , Culverts.**
5	**Embankment / Sub-grade Construction**	**Suitable soils for Embankment, Thickness of layers, Side Earth / Barrowed Earth, Testing density of soils, Compaction of Soils.**
6	**Sub-Grade Construction**	**Suitable Materials, Suitable soils for Embankment, Thickness of layers, Side Earth / Barrowed Earth, Testing density of soils, Compaction of Soils, Equipment for Compaction**
7	**Sub-Base Courses**	**Types of sub-bases, Mateirals used for sub-base, Granular sub-base, Purposes, Drinage layers, Gradation of GSB, Coarser / Closely graded, Density, CBR values**
8.	**Base Courses**	**Types, Gradation, Layers, Compaction/ Density**
9	**Bituminous Base and Surface Courses**	**Bituminous Base courses - Semi-Grout , Bituminous Macadam, Dense bituminous Macadam,** **Bituminous wearing coat – Bituminous Carpet BC, SDBC, MSS,OGPC**
10	**Cement Concrete Roads and Pavement Quality Concrete**	**Base courses, Dry lean concrete mix, PCC 1:3:6, M30/M35, Mixing and Placing, Compaction, Curing , Expansion Joints & Construction Joints in Concrete**
11	**Shoulders**	**Earthen / Gravel, Side Earth / Barrowed Earth, Testing density of soils, Compaction of Soils**
12	**Hot Mix Production**	**Hot Mix Plant, Bituminous tank, Loading, Transporting, Heating, Pumping, Belt Conveyor, Placing, Laying, Compacting, Finishing.**
13	**Compaction**	**Equipment, Rollers Static –** **Vibratory, Sheep foot, Smooth Finish, Soil Compactor, Pneumatic Tired Roller, Tandom, Density Checking**
14	**Equipment like rougho meters etc.**	**Construction Equipment, Construction Machinery, Compaction Equipment, Spreading / Laying, Transporting, Production Plant, Quality Control**

2. BRIDGES and CULVERTS		
1	**Bridges**	**Types of Bridges – T-Beam, Bowstring grider, Suspension, Movable Steel, Masonry Arch, Prestressed Concrete, Steel**
2	**Culverts**	**Types of Culverts – Pipe, Cut stone Slab, Box type, Arch, Slab,**
3	**Components of Bridge**	**Sub-Structure – Foundations, Piers, Abutments, Wing walls, Returns** **Super Structure – Girders, Deck Slab, Backing walls, Wearing Coat, Approach slabs, Hand Rails, Drainage, Bearings, Expansion joints**
4	**Foundations**	**Open Foundations, Shallow, Deep Foundations, Pile Foundations, Well Foundations, Raft Foundations**
5	**Construction of Sub-Structure**	**Excavation of Foundation, Construction of Foundation, Construction of Abutments, Piers Sinking of Wells, Driving of piles**
6	**Construction of Super-Superstructure**	**Bed blocks, Slabs – Solid deck slab, Girder slabs, Segmental block, Backing wall, Construction etc.,**
7	**Form Work**	**Wooden, Casuarinas, Steel, Fibre**
8	**Revetment**	**Thickness, Gravel packing, Slopes, Road side slopes, Culverts, Bridges, Protective works like Rigid aprons, loose aprons, cut off walls**
9	**Procedure of Back Filling**	**Filling backside the abutments; Material, Compaction, Weep holes, Fitters**
3. Road Appurtenances		
1	**Road Appurtenances**	**Signboards, Road Markings, Road Traffic Signs, Hectometer / Kilometer Stones, Road Delineators, Fencing, Tubular Steel Railing, Concrete Crash Barrier, Metal Beam Crash Barrier, Road Traffic Signals, Junction boards, Guide stones, Guard stones, Boundary stones, Studs..**
4. Quality Control		
1	**Quality Control Tests**	**Soil Testing, Tests for Aggregate, Cement, Bitumen Extraction Test, Density of the compacted layers etc.**

5. Maintenance		
1	**Maintenance of Roads & bridges**	**Restoration of Raincuts, Earthen Shoulders Maintenance and Bituminous Pavements - Pot holes, Patch Repairs, Maintenance of Concrete Roads, clearing drainage spouts, pre monsoon and post monsoon inspection of Cross Drainage works, silt clearance of the culvert and Bridge vents, inspection of bearings .**
6. MORT&H Specification		
1	**MORT&H Specification**	**300,400,500,600,900,1500,1600,1700,2200,2300**

Table – 2. Sectoral Skill Panel Members – Construction Sector (For additional Skills identified)

Name	Address	Contact details
Mr. S. J. Amalan Chairman	Director, Apex Hi-Tech Institute, Bangalore and Regional Director D.G.E.T, Ministry of Labour and Employment, Karnataka, Andhra Pradesh and Orissa.	sjamalan@yahoo.co.in 080-23378335 +(91) 0 9880361079
Mr. L. Nagarajamurthy Advisor	Former Director of Vocational Education, Government of Karnataka	nagarajamurthyl@gmail.com +(91) 0 9448633189
Mr. B. Purushothama Coordinator	Consultant – QMS and Textiles B-17, Jayanthi Apartments, 13th cross, 4th Main, Malleswaram, Bangalore 560003	purushothama1949@yahoo.co.in +(91) 0 9448864028 080-23461512
Dr.P Arunkumar	Head,N I T T R Ext Centre, SJP Campus, Sheshadri Road Bangalore 560001	080-22374154 arun.ecb@gmail.com
V Shivakumar,	Faculty N I T T R Ext Centre SJP Campus, Sheshadri Road Bangalore - 560001	8022374154 veeyeskey@rediffmail.com
Suresh Kumar K S	Project Officer Community Polytechnic Scheme Govt. Polytechnic For Women, Bangalore 560001	9341015567 sknitt@gmail.com
A M Subramanyam	Rtd.Frofessor 38,7th B Main, IV Block Jayanagar Bangalore 560011	080-26653348 amsubramaniyam@yahoo.com

Muralidhara	Governmet Class I Contracter and Memberof the National Executive committee,Builders Associaation of India. Prorietor, Pavan Builders 752, 8th Main, J P nagar, Bangalore 560078	08026584397, +919448046633 ananthmurali@hotmail.com
Sri Ramanuja and team	Stone Dressers	Beeraganahalli, Srinivasapura Taluk, Kolar District. Karnataka state.

Members of the Sectoral Skill Panel (Review committe):

1. Er.A.K. Yussouf. M.E.,

   National President, Builders association Of India.

   Camp Off. Red Star Building, No. 6 Thillainagar Main Road, Tiruchirapalli, 620018.

   Ph.Off. 0431 2740678/2742645. Email:akyussouf@rediffmail.com

2. Sri. Kaatoor Mahalingam. M.A. LL.B., M.Phil.

   General Council Member, BAI-Trichy Centre & Class 1 PWD Contractor,

   Smart Associates, 35A, Pattabiraman Street,Tennur, Tiruchy.

   Ph. 0431-2794159, 2764159. Email:katturmali@gmail.com

3. Sri. V.K. Jain,

Vice President(South)

M/S Ahluwalia Contracts (India) Ltd.

#216/b,6th Cross, 2nd main, I Stage, Indiranagar, Bangalore-560038

Ph. 080 23470233/ 25210679. Email: vkjan@acilnet.com Website:www.acilnet.com

4. Sri D.V. Shivanand. B.E., (Elect)
   C.E.O Universal Power Controls. Plot No.22, Satyamangala Indl. Area,

   Tumkur. 572104.

5. Sri Shivakimaraiah,
   Asst. Engineer (Ele) Department of Construction and Maintenance

   Siddagagnaga Institute of Technology, Tumkur- 572103

6. Sri Chikkegowda,
   Lecturer, Vocational Education, Govet. P U College, Tumkur. 572101.

7. Sri. Asoka. K,
   Foreman. Department of Electrical Engineering,

   Siddaganaga Institute of Technology, Tumkur. 572103

1. **Module Name**	3D Designer Using PROE

2. **Sector**	Construction/Manufacturing
3. **Code**	CON 222
4. **Entry Qualification**	Minimum 10th Std. + ICT 101
5. **Terminal Competency**	After completion of the training, participants would be able to: • Do the work on Mechanical 3D Modelling & design (Part Design and Sketching). • Apply this knowledge to understand the engineering part design for the Manufacturing Industry
6. **Duration**	200 Hrs
7. **Preface**	Designing is very essential before starting a construction activity to visualise the building or the structure. 3D Modelling gives a clear picture of the structure after it is completed.
8. **Job Profile**	a) Installation of software b) Maintenance of Lab c) Designer Using PROE
9. **Course Content**	
(a) **Core Competency**	• Read instructions for installing software from the manual provided. • Installing software by following the instruction from the manual. • Skill of starting the computer in the network and knowing about the security system like password and assisting the participants • File management in the local area network including saving the files in one computer and accessing with another. • Browsing the net to get more instruction material. • Interact with other designers of other levels and communicate the requirement.

(b) **Technical Competency** :

Practical Competencies	**Under Pinning Knowledge (Theory)**
Set the working Directory	File saving in a directory in a network
Use various tools to create geometry. • Dimension of a sketch, • Applying constraint to a sketch.	Knowing about the various types of geometry and dimensioning aspects and need of making constraint
• Modify a Sketch. • Edit the Geometry of a sketch by trimming. • Mirror a Sketch.	Creativity and converting rough sketch into the actual sketch and its manipulation.

• Use the Drawing Display Options. • Use various Options to dimension a sketch.	Zoom in, Zoom out and Pan Options Knowing about the various types of geometry and dimensioning aspects and need of making constraint
Create fillets	Working with fillets and splines
Create, Dimension, and Modify splines. Create text. Scale and Rotate Entities. Copy a sketch.	Various places of Text usage Scales in engineering drawing and its need Repeated entities
Import 2D drawings	Working with other software to import to drawing
Create a Solid Feature using the Extrude Tool.	Concept of developing solid from sketch
•Create a thin Feature using the Extrude Tool.	Surface modelling concepts
•Create a Solid Feature using the Revolve Tool.	Rotation about an axis
•Create a thin Feature using the Revolve Tool.	Hollow sections
•Specify the depth of Extrusion to a Solid feature.	Concept of developing solid from sketch
•Specify the angle of Revolution to a Revolve feature.	Rotation about an axis
•Orient the Datum Planes.	Understanding about the Planes for sketching and axis of revolution.
•Understand the parent / child relationships.	Concept of model tree, Implicit and Explicit relationship
•Understand nesting of sketches.	Combining two or more sketches
Understand three default datum planes.	Mutually perpendicular planes for reference
Creating Datum Planes using different constraints.	Constraints and reference planes
Creating Datum planes on-the-fly.	Constraints and reference planes
Create datum axes using different constraints	Constraints and reference axes
Create datum points.	Reference imaginary points
Create extrude and revolve cuts.	Removing materials
Create holes using the Hole Dashboard.	Drilling/ Threading aspects

Create Round, Chamfer, and Rib.	Rounded Transition, Filleting,
Edit features.	Parent child concept, Model Tree
Redefine, Reroute and Reorder features.	Sequence of feature creation, Changing the sequence
Suppress and delete features.	Regeneration
Modify features.	Modify by dimension
Create a Dimension pattern.	Concept of Pattern/array
Create a Direction pattern.	Concept of Pattern/array
Create an Axis pattern.	Polar array
Create a fill pattern.	Concept of Pattern/array
Create a Reference pattern.	Concept of Pattern/array
Create a Table driven pattern.	Concept of Pattern/array
Create a curve driven pattern.	Concept of Pattern/array
Control the size of the pattern instances using constraints in the sketcher environment.	Constraints/pattern/array
Use the copy option.	Copying a feature/ repeated work
Use the move option	Manipulation of feature
Use the mirror option.	Manipulation of feature
Use the mirror tool button.	Manipulation of feature
Create a section of a model.	Sectioning concepts
10. Tools and Equipment for training 20 candidates	
Hardware	20 workstations of suitable configuration
Software	20 licenses of 3D software

LEVEL – III

1. **Module Name**	3D ADVANCED DESIGNER Using PROE
2. **Sector**	Construction/Manufacturing
3. **Code**	CON 323
4. **Entry Qualification**	10^{th} Std. + CON 222
5. **Terminal Competency**	After completion of the training, participants would be able to: • Do the work on Mechanical 3D Advanced Modelling & Assembly. • Apply this knowledge to understand the engineering in the Assembly and Analysis in Manufacturing Industry
6. **Duration**	: 200 Hrs
7. **Preface**	
8. **Job Profile**	a) Installation of software b) Maintenance of Lab c) Advanced Designer Using PROE
9. **Course Content**	
(a) **Core Competency**	• Read instructions for installing software from the manual provided. • Installing software by following the instruction from the manual. • Skill of starting the computer in the network and knowing about the security system like password and assisting the participants • File management in the local area network including saving the files in one computer and accessing with another. • Browsing the net to get more instruction material. • Interact with other designers of other levels and communicate the requirement.
(b) **Technical Competency**	

Practical Competencies	**Under Pinning Knowledge (Theory)**

Basic Part design using pro-E	Theory related for the same.
Creating Sweep feature With Sketch Traj option 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 modelling 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 modelling
Inserting components in the assembly	Co-ordinate system
Placing components using constraints	aligning
Packaging Components	Assembly datum planes
Use the view manager	Part modelling
Edit assembly constraints after assembling	Part modelling
Modify components of the assembly with in the assembly	Part modelling
Create the exploded state of the assembly	Part modelling
Add offset lines to exploded components	Part modelling
Understand the Bill of materials in the assembly	About the product

1. **Tools and Equipment** :
   1. Hardware: 20 workstations of suitable configuration

   2. Software: 20 licenses of 3D software

LEVEL –I

1. Module Name	**Construction Electrician Level - 1**
2. **Sector**	Construction
3. **Code**	CON 124
4. **Entry Qualification**	Minimum 8th Std.
5. **Terminal Competency**	Layout, Assemble, Install, Test, Troubleshoot & Repair electrical wiring, Fixtures, Control Devices & related equipment in buildings & other structures
6. **Duration**	300 Hrs
7. **Preface**	
8. **Job Profile**	They are employed by electrical contractors & maintenance departments of buildings & other establishments or they may be self employed
9. **Course Content**	
(a) **Core Competency**	
1. Reading	Read instructions for installing equipment, sequence of operation, safety instructions and manuals, electrical code and regulation manuals etc., May read customer or engineer specifications ranging from several pages to full binder, detailing requirements which may vary from the plans making careful reading essential.
2. Document Use	• Interpret sets of drawings including schematics when installing, assembling or repairing electrical equipment • Study set of drawings & schematics for details about the electrical functioning components to troubleshoot or anticipate problems. Background knowledge is required to integrate information & read drafting conventions, symbols & abbreviations. Ability to translate the two dimensional prints into three dimension is required. Plans are assessed and compared to existing features to identify problems or inconsistency. For example, existing walls may be omitted on the plan or a circuit may be incomplete. Inference required can be significant. • Complete an accident report • Read & integrate information from several diagrams in repair manual to troubleshoot a problem.

3. Writing	• May write fax requests to head office for materials. • Make a list of materials needed when setting up for a job. • May keep a journal of daily work. • May record the incident details on an incident.
4. Oral Communication	• Talk to suppliers to order materials or equipments • Interact with co-workers to exchange information and opinions on how to get the job done • Interact with engineers, owners, inspectors and others to ensure that work can meet scheduling and code requirements
5. Numeric & Mathematics	• Money Math • Scheduling, Budgeting & Accounting Math • Measurement & Calculation Math • Data Analysis Math • Numerical Estimation • Number concepts • Patterns and Relations • Shape and spatial sense • Statistics and probability
6. Thinking Skills	Problem Solving • May deal with problems involving malfunctioning electrical equipment. Using a troubleshooting process, they start with the most likely causes for the malfunction and after exhausting possibilities • May be required to provide immediate solution to such problems as an unexplained loss of heating in a building in the winter. They analyze a broad range of factors that could be involved. Identify the nature of the problem may be difficult & the urgency of the matter makes the situation more difficult. • May experience difficulties positioning new equipment in a plant setting. They need to take into account limited space for conduit installation of new electrical lines & consider such factors as the consequences of equipment placement for future development. To solve the problem the electrician may bend the conduit Decision Making • Decide how to retain normal operations during construction phases. For example, if a capacitor bank blows up, it can destroy the existing contactors & switch gear. A decision may involve temporary shut down to rewire existing loads that are essential to the function of the particular location. In some cases, loss of security or money is a significant factor. • Decide what type of wire to use & what type of installation is needed based on variables such as wet or dry conditions & inside or outside locations. For example, the application & installation in a food processing plant, which is washed down every day, is different than a garage where water is not a significant factor.
7. Job task Planning &	• Construction Electricians plan & organize their workday to

Organizing	complete work assignments. If they have to wire an area, they need to plan where to begin, i.e., either with the wiring first or installing the boxes or plugs. They plan efficient use of resources so that they have the necessary materials delivered & available on time to complete the job. This also involves making a few trips as possible from the job to the service truck for tools & materials. When tasks are repetitive, Construction Electricians plan efficient work methods, for example, making a jig to produce multiples quickly. Because larger project involve other trades, they may have to revise their work plans to integrate them with the work plans of others. • Journey construction electricians may supervise apprentices, assign tasks and monitor their progress
8. Finding information	• Refer to the IEC book to identify relevant sections for applications in order to meet standards called for in specifications • Refer to several manuals for details regarding complex or unusual installations • Refer to brochures & search internet sites for information about new products or techniques • Seek advice from other experienced tradesperson, manufacturer's representatives or engineers to solve technical problems, which may involve seldom used or innovative new construction techniques
9. Working with others	• Depending on the situation, Construction Electrician work with a co-worker or in a team of construction electricians assigned to complete installations in a particular area. Large construction sites involve the services of several other building trades. Conflicting priorities occur; however, all have a stake in working safely & efficiently. Construction Electricians work primarily with other construction electricians but also may interact with a wide variety of workers including apprentices, supervisors, owner's representatives, architects, engineers, inspectors & suppliers.
10. Computer Use	May use a spreadsheet for estimating costs • May use a distributed control system or similar software to control electrical equipment in a plant to aid in troubleshooting equipment or instrument failure. The system presents a variety of views of the data from thousands of sensors and controls within the plant that can be analyzed before adjustments are made. • May use laptop computers to inspect & program, Programmable Logic Controllers (PLC). The program is used to solve problems such as adjusting currents or changing programs to control different pieces of equipment in industrial settings.
11. Continuous Learning	Because the electrical code is updated regularly, Construction Electrician is expected to continue to learn and become familiar with changing code requirements. They must also keep up to date with changes in technology such as computer controls or PLC. Also, fibre optics and data cables are becoming more widely used and trained

	installers are in demand.
12. Other Information	Physical Aspects • The work is often very physically demanding, for example, pulling huge cables long distances & climbing ladders & scaffolds. The construction electricians interviewed noted that understanding how to use your body properly is important, for example, using legs for lifting. Good hand dexterity is a benefit, as well as good vision & hearing because of safety issues. • Attitudes • Because construction electricians work in potentially dangerous situations, they need to have a good balance between risk taking and careful, cautious work habits. They must wear or use personal protective equipment and apply proper procedures to ensure that no harm is caused in a sensitive customer environment as to ongoing production. A strong work ethic & a desire to learn about new systems are important for full employability

(b) **Technical Competency** :

Practical Competencies	**Under Pinning Knowledge (Theory)**
1.0 Use Essential Skills 1.1 Use Analytical Trouble Shooting Techniques.	• Describe techniques to accurately break systems down into units of functions. • Describe techniques to determine equipments specifications & operating parameters • Describe & use flow charts & process charts in trouble shooting.
1.2 Use Computers	Knowledge of : • Components of a computer • Common peripherals interfaces • Installing peripherals interfaces • Connecting peripherals hardware components. • Installing & Uninstalling software • Using software • Creating & Storing data • Accessing & using the internet
2.0 Use Safe Work Practices 2.1 Perform Lockout Procedure	Knowledge of : • Lockout requirements for various sources energy. • Lockout procedures

2.2Apply Safe Work Practices	• Knowledge of personal safety precautions & procedure. • Knowledge of locating shop emergency equipment & means egress. • Knowledge of the conditions necessary to support fire. • Knowledge of the classes of fires according to the materials being burnt. • Knowledge of safe fire preventions & precautions when working near, handling or storing flammable liquids or gases, combustible materials & electrical apparatus. • Describe the considerations & steps to be taken prior to fighting a fire. • Knowledge of the procedures for using fire extinguishers.
2.3 Apply Worker Compensation Act Standards & Regulations	• Define terms used in the workers compensation act. • Describe the conditions under which compensation will be paid. • State the general duties of employer, employees & others. • State the workers compensations act requirements for the reporting of accidents. • State the core requirements of the occupational health & safety regulations. • Knowledge of general hazard requirements such as chemical & biological substances of the occupational health & safety regulations.
2.4 Apply WHMIS (Work place Hazardous Materials Information System) Regulations.	• Knowledge of legislation that requires suppliers of hazardous materials to provide MSDS (Materials Safety Data Sheets) & label products as conditions of sale & importation. • State the purpose of the WHMIS • Describe the key elements of WHMIS • Describe the responsibilities of suppliers under WHMIS • Describe the responsibilities of employers under WHMIS. • Describe the information to be disclosed on a MSDS • Identify the symbols found on WHMIS labels & their meaning. • Knowledge of applying WHMIS Regulations as they apply to hazardous materials used in the shop. • Obtain necessary certification.
2.5 Use a Daily Safety Plan	• Knowledge of steps involved in performing a job safety analysis. • Identify & assess job hazards • Describe elements of a safe work plan.

3.0 Use Tools & Equipment 3.1 Use Safe Rigging Techniques	• Knowledge of slings • Knowledge of hands signals for crane operations • Knowledge of inspecting lifting devices
4.0 Apply Circuit Concepts 4.1 Use Electrical Circuit Concepts	• Describe the structure of matter • Describe the concepts of electric charge & current flow • Describe methods of producing electricity • Describe electrical quantities, units & symbols • Perform calculations using Ohm's Law & Watt's Law • Describe the relationship between electrical power & energy • Identify common drawings for electric circuits • Describe the basic operation of electric circuits • Calculate values of voltage, current, resistance & power in electric circuits • Describe meters for measurements in electric circuits • Describe features of resistors • Describe features of switches • Describe features of circuit protection devices • Describe the characteristics of common conducting materials & conductor forms • Describe common insulating materials used for conductors • Describe the application of various types of conductors • Measure & describe sizing of conductors • Calculate the resistance of conductors • Determine the ampacity of various types of conductors • Solve problems involving conductor line drop & line loss
4.2 Analyze DC Circuits	• Describe the characteristics of a series circuit • Solve problems involving series circuits • Describe effects of voltage sources in series • Connect & test series circuits • Describe the characteristics of a parallel circuit • Solve problems involving parallel circuits • Describe effects of voltage sources in parallel • Connect and test parallel circuits • Describe the characteristics of a combination circuit • Solve problems involving combination circuits • Connect & test combination circuits

	• Describe the characteristics of a voltage divider circuit • Solve problems involving voltage divider circuits • Connect & test voltage divider circuits • Describe the characteristics of a bridge circuit • Solve problems involving bridge circuits • Connect & test bridge circuits • Describe the features of a three wire distribution system • Solve problems involving three-wire circuits • Connect & test three-wire circuits
4.3 Solve Problems using the Principles of Electromagnetism	• Describe the characteristics of magnetic lines of force • Describe the effects of current carrying conductors & coils • Describe terminology & units of measure for magnetic circuits • Describe applications of magnetic devices • Solve problems involving electromagnetic circuits
4.4 Analyze Electronic Circuits	• Describe characteristics of semiconductor materials • Describe features of the PN junction diode • Describe features of the Zener diode • Describe features of photo & light-emitting diodes • Connect & test simple diode circuits • Describe feature of the bipolar junction transistor • Describe basic applications of the junction transistor in DC circuits • Describe features of specialty transistors • Connect & test transistor circuits
5.0 Use Test Equipment 5.1 Use Analogue Meters	• Select analogue meters • Use analogue meters • Maintain analogue meters
5.2 Use Digital Meters	• Select digital meters • Use digital meters • Maintain digital meters
6.0 Read & Interpret Drawings & Manuals 6.1 Use Circuit Drawings	• Identify symbols • Describe conventions for schematic diagrams • Describe conventions for wiring diagrams • Describe the conventions for single-line diagrams • Use diagrams to convey information • Convert between schematic & wiring diagrams

6.2 Use Construction Drawings & Specifications	• Describe the principles of orthographic projection • Identify lines, lettering & dimensioning used in sketches & drawings • Describe the application of working drawings • Describe common construction drawing & their major divisions • Describe common drawing conventions • Describe electrical working drawings • Use prints & drawings to locate information • Use Specifications
6.3 Use Manuals & Manufacture's Instructions	• Identify information normally found in manuals & instructions • Locate information in manuals & instructions
6.4 Plan Time & Materials	• Assess material requirements • Assess tool requirements • Assess labour requirements
7.0 Apply the IEC, Regulations, & Standards 7.1 Describe the Application of the Indian Electrical Code (IEC)	• Describe the general arrangement of IEC rules & regulations • Describe the administration of IEC rules & regulations
7.2 Apply the IEC to Installations	Interpret applicable IEC rules & regulations
7.3 Apply other Regulations & Codes	Identify applicable codes & regulations Apply applicable codes & regulations
8.0 Install Low Voltage Distribution Systems 8.1 Install Service Equipment	• Describe the features of a single-phase, three-wire distribution system • Describe service entrance equipment • Determine single-phase residential service requirements
8.2 Install Grounding & Bonding	• Describe the objectives of grounding • Describe the objectives of bonding • Select appropriate materials for grounding & bonding • Determine grounding & bonding requirements
8.3 Install Raceways, Boxes & Fittings	• Identify raceways • Identify boxes & fittings • Determine raceway requirements • Determine box & fitting requirements • Describe procedures to create & seal

	openings
8.4 Install Conductors & Cables	• Identify conductors • Identify cables • Determine conductor requirements • Determine cable requirements
8.5 Install Devices	• Identify devices • Determine device installation requirements • Describe device testing requirements
9.0 Install Control Circuits 9.1 Install Manual Motor Controls	• Describe the features of manual motor starters • Draw diagrams for manual AC motor starters • Describe safe procedures for working around motors & controls • Connect & maintain manual motor starters
9.2 Install Magnetic Motor Controls	• Describe the feature of AC magnetic motor starters • Describe the operation of across-the-line magnetic starters • Develop schematic & wiring diagrams for three-phase magnetic starters • Describe the operation of jogging circuits • Describe the operation of reversing magnetic starters • Describe safety lockout procedures • Connect & maintain magnetic motor starters

10. **Tools:**

Adjustable wrench	Allen key set	Cable cutters	Centre punch
Awl	Combination Square	Cold chisel	Chalk line
Files	Fish tape	Flashlight	Fuse puller
drill bits	Combination wrench set	Crimping Pliers	Crowbar
Keyhole Saw	Knives	Hammers	Hack saw
Needle nose pliers	Knockout cutter	Measuring tape	Nut drivers
Pliers	Tin snips	Pipe benders	Strippers
Multimeter	Reamers	Pipe cutters	Pipe threader
Tool bucket	Side/Diagonal Cutters,	Pipe wrench	Socket set
Tool belt	Wood chisel	Screwdrivers – Robertson 6,8,10; Phillips 1,2;	

flat blades(3 sizes),	Slip Joint Pliers.	Torpedo level	Tap set

Safety Equipment:

Face Shields Fall Arresters Fire Blankets Goggles	Fire Extinguisher First aid equipment Full Body harness Gloves	Hard hat Insulated Gloves Life Line Lock-out kit	Portable lighting Respirators Rope Grabs
Safety Glasses Warning tapes Ear Plugs & Muffs	Fume & toxic gas detector Eye wash facilities	Safety belt Coveralls (Fire Retardant)	Signage Safety vest

Scaffolding & Access Equipment:

Aluminium planks Boatswain's chair Boom lifts Ladders Swing stage	Ladder jacks, ladder jack scaffolds Mechanical scaffolds Sawhorses	Rolling scaffolds Scissor-lift Stationary scaffolds Stepladders

Power Tools & Equipment:

Band saws	Jig saw	Chop saw	Circular saw
Hydraulic crimper	Grinder	Percussion drill	PVC bender
Hydraulic bender	Heat gun	Reciprocating saw	Power pipe cutter
Power pipe benders	Tugger	Vacuum Battery/rechargeable drill	
Percussion drill	Power drill		

Speciality Tools & Equipment:

Chain falls	Communication devices	Come-along	Creepers & crawlers

picks	Strain relief grips	Reel jacks	Sledgehammer
rope	Extension cords	Wire rack	Soldering apparatus
Shackles	Powder-actuated tools	Shovels	Portable generators
Slings			

Measuring Equipment:

Ammeter	Cable locator	LAN meter	Voltmeter
Ground meter	Ground megohmmeter	Light meter	Oscilloscope
Circuit analyzer	Frequency meter	Megohmmeter	ohmmeter
Dielectric tester	Inductive voltage detector	Tachometer	Fault tester
Voltage tester	Phase rotation meter	Jumpers	Recording meter
Hi-pot tester	Insulation tester		

LEVEL –II

1. **Module Name**	**Construction Electrician level 2**
2. **Sector**	Construction
3. **Code**	CON 225
4. **Entry Qualification**	Minimum 8th Std. +CON124
5. **Terminal Competency**	Layout, Assemble, Install, Test, Troubleshoot & Repair electrical wiring, Fixtures, Control Devices & related equipment in buildings & other structures
6. **Duration**	150 Hrs
7. **Preface**	
8. **Job Profile**	They are employed by electrical contractors & maintenance departments of buildings & other establishments or they may be self employed
9. **Course Content**	
(a) **Core Competency**	
(b) **Technical Competency**:	

Practical Competencies	**Under Pinning Knowledge (Theory)**
1.0 Use Essential Skills 1.1 Solve Problems using Applied Mathematics.	• Describe terminology associated with triangles • Describe the relationship between sides & angles for right triangles • Solve problems involving right triangles by applying basic trigonometry • Describe standard conventions related to vectors • Solve problems involving vectors
2.0 Apply Circuit Concepts 2.1 Use Electrical Circuits Concepts	• Describe the generation of an alternating voltage • Describe the features of alternating current • Describe the difference between DC ohmic & effective AC resistance • Solve problems involving AC values • Describe the principles of electromagnetic induction • Describe the features of inductors • Describe the action of inductors in DC circuits

	• Solve problems involving inductors in DC circuits • Connect & test inductive DC circuits • Describe the principles of electrostatic charges • Describe the features of capacitors • Describe the action of capacitors in DC circuits • Solve problems involving inductors in DC circuits • Connect & test capacitive DC circuits • Describe the behaviour of inductors in AC circuits • Solve problems involving inductive reactance • Connect & test inductive AC circuits • Describe the behaviour of capacitors in AC circuits • Solve problems involving capacitive reactance • Connect & test capacitive AC circuits • Describe the factors affecting impedance • Describe the factors affecting power factor • Measure & calculate the impedance & power factor in an AC circuit
2.2 Analyze Single-Phase AC Circuits	• Describe the effects of a series AC circuit containing resistance & inductance(R-L) • Describe the effects of a series AC circuit containing resistance & capacitance(R-C) • Describe the effects of a series AC circuit containing resistance, inductance & capacitance (R-L-C) • Solve problems & describe applications involving series AC circuits • Connect & test series AC circuits • Describe the effects of a parallel AC circuit containing branches of resistance & inductance (R-L) • Describe the effects of a parallel AC circuit containing branches of resistance & capacitance(R-C) • Describe the effects of a parallel AC circuit containing branches of resistance, inductance & capacitance(R-L-C) • Solve problems & describe applications involving parallel AC circuits • Connect & test parallel AC circuits • Describe reasons for power factor correction • Describe the application of capacitors for power factor correction • Solve problems involving power factor correction. • Insert capacitors for power factor correction

2.3 Analyze Electronic Circuits	• Describe the operation of single-phase AC rectifier circuits • Describe the features of field effect transistors • Describe basic applications of field effect transistors • Describe the operation of filters for rectifier circuits • Determine values for rectified power supplies • Connect & test rectifier circuits • Describe basic junction transistor circuits • Connect & test transistor circuits
Use Test Equipment Use Scopes	 Use Oscilloscopes
Apply the IEC, Regulations, & Standards Apply the IEC to Installations.	Interpret applicable IEC rules & regulations Calculate service entrance requirements
5.0 Install Low Voltage Distributions Systems 5.1 Install Service Equipment.	• Describe the features of a single-phase, three-wire distribution system • Describe service entrance equipment • Determine single-phase commercial service requirements
5.2 Install Distribution Centres.	• Identify types of distribution centres • Identify components of distribution centres • Determine distribution centre requirements
5.3 Install Raceways, Boxes and Fittings.	• Identify raceways • Identify boxes and fittings • Determine raceway requirements • Determine box & fitting requirements • Describe procedures to create & seal openings
5.4 Install Conductors & Cables	• Identify conductors • Identify cables • Determine conductor requirements • Determine cable requirements
5.5 Install Protective Devices.	• Identify protective devices • Determine protective device requirements • Describe procedures to test protective devices
5.6 Install Devices.	• Identify devices • Determine device installation requirements • Describe procedures to test devices
6.0 Install Electrical Equipment. 6.1 Install Lighting & Lighting Controls.	 • Describe factors affecting vision • Describe light characteristics & measurements • Describe basic factors in lighting design

	• Select lighting equipment • Select lighting controls • Connect & maintain lighting equipment • Connect & maintain lighting controls • Test & maintain lighting equipment
6.2 Install Transformers.	• Describe the operating principles of a transformer • Calculate transformer values using ratios • Describe transformer markings & ratings • Describe transformer types & applications • Connect & maintain transformers for step-down & step-up applications • Determine the polarity & markings for transformers • Describe the various connections & applications for multi-coil transformers • Interpret nameplate information • Solve problems involving transformer calculations • Connect & maintain transformers • Describe the effects of load on a transformer • Describe the application of multi-tap windings & tap changers • Calculate values involving multi-tap & tap changer transformers • Connect & maintain multi-tap & tap changer transformer • Describe construction features & applications of autotransformers • Describe how standard two-winding transformers can be connected as autotransformers • Solve problems involving autotransformer calculations • Connect & maintain autotransformer circuits • Describe the features & applications of instrument transformers • Illustrate instrument transformer connections • Solve problems involving instrument transformer calculations • Connect & maintain instrument transformer circuits
7.0 Install Control Circuits 7.1 Install Magnetic Motor Controls.	• Describe features of common control devices • Describe features of control & time delay relays • Describe features & applications of plugging switches • Develop circuit diagrams involving automatic & sequence control • Connect & test circuits utilizing auxiliary control devices • Develop schematic & wiring diagrams for three-phase magnetic starters • Describe the operation of jogging circuits • Describe the operation of reversing magnetic

	starters • Describe safety lockout procedures • Connect & maintain magnetic motor starters • Describe basic troubleshooting procedures

10. **Tools:**

Files	Chalk line	Allen key set	Adjustable wrench
Awl	Fuse puller	Cable cutters	Needle nose pliers
Centre punch	Hack saw	Crimping Pliers	Combination Square
Cold chisel	Nut drivers	Keyhole Saw	Combination wrench set
Fish tape	Pipe cutters	Pipe benders	Crowbar
drill bits	Pipe threader	Wood chisel	Measuring tape
Knives	Tin snips	Tool bucket	Knockout cutter
Flashlight	Strippers	Socket set	Slip Joint Pliers
Pliers	Reamers	Tap set	Torpedo level
Hammers	Multimeter	Tool belt	Pipe wrench
			Side/Diagonal Cutters
Screwdrivers – Robertson 6,8,10, Phillips 1,2; flat blades(3 sizes)			

Equipment:

Face Shields Fall Arresters Fire Blankets Goggles	Fire Extinguishers First aid equipment Fully Body harness Gloves	Hard hat Insulated Glove Life Line Lock-out kit	Portable lighting Respirators Rope Grabs Signage
Safety Glasses Safety belt Safety vest	Fume & toxic gas detector	Warning tapes Coveralls (Fire Retardant)	Ear Plugs & Muffs Eye wash facilities

Scaffolding & Access Equipment:

Aluminium planks Boatswain's chair Boom lifts	Ladder jacks, ladder jack scaffolds Mechanical scaffolds	Rolling scaffolds Scissor-lift Stationary scaffolds

Ladders Swing stage	Sawhorses	Stepladders

Power Tools & Equipment:

Band saws	Chop saw	Hydraulic bender	Circular saw
Percussion drill	Grinder	Power pipe cutter	PVC bender
Tugger	Heat gun	Hydraulic crimper	Jig saw
Reciprocating saw	Power drill	Power pipe benders	
Vacuum Battery/rechargeable drill			

Speciality Tools & Equipment:

Chain falls	Come-along	rope
Communication devices	Strain relief grips	Slings
Creepers & crawlers	Portable generators	picks
Soldering apparatus	Extension cords	wire rack
Reel jacks	Shackles	Shovels
Powder-actuated tools	Sledgehammer	

Measuring Equipment

Ammeter	Tachometer	LAN meter	Hi-pot tester
Cable locator	Inductive voltage detector	Light meter	Fault tester
Circuit analyzer	Megohmmeter	Voltmeter	Jumpers
ohmmeter	Ground megohmmeter	Frequency meter	Oscilloscope
Ground meter	Phase rotation meter	Dielectric tester	Voltage tester
	Insulation tester	Recording meter	

LEVEL –III

1. **Module Name**	**Construction Electrician Level 3**
2. **Sector**	Construction
3. **Code**	CON 326
4. **Entry Qualification**	8th Std. + CON 225
5. **Terminal Competency**	Layout, Assemble, Install, Test, Troubleshoot & Repair electrical wiring, Fixtures, Control Devices & related equipment in buildings & other structures
6. **Duration**	300 Hrs
7. **Preface**	
8. **Job Profile**	They are employed by electrical contractors & maintenance departments of buildings & other establishments or they may be self employed
9. **Course Content**	
(a) **Core Competency**	

(b) **Technical Competency**:

Practical Competencies	Under Pinning Knowledge (Theory)
Apply Circuit Concepts Analyze Three-Phase Circuits.	• Describe the characteristics of three-phase AC • Describe characteristics of the Wye connection • Describe characteristics of the delta connection • Calculate voltage, current & power for balanced three-phase circuits • Determine the neutral current in Wye-connected circuits • Describe the effects of an open in three-phase Wye & delta circuits • Connect & test three-phase circuits • Calculate power & power factor in balance three phase systems • Describe the connection of capacitors for three-phase, power factor correction • Calculate the ratings of capacitors for three-phase, power factor correction
1.2 Analyze Electronic Circuits	• Describe features of the silicon controlled rectifier(SCR) • Describe the basic action of the SCR • Describe SCR triggering circuits for AC phase control • Describe features of the triac • Describe features of specialty thyristors • Describe the application of thyristors • Connect & test thyristor circuits • Describe the operation of three-phase AC rectifier circuits • Determine values for rectified power supplies

	• Connect & test rectifier circuits • Describe common number systems used in digital electronics • Describe the operation of common logic gates • Describe the features of operational amplifiers • Describe common circuit applications for the operational amplifier • Connect & test operational amplifier circuits
Use Test Equipment 2.1 Use Power Quality Analyzers.	• Identify problems with power quality • Identify possible causes of poor power quality • Describe the use of power quality analyzers
Apply the IEC, Regulations, & Standards; Apply the IEC to Installations	• Interpret applicable IEC rules & regulations • Calculate service entrance requirements
Install Low Voltage Distributions Systems Install Service Equipment.	• Describe the features of three-phase, low voltage distribution systems • Describe service entrance equipment • Describe system grounding techniques • Determine low-voltage three-phase service requirements
Install Grounding & Bonding	• Describe the objective of grounding • Describe the objectives of bonding • Describe cathodic protection systems • Identify appropriate materials for grounding & bonding • Describe appropriate methods of grounding & bonding • Determine grounding & bonding requirements
4.3 Install Distribution Centres	• Identify types of distribution centres • Identify components of distribution centres • Determine distribution centre requirements
4.4 Install Raceways, Boxes and Fittings	• Identify raceways • Identify boxes & fittings • Determine raceways requirements • Determine box & fitting requirements • Describe procedures to create & seal openings
4.5 Install Conductors & Cable.	• Identify conductors • Identify cables • Determine conductor requirements • Determine cable requirements
4.6 Install Devices.	• Identify devices • Determine device installation requirements • Describe procedures to test devices
5.0 Install Electrical Equipment. 5.1 Install	• Describe the construction & features of three-phase transformers • Describe the connections of three-phase transformer banks • Calculate voltage, current & KVA values for three-phase transformer banks

Transformers.	• Connect & maintain three-phase transformer banks • Describe common connections for autotransformers in three-phase circuits • Calculate voltage, current & KVA values for three-phase circuits • Connect & maintain three-phase autotransformer connections • Describe instrument transformer connections in three-phase circuits • Calculate instrument transformer ratings & meter readings in three-phase circuits • Connect & maintain instrument transformers in three-phase circuits
5.2 Install DC Motors & Generators	• Describe the constructional features of DC machines • Describe the operating principles of generators • Describe the characteristics of the various types of DC generators • Connect & maintain DC generators • Describe the operating principles of DC motors • Describe the features & operating characteristics of the shunt motor • Describe the features & operating characteristics of the series motor • Describe the features & operating characteristics of the compound motor • Connect & maintain DC motors • Describe basic maintenance & troubleshooting for DC motors
5.3 Install AC Motors & Alternators	• Describe the constructional features of three-phase induction motors • Describe the operating principles of three-phase induction motors • Identify common connections for squirrel-cage induction motors • Describe basic maintenance & troubleshooting for three-phase induction motors • Connect & maintain three-phase, squirrel-cage induction motors • Describe the constructional features of the wound-rotor induction motor • Describe the operating characteristics of the wound rotor induction motor • Connect & maintain three-phase, wound rotor induction motors • Describe basic maintenance & troubleshooting for wound-rotor induction motors • Describe the constructional features of three-phase synchronous motors • Describe the operating principles of three-phase synchronous motors • Identify common connections for three-phase synchronous motors • Connect & maintain three-phase, synchronous motors • Describe basic maintenance & troubleshooting for three-

	phase synchronous motors • Describe the constructional features of the split-phase type of induction motor • Describe the operating principles of split-phase type induction motors • Identify common connections for split-phase types of motors • Describe the features of other types of single-phase motors • Connect & maintain single-phase motors • Describe basic maintenance & troubleshooting for single-phase motors • Describe the constructional features of three-phase alternators • Describe operating principles of three-phase alternators • Identify common connections for three-phase alternators • Describe the conditions for operating alternator in parallel (synchronizing) • Connect & maintain three-phase alternators • Describe basic maintenance & troubleshooting for alternators
6.0 Install Control Circuits 6.1 Install Magnetic Motor Controls.	• Describe the considerations in selecting AC & DC motor starting equipment • Describe the operation of primary impedance type starters • Describe the operation of autotransformer type starters • Describe the operation of Wye-delta type starters • Describe basic maintenance & troubleshooting for reduced voltage starters • Connect & maintain reduced voltage starters • Describe the methods of automatic acceleration for wound-rotor motors • Describe basic maintenance & troubleshooting for wound-rotor motor controllers • Connect & maintain wound-rotor motor controllers • Describe the special control feature for synchronous motor starters • Describe the operation of synchronous motor starters • Describe basic maintenance & troubleshooting for synchronous motor starters • Connect & maintain synchronous motor starters • Describe the common methods used for motor deceleration • Connect & maintain motor braking & deceleration controls
6.2 Install Electronic Motor Controls.	• Describe the features of adjustable speed DC drives • Describe the operation of power converters • Describe the operation of DC motors used with adjustable speed drives • Connect & maintain adjustable speed DC drives • Describe the features of AC soft start controllers • Describe the operation of AC soft start controllers • Connect & maintain AC soft start controllers

10. **Tools:**

Crowbar	Files	Allen key set	Adjustable wrench
Awl	Fish tape	Cable cutters	Combination wrench set
Centre punch	drill bits	Fuse puller	Combination Square
Cold chisel	Chalk line	Hack saw	Crimping Pliers
Flashlight	Keyhole Saw	Knives	Needle nose pliers
Hammers	Nut drivers	Pliers	Measuring tape
Multimeter	Pipe cutters	Pipe benders	Knockout cutter
Pipe wrench	Pipe threader	Reamers	Socket set
Tap set	Strippers	Tool bucket	Tin snips
Tool belt	Torpe	Wood chisel	do level
Screwdrivers – Robertson 6,8,10; Phillips 1,2; flat blades(3 sizes) , Side/Diagonal		Cutters,	Slip Joint Pliers

Equipment:

Face Shields Fall Arresters Fire Blankets Goggles	Fire Extinguishers First aid equipment Fully Body harness Gloves	Hard hat Insulated Gloves Life Line Lock-out kit	Portable lighting Respirators Rope Grabs Signage
Safety Glasses Safety belt Safety vest	Fume & toxic gas detector	Warning tapes Coveralls (Fire Retardant)	Ear Plugs & Muffs Eye wash facilities

Scaffolding & Access Equipment:

Aluminium planks Boatswain's chair Boom lifts Ladders Swing stage	Ladder jacks, ladder jack scaffolds Mechanical scaffolds Sawhorses	Rolling scaffolds Scissor-lift Stationary scaffolds Stepladders

Power Tools & Equipment:

Band saws	Reciprocating saw	Chop saw	Circular saw
Percussion drill	Grinder	Power pipe cutter	Tugger
Hydraulic bender	Heat gun	Hydraulic crimper	Jig saw
Percussion drill	Power drill	Power pipe benders	PVC bender
Vacuum Battery/rechargeable drill			

Speciality Tools & Equipment:

Chain falls	Reel jacks	Come-along	Strain relief grips
Communication devices	rope	Sledgehammer	picks
Creepers & crawlers	Extension cords	Portable generators	wire rack
Powder-actuated tools	Shackles	Shovels	
Soldering apparatus	Slings		

Measuring Equipment:

Ammeter LAN meter Cable locator Light meter	Circuit analyzer Frequency meter Megohmmeter ohmmeter	Ground meter Oscilloscope Hi-pot tester Jumpers	Fault tester Insulation tester Recording meter Tachometer
Voltage tester Voltmeter	Dielectric tester Inductive voltage detector	Ground megohmmeter	Phase rotation meter

1. **Module Name**	**Building Security System Mechanic**
2. **Sector**	Construction
3. **Code**	CON 227
4. **Entry Qualification**	Minimum 8th Std. + ELC 101+ ICT 101
5. **Terminal Competency**	: Install, Maintain & Repair, Building Security System including Access Control System Security Alarm System Building Controlling & Monitoring System Real Time Remote video Surveillance monitoring Public Address System Building Door Phone System Biometric Security System
6. **Duration**	200 Hrs
7. **Preface**	
8. **Job Profile**	a) Installation and Maintenance Mechanic with building constructor. b) Maintenance Mechanic in multi-storied building c) Installation Mechanic with manufacture of the equipment

9. **Course Content**

(a) **Core Competency** :	
(b) **Technical Competency** :	
Practical Competencies	**Under Pinning Knowledge (Theory)**
• Correctly use & maintain tools of the trade including crimping and termination tools, test equipment and measuring instruments.	• Basic Electrical engineering, electronics & computer science. • Knowledge of test equipment and measuring instrument.
• Install and properly maintain building security systems and equipment according to stipulated procedures.	• Operating principles of building security system and equipment. • Installation practice and regulations, &

	relevant codes of practice. • Industrial hazards, safety and health precaution & environmental concern. • Knowledge of basic workshops practice, engineering materials and wiring.
• Locate and repair faults in building security systems and equipment.	• Serial No. 3, 4 of the above. • Knowledge of electrical & electronic symbols and wiring diagrams and layout drawings for building security systems. • Knowledge of trouble shooting technique & trouble shootings charts of equipment. • Serial No.2 & 3 of the above.
• Identify and install different types of cables and wires including fibre optic cables.	Knowledge of cables
• Use safety equipment, and protective devices and equipment.	Knowledge of safety equipment and hazards safety and health regulation.
• Read and interpret simple building security equipment specifications, electrical and electronic wiring and circuit diagrams, and building plans.	Knowledge of specifications of security equipment and wiring diagrams and building plans
• Inspect, test and commission building security equipment.	Knowledge of regulation, test equipment and security equipment.
• Correctly instruct, supervise and transfer skills to any apprentice and semi-skilled worker assigned to him to ensure safety and quality of work.	Good communication, leadership and technical knowledge.

2. **Tools and Equipment** :

The training has to be given at the premises of the manufacturer of building security system.

1. Module Name	**Rigger**
2. Sector	Construction
3. Code	CON 128
4. Entry Qualification	These jobs do not usually require completion of secondary education, however further part-time study such as a Certificate III or IV, and on-the-job training, May be required. basic reading or writing skills
5. Age	14 years and above
6. Terminal Competency	
7. Preface	Operates power winch, equipped with cathead, to haul and slack ropes and cables to move barge or skid-mounted pile driver into position and hold pile driver leads in position for driving piling at angles: attaches lines to piling or snubbing post to pull or anchor pile driver. Winds and releases ropes or cables on winch drum to move barge, pile driver, or pile driver leads. Fastens lines to pile driver platform or barge to hold it in place while driving piles.
8. Duration	200 Hrs
9. Job Profile	Enjoy practical outdoor work, Physically fit, Able to work at heights, Good with hands, Able to work as part of a team

10. **COURSE CONTENT**

Practical Competencies	**Under Pinning Knowledge (Theory)**
➢ Examine objects to be moved, estimate their size, shape and weight and decide on the type of equipment necessary to move them ➢ Erect a temporary jib or derrick (lifting devices) if required, and install cables, pulleys and other tackle ➢ Choose or make slinging equipment and attach it to the load ➢ Erect cranes and mobile crane booms, and increase the height of tower cranes by bolting component parts in place and rigging cables ➢ Splice ropes and cables to make slings and tackle	➢ These jobs involve working with things, using the hands, or special tools or equipment to make, fix, install or adjust them. Activities include doing practical and physical tasks, and may require an understanding of how equipment or machinery works. ➢ The main duties and tasks involved in these jobs require daily physical exertion, such as bending and twisting, lifting, climbing, pulling, pushing, carrying or other effort where physical fitness is required. People with heart, back or other

➢ Erect structural steel for buildings or plants under construction ➢ Erect pre cast-concrete panels used on facades of buildings ➢ Inspect, maintain and repair equipment ➢ Make sure that safety requirements are met at all times.	conditions who should avoid physical strain may wish to avoid these jobs. Jobs requiring physical effort have been excluded

11. Tools and Equipment

Hoists	Slings	Shackles	Pipe Cradles
Crane Fork Attachments & Platform Cages**.**	Rigging gear. Synthetic	Dollies	Wire Rope
Wire Mesh & Chain...	wire rope & chain slings	Jacks	Pumps
Round	Air Chain	Lever & Electric Hoists	Skates & Trolleys.
Air Tuggers	Moving Equipment	Wire Rope Pullers	Dynamometers
Cranes	Rigging Hardware	Wire Ropes	Wire Rope Grips & Slings
Beam Trolleys			

1. **Module Name**	**Electrical Wireman**
2. **Sector**	Construction
3. **Code**	CON 229
4. **Entry Qualification**	8th Standard + ELE 101
5. **Terminal Competency**	Installs, lays and repairs wiring for electrical systems and equipment.
6. **Duration**	200 Hrs
7. **Preface**	
8. **Job Profile**	(i) Electrical maintenance Mechanic in multi-storied building & apartments (ii) Electrical wireman with electrical contractor.
9. **Course Content**	
(a) **Core Competency**	
(b) **Technical Competency**	
Practical Competencies	**Under Pinning Knowledge (Theory)**
• Correctly use and maintain the tools of the trade including power tools, test equipment and measuring instruments.	Knowledge of tools, measuring instrument & equipment.
• Install all types of commonly used wiring and wiring accessories.	Knowledge of engineering calculations associated with current carrying capacity of cables, wires, fuses & other circuit protective devices
• Locate and repair faults in electrical wiring systems.	• Knowledge of electrical wiring diagrams & symbols. • Single & three phase circuits. • Users test equipment & measuring instruments. • Basic workshops practice, engineering materials, conduit & wiring.
• Identify different types of cables and wires.	Knowledge of cables & wires.
• Read and interpret simple electrical specifications, wiring and circuit diagrams, and building plans.	Knowledge of electrical wiring diagrams & symbols.

• Inspect and check electrical wiring systems	Knowledge of Installation practice & regulations, relevant codes of practice.
• Use safety equipment, and protective devices and equipment.	Knowledge of safety & health precautions
• Correctly instruct, supervise and transfer skills to any apprentice and semi-skilled worker assigned to him to ensure safety and quality of work.	Good communication, leadership and technical knowledge

10. Tools and Equipment: Training has to be given with Grade I electrical contractor.

1. **Module Name**	**Control Panel Assembler**
2. **Sector**	Construction
3. **Code**	CON 230
4. **Entry Qualification**	8th Standard + ELE 101 + FAB 109
5. **Terminal Competency**	Fits, assembles, erects, installs, maintains and repairs low voltage switchboards and control panels for electrical systems and equipment.
6. **Duration**	200 Hrs
7. **Preface**	
8. **Job Profile**	Control panel assembler in a control panel manufacturing/ servicing company.

9. **Course Content**

(a) **Core Competency**	
(b) **Technical Competency**	
Practical Competencies	**Under Pinning Knowledge (Theory)**
• Correctly use and maintain the tools of the trade including power tools, test equipment and measuring instruments.	Knowledge of tools, measuring instrument & equipment
• Carry out mechanical fitting and assembling works relevant to heavy current equipment, and machine or fabricate parts for such equipment.	Knowledge of sheet metal works & fabrication including welding & soldering.
• Install and electrical equipment such as motor starters, controllers, switchgears, switchboards and control panels.	• Knowledge of switch gears, motor controllers, cables & wires. • Knowledge of engineering calculation associated with current carrying of cables, wires, fuses & other circuits' protective devices. • Knowledge of single entry & three phase circuits & earth circuits, insulating & conducting materials, switch fuses & isolators. • Knowledge of basic workshop practice, engineering materials & wiring. • Knowledge of electric motors, starting methods & control equipments.
• Install meters, instruments, relays and protection equipment.	Knowledge of meters, instruments &

	protective equipments like relays etc.,
• Locate and repair faults in switchboards and control panels.	• Knowledge of electrical wiring diagrams & symbols. • Knowledge of test equipment & measuring instruments
• Read and interpret simple electrical specifications, wiring and circuit diagrams.	Knowledge of electrical wiring diagrams & symbols.
• Service and maintain electrical equipment of switchboards and control panels.	Knowledge of switchgear & motor control equipments.
• Use safety equipment, and protective devices and equipment.	Knowledge of safety health & precautions.
• Correctly instruct, supervise and transfer skills to any apprentice and semi-skilled worker assigned to him to ensure safety and quality of work.	Good communication, leadership and technical knowledge

10. Tools and Equipment: Training has to be given in a control panel manufacturing/servicing company.

1. **Module Name**	**Electrical Fitter**
2. **Sector**	Construction
3. **Code**	CON 231
4. **Entry Qualification**	8th Standard + ELE 101
5. **Terminal Competency**	Installs, tests, maintains and repairs electrical installations and wiring in accordance with regulations and specifications, fits, assembles, installs, tests, commissions, maintains and repairs electrical systems and equipment.
6. **Duration**	200 Hrs
7. **Preface**	
8. **Job Profile**	As electrical fitter in electrical equipment manufacturing company and with Grade I electrical contractor.

9. **Course Content**

(a) **Core Competency**	
(b) **Technical Competency**	
Practical Competencies	**Under Pinning Knowledge (Theory)**
• Correctly use and maintain the tools of the trade including power tools, test equipment and measuring instruments.	Knowledge of tools, measuring instrument & equipment
• Install all types of commonly used wiring and wiring accessories.	• Knowledge of different types of wiring and wiring accessories. • Knowledge of electrical wiring diagram & symbols.
• Install electrical equipment such as motor starters, controllers, switchgears, switchboards and control panels.	Knowledge of motors, starters, controllers, switchgears, switchboards & control panels.
• Locate and repair faults in electrical installations and equipment.	• Knowledge of motors, starters, controllers, switchgears, switchboards & control panels. • Knowledge of test equipment & measuring instruments.
• Identify different types of cables and wires.	Knowledge of cables & wires and its specifications.
• Carry out mechanical fitting and assembling works relevant to heavy current equipment, and machine or fabricate parts for such equipment...	• Knowledge of mechanical fitting and assembly. • Knowledge of fabrication.
• Install meters, instruments, relays and protection equipment.	Knowledge of theory & operations of measuring instruments, relays & protective

	equipment.
• Read and interpret simple electrical specifications, wiring and circuit diagrams, and building plans.	Knowledge of electrical wiring diagram & symbols.
• Inspect, test, commission and maintain electrical installation and equipment.	• Knowledge of electrical wiring & equipment. • Knowledge of regulations & relevant code of practice.
• Use safety equipment, and protective devices and equipment.	Knowledge of safety health & precautions
• Correctly instruct, supervise and transfer skill to any apprentice and semi-skilled worker assigned to him to ensure safety and quality of work.	Good communication, leadership and technical knowledge

10. Tools and Equipment: Training has to be given in an equipment manufacturing company and with Grade I electrical contractor.

1. **Module Name**	**Overhead Linesman**
2. **Sector**	Construction
3. **Code**	CON 232
4. **Entry Qualification**	8th Standard + ELE 101 + CON 111
5. **Terminal Competency**	Constructs, maintains and repairs overhead line systems of all voltages on tabular steel, concrete, lattice girder of wood supports.
6. **Duration**	200 Hrs
7. **Preface**	
8. **Job Profile**	Electricity Board or at big work site.

9. **Course Content**

(a) **Core Competency**	
(b) **Technical Competency**	
Practical Competencies	**Under Pinning Knowledge (Theory)**
• Correctly use and maintain the general and special tools of the trade including power tools, test equipment and measuring instruments.	Knowledge of tools, measuring instrument & equipment
• Set out support positions in accordance with predetermined routes and profiles.	• Knowledge of basic mechanics including slings, stays, guys, derricks, winches and shear legs, variations of load with angle, factors of safety, centre of gravity and equilibrium. • Statutory requirements on lifting gears.
• Prepare and complete foundations for supports and stays and erect supports.	Knowledge of foundations & supports for the pole.
• Run out, tension, sag, bind in, joint and bond and terminate all commonly used conductors and service cables.	• Knowledge of erecting pole, stringing the wire and making joints. • Sag charts; variations of sag with temperature, conductor materials and types. • Deviation, bisection and triangulation, vectorial representation of forces acting on lines, bending moment, supports and stays.
• Install insulators, fastening components and accessories.	• Knowledge of insulators, fastening components and other accessories. • Installation practice and regulations and relevant code of practice.

• Maintain and service overhead line systems and emergency restoration systems.	• Knowledge of preventive maintenance. • Fundamentals of power transmission and distributions. • Single and three phase circuits, resistance, inductance, capacitance and earth circuit. • Electromagnetic induction and proper earthing.
• Climb supports using ladders, climbing corns or other aids.	
• Use safety equipment and protective devices and work in compliance with requirements of safety codes of practice, safety procedures, etc.	• Basic knowledge of first aid • Knowledge of industrial hazards, safety and health precautions.
• Use knots and hitches and apply them in the construction, maintenance and repair of overhead lines.	Knowledge of conductor joints.
• Correctly instruct, supervise and transfer skill to any apprentice and semi-skilled worker assigned to him to ensure safety and quality of work.	Good communication, leadership and technical knowledge

10. Tools and Equipment: Training has to be given at Electricity Board or any authorized agency.

1. **Module Name**	**Cable Jointer (Power)**
2. **Sector**	Construction
3. **Code**	CON 233
4. **Entry Qualification**	8th Standard + ELE 101 + CON 111
5. **Terminal Competency**	Joints low voltage cables (i.e. not exceeding 1000 volts) either with the circuits dead or one or both ends energized and joints dead cables of all voltages.
6. **Duration**	200 Hrs
7. **Preface**	
8. **Job Profile**	As cable jointer with class I electrical contractor or electricity board.

9. **Course Content**

(a) **Core Competency**	
(b) **Technical Competency**	
Practical Competencies	**Under Pinning Knowledge (Theory)**
• Correctly use and maintain tools of the trade including power tools, test equipment and measuring instruments.	Knowledge and use of measuring instruments & tools.
• Prepare different types of cables with different cable sheathing systems and accessories for the jointing process.	• Knowledge of cable of construction, jointing materials, reading and interpretation of jointing instructions. • Single & three phase circuits, balanced and unbalanced loads in three phase-four wire circuits. • Knowledge of cable sizes, ratings, bending radii, direct laying and draw in systems.
• Joint copper or aluminium conductor cables using soldering, mechanical or compression techniques.	Knowledge of reading & interpretation of jointing instructions, jointing sequence and joint specification
• Joint telephone and pilot cables.	Knowledge of reading & interpretation of jointing instructions, jointing sequence and joint specification
• Terminate cables using soldering, mechanical or compression techniques...	Knowledge of metals and compounds mixing and curing temperature effects on cable materials.
• Insulate cable joints and terminations	• Knowledge of metals and compounds

according to the specifications or code of practice using heat shrink tubing or cold mix compound.	mixing and curing temperature effects on cable materials. • Installation practice and regulations, and relevant code of practice.
• Plumb lead or aluminium sheathed cable in any plane and apply the alternative use of mechanical earth connector.	Knowledge of cables & cable laying
• Identify different types of cables, and different cores and pairs for telephone and pilot cables.	Knowledge of cable sizes, ratings, bending radii, direct laying and draw in systems.
• Use safety equipment, and protective devices and equipment.	Knowledge of safety and environmental precautions on the use of fluxes, flame, resins and compounds and the responsibility to protect the public.
• Correctly instruct, supervise and transfer skill to any apprentice and semi-skilled worker assigned to him to ensure safety and quality of work.	Good communication, leadership and technical knowledge
• Apply live work procedures and skills for Tee and Straight L V joints and terminations.	Knowledge of safety precautions and cable constructions and jointing.

10. Tools and Equipment: Training has to be given with class I electrical contractor or electricity board.

1. **Module Name**	**Communication System Mechanic**
2. **Sector**	Construction
3. **Code**	CON 234
4. **Entry Qualification**	8th Standard + ELE 101 + ELC 101
5. **Terminal Competency**	Fits, assembles, installs, maintains and repairs communication equipment and systems including block wiring systems, private automatic branch exchange systems, intercom systems, in-building coaxial cable distribution systems, and other wired or wireless signed transmission and reception systems.
6. **Duration**	200 Hrs
7. **Preface**	
8. **Job Profile**	Communication System Mechanic in Manufacturer/Servicing company of communication equipment.

9. **Course Content**

(a) **Core Competency**	
(b) **Technical Competency**	
Practical Competencies	**Under Pinning Knowledge (Theory)**
• Correctly use and maintain the tools of the trade including crimping and termination tools, test equipment, and calibration and measuring instruments.	Knowledge of wiring tools such as crimping, test equipment and measuring instrument.
• Install and properly maintain communication systems and equipment according to stipulated procedures.	• Knowledge of basic electrical & communication engineering. • Operating principles of communication systems & equipment. • Knowledge of Installation practice & regulations & relevant codes of practice.
• Locate and repair faults in communication systems and equipment.	• Use of test equipment and measuring instrument. • Knowledge of extra low voltage systems.
• Service and calibrate communication systems and equipment.	Use of calibrating equipment
• Identify and install different types of cables and wires including fibre optic cables.	• Basic workshops practice, engineering materials, conduit & wiring. • Knowledge of Installation practice & regulations & relevant codes of practice.
• Use safety equipment, and protective devices and equipment.	Knowledge of industrial hazards & health precautions & environmental concerns

• Read and interpret simple communication equipment specifications, electrical and electronic wiring and circuit diagrams, and building plans.	Knowledge of electrical & communication symbols & wiring diagrams & layout diagrams for communication systems.
• Inspect test and commission communication equipment.	• Knowledge of Installation practice & regulations & relevant codes of practice. • Use of test equipment and measuring instrument.
• Correctly instruct, supervise and transfer skill to any apprentice and semi-skilled worker assigned to him to ensure safety and quality of work.	Good communication, leadership and technical knowledge

10. Tools and Equipment :

Training to be given at the manufacturer/ servicing company of communication equipment.

1. **Module Name**	**Refrigeration/Air-Conditioning /Ventilation Mechanic (Electrical Control)**
2. **Sector**	Construction
3. **Code**	CON 235
4. **Entry Qualification**	8th Standard + ELE 101 + FAB 108
5. **Terminal Competency**	Fits, assembles, installs, commissions, operates, maintains and repairs electrical controls for air-conditioning and refrigeration systems including refrigerating, air-handling and ventilation equipment.
6. **Duration**	200 Hrs
7. **Preface**	
8. **Job Profile**	Electronic/Electrical control mechanic in refrigeration/air conditioning/ventilation manufacturing/ servicing company

9. **Course Content**

(a) **Core Competency**	
(b) **Technical Competency**	
Practical Competencies	**Under Pinning Knowledge (Theory)**
• Correctly use and maintain the general and special tools of the trade including power tools, test equipment and measuring instruments.	Knowledge of tools of the trade including power tools, test equipment and measuring instruments.
• Install wiring and wiring accessories for air-conditioning and refrigeration systems.	• Knowledge of basic workshop practice, engineering materials & electrical wiring. • Knowledge of line & wiring diagrams & layout drawings for refrigeration/air conditioning/ventilation systems
• Install, test, maintain and repair electrical control, and equipment for air-conditioning systems, cold stores, ice-making and other refrigerating equipment.	• Knowledge of electrical devices including motors, pumps and their control gears. • Knowledge of relevant electrical control components & system. • Use of test equipment and measuring instrument.
• Install, test, maintain and repair air-conditioning and ventilation equipment related to fire service systems.	• Knowledge of basic refrigeration/air conditioning/ventilation technology including : (i) Refrigeration cycle (ii) Fans, pumps, compressor & related

	accessories. • Use of test equipment and measuring instrument. • Knowledge of standards & requirements of air conditioning & ventilation equipment relate fire service systems.
• Locate and repair faults in refrigeration/air-conditioning/ventilation systems, plants and equipment.	• Knowledge of basic refrigeration/air conditioning/ventilation technology including : (i) Refrigeration cycle (ii) Fans, pumps, compressor & related accessories • Use of test equipment and measuring instrument.
• Read and interpret simple refrigeration/air-conditioning/ventilation specifications, building plans, refrigeration and electrical circuit diagrams.	Knowledge of line & wiring diagrams & layout drawings for refrigeration/air conditioning/ventilation systems
• Use approved mechanical handling and lifting equipment.	Knowledge of mechanical handling and lifting equipment.
• Use safety equipment and protective devices and equipment.	Knowledge of industrial hazards, safety and health precautions and fire service systems.
• Correctly instruct, supervise and transfer skill to any apprentice and semi-skilled worker assigned to him to ensure safety and quality of work.	Good communication, leadership and technical knowledge.

10. **Tools and Equipment** :
Training to be given at the manufacturer/ servicing company of communication equipment.

1. **Module Name**	**Fire Services Electrical Fitter**
2. **Sector**	Construction
3. **Code**	CON 236
4. **Entry Qualification**	8th Standard + ELE 101 + ELC 101
5. **Terminal Competency**	Installs, tests, inspects, maintains, and repairs automatic fire alarm (AFA) and manual fire alarm systems, and electrical/electronic parts of fire services systems.
6. **Duration**	200 Hrs
7. **Preface**	
8. **Job Profile**	Fire service electrical fitter in multi storied building.

9. **Course Content**

(a) **Core Competency**	
(b) **Technical Competency**	
Practical Competencies	**Under Pinning Knowledge (Theory)**
• Correctly use and maintain the tools of the trade including power tools, test equipment and measuring instruments.	Knowledge of tools of the trade including power tools, test equipment and measuring instruments.
• Install operate and properly maintain fire services systems and equipment in electrical/electronic aspects according to stipulated procedures.	• Knowledge of operating principles of electrical/electronic equipment of fire service system. • Knowledge of motors & starting methods and control equipment. • Single phase & three phase circuit, earthing & general precautions. • Knowledge of interface between electrical/ electronic and mechanical equipment of fire service system, and between fire service systems and building service systems in a building. • Basics operation principles of fire extinguishing agents including gaseous extinguishing agents and its applications. • Knowledge of installation practice and regulations and relevant codes of practice.
• Locate and repair faults in fire services systems and equipment.	1. Knowledge of operating principles of electrical/electronic equipment of fire service system.

	2. Knowledge of motors & starting methods and control equipment. 3. Single phase & three phase circuit, earthing & general precautions. 4. Knowledge of interface between electrical/ electronic and mechanical equipment of fire service system, and between fire service systems and building service systems in a building. 5. Basics operation principles of fire extinguishing agents including gaseous extinguishing agents and its applications.
1. Overhaul and service electrical parts of fire services systems and electrical/electronic equipment of the fire systems.	Knowledge of operating principles of electrical/electronic equipment of fire service system.
• Use safety equipment, and protective devices and equipment.	Knowledge of industrial hazards, safety and health precaution, energy saving and environmental concern.
• Read and interpret fire services system schematic drawings, installation plan, electrical wiring and circuit diagrams, and layout plans.	Knowledge of line diagrams and layout diagrams for fire service systems.
• Inspect test and commission electrical parts of the service systems.	1. Knowledge of electrical parts of the fire service systems. 2. Knowledge of test and measuring equipments.
• Correctly dispose waste chemical, equipment containing radioactive substances and unused extinguishing agents involved.	Knowledge of basic environmental technology.
• Correctly instruct, supervise and transfer skill to any apprentice and semi-skilled worker assigned to him to ensure safety and quality of work.	Good communication, leadership and technology knowledge.

10. **Tools and Equipment**: Training should be given in fire service department/manufacturer of electronic/electrical fire alarm systems.

1. **Module Name**	**Construction Electrician Level 4**
2. **Sector**	Construction
3. **Code**	CON - 437
4. **Entry Qualification**	Minimum 8th Std. + CON326
5. **Terminal Competency**	Layout, Assemble, Install, Test, Troubleshoot & Repair electrical wiring, Fixtures, Control Devices & related equipment in buildings & other structures
6. **Duration**	200 Hrs
7. **Preface**	
8. **Job Profile**	They are employed by electrical contractors & maintenance departments of buildings & other establishments or they may be self employed.
9. **Course Content**	

(b) **Technical Competency:**

Practical Competencies	**Under Pinning Knowledge (Theory)**
Apply Circuit Concepts 1.1Analyze DC Circuits	1) Solve problems involving DC circuits
1.2 Analyze Single-Phase AC Circuits	Solve problems involving AC waveforms Solve problems involving AC circuits
1.3 Analyze Three-Phase Circuits	1) Solve problems involving three-phase AC circuits
1.4 Analyze Electronic Circuits	• Describe the operation of logic gates • Describe the operation of special combination logic circuits • Describe the features of integrated circuits(IC) • Connect & test digital logic circuits
2.0 Use Test Equipment 2.1 Perform Structured Cable Testing & Reporting.	• Describe the tests conducted on twisted pair cable • Describe how to perform tests • Describe how to create & save cable test reports • Describe fibre optic tests • Describe coaxial cable tests
3.0 Apply the IEC, Regulations, & Standards 3.1 Apply the IEC to Installations	• Interpret applicable rules & regulations. • Calculate service entrance requirements • Describe the installation requirement for hazardous areas
4.0 Install Low Voltage Distributions	• Describe the features of unit substations • Determine unit substation requirements

Systems 4.1 Install Service Equipment.	
4.2 Install Raceways, Boxes and Fittings	• Identify raceways • Identify boxes & fittings • Determine raceways requirements • Determine box & fitting requirements • Describe procedure to create & seal openings
4.3 Install Conductors & Cable	• Identify conductors • Identify cables • Determine conductor requirements • Determine cable requirements
4.4 Install Emergency Power Systems	• Identify types of emergency power systems • Describe emergency lighting equipment • Describe standby generators • Describe Uninterruptible power supplies • Determine emergency power system requirements • Describe procedures to test emergency power systems
4.5 Install Alternative Power Systems.	• Describe alternative power systems • Install alternative power systems • Test alternative power systems
5.0 Install Electrical Equipment. 5.1 Install Transformers.	• Solve problems involving single-phase transformer installations • Solve problems involving three-phase transformer installations
5.2 Install HVAC	• Describe common types of residential heating & cooling systems • Describe the components of a commercial HVAC system • Describe the application of energy management devices • Connect & maintain controls for heating, ventilating and air conditioning
6.0 Install Control Circuits 6.1 Install Magnetic Motor Controls.	Solve problems involving switching & control circuits
6.2 Install Electronic Motor Controls	1) Describe the features of variable frequency AC drives 2) Describe the operation of inverters 3) Describe the operation of AC motors used with variable frequency drives 4) Connect & maintain variable frequency AC drives
6.3 Install, Connect & Maintain PLCs	• Describe the features of programmable logic controllers (PLC) • Describe the memory system of the processor • Describe input & output(I/O) types • Describe basic installation procedures

	• Describe the operating cycle of the PLC processor • Describe basic programming instructions • Describe the interaction of hardware & software • Write basic PLC programs • Use a programming terminal • Describe PLC operating modes • Connect & maintain PLC systems
6.4 Install Process Controls	• Describe the components of an automatic control system • Describe common types of sensors& transducers • Describe the action of the controller in automatic control systems • Describe common types of electrical actuators • Connect & maintain automatic control systems
7.0 Install Signal & Communication Systems 7.1 Install Fire Alarm & Suppression Systems	• Describe the features of fire alarm systems • Describe procedures to install & test a fire alarm system
7.2 Install Structured Cabling Systems	• Describe structured cabling system • Describe procedures to install a structured cable system • Describe procedures to complete testing & follow-up • Describe the basic features of fibre optic installations
7.3 Install Nurse Call Systems	• Describe the operating principles of nurse call systems • Describe procedures to install & test nurse call systems
7.4 Install Building Automation Systems.	• Describe the operating principles of building automation systems • Describe procedures to install & test building automation systems
7.5 Install Sound Systems	• Describe the operating principles of sound systems • Describe procedures to install & test sound systems
7.6 Install Entertainment Systems	• Describe the operating principles of entertainment systems • Describe procedures to install & test entertainment systems
7.7 Install CATV Systems	• Describe the operating principles of CATV systems • Describe the components of CATV systems • Describe procedures to install & test CATV systems
7.8 Install Security Alarm Systems	• Describe the operating principles of security alarm systems • Describe the components of security alarm systems • Describe procedures to install & test security alarm systems
8 Install High Voltage Systems 8.5 Apply High Voltage Safety Procedures	• Describe common terms & concepts associated with high voltage systems • Describe features of distribution systems & substation

	equipment • Describe hazards & safety precautions for high voltage installations • Interpret IEC rules and supply authority regulations concerning high voltage installations
8.6 Install High Voltage Cable	• Describe features of high voltage cables • Describe the construction of common medium-voltage cables • Describe practical considerations for high voltage cable installations • Interpret IEC rules & regulations concerning wiring methods for high voltage installations • Describe procedures to install a high voltage, single conductor, solid-dielectric cable
8.7 Install High Voltage Switch Gear	• Describe the features of high voltage switchgear • Describe the features of high voltage fuses • Describe the features of high voltage AC circuit breakers • Describe safety procedures for operating high voltage switches & circuit breakers • Interpret IEC rules & regulations concerning high voltage control and protective equipment • Describe common types of protective relays used in high voltage systems • Describe safety precautions when working with protective relay circuits • Describe procedures to install high voltage switchgear and protective devices
8.8 Use of High Voltage Test Equipment.	• Describe characteristics of cable insulation • Describe the use of a megger for insulation testing of high voltage circuits • Describe non-destructive testing of cables & equipment • Describe the use & care of high voltage test equipment • Describe the use of high voltage test equipment

10. **Tools:**

Centre punch	Adjustable wrench	Crimping Pliers	Allen key set
Cold chisel	Awl	Files	Cable cutters
drill bits	Chalk line	Fish tape	Crowbar
Keyhole Saw	Combination wrench set	Needle nose pliers	Combination Square
Flashlight	Fuse puller	Pipe benders	Knives
Multi meter	Hack saw	Knockout cutter	Pipe cutters
Hammers	Measuring tape	Nut drivers	Pliers
Pipe wrench	Pipe threader	Reamers	Socket set

Tap set	Strippers	Wood chisel	Tin snips
Tool belt	Tool bucket	Torpedo level	
Screwdrivers – Robertson 6,8,10; Phillips 1,2; flat blades(3 sizes), Side/Diagonal		Cutters,	Slip Joint Pliers.

Safety Equipment:

Face Shields Fall Arresters Fire Blankets Goggles	Fire Extinguishers First aid equipment Fully Body harness Gloves	Hard hat Insulated Gloves Life Line Lock-out kit	Portable lighting Respirators Rope Grabs Signage
Safety Glasses Safety belt Safety vest	Fume & toxic gas detector	Warning tapes Coveralls (Fire Retardant)	Ear Plugs & Muffs Eye wash facilities

Scaffolding & Access Equipment:

Aluminium planks Boatswain's chair Boom lifts	Ladder jacks, ladder jack scaffolds Mechanical scaffolds Sawhorses	Rolling scaffolds Scissor-lift Stationary scaffolds	Swing stage Ladders Stepladders

Power Tools & Equipment:

Band saws	Reciprocating saw	Chop saw	Circular saw
Power pipe cutter	Grinder	Percussion drill	Power drill
Hydraulic bender	Heat gun	Hydraulic crimper	Jig saw
	Tugger	Power pipe benders	PVC bender
		Vacuum Battery/rechargeable drill	

Speciality Tools & Equipment

Chain falls	wire rack	Come-along	Shackles
Communication devices	Shovels	Strain relief grips	Slings
Creepers & crawlers	Extension cords	Portable generators	Sledgehammer
picks	Reel jacks	Powder-actuated tools	Soldering apparatus

Measuring Equipment:

Ammeter	Ground megohmmeter	LAN meter	Dielectric tester
Cable locator	Inductive voltage detector	Light meter	Voltmeter
Circuit analyzer	Frequency meter	Megohmmeter	Tachometer
ohmmeter	Phase rotation meter	Fault tester	Voltage tester
Ground meter	Recording meter	Oscilloscope	Insulation tester
Hi-pot tester	Jumpers		

1. Module Name	**Helper**
2. Sector	Construction
3. Code	CON 138
4. Entry Qualification	5th Std + Should know to read and write in local language
5. Age	14 years and above
6. Terminal Competency	These positions are great places to start a career. Not only are they good forays into the professional world, they also teach you a lot about work ethic, customer service and your own interests.
7. Preface	Construction Helpers assist skilled trade's workers in a variety of construction occupations. They may help carpenters, plumbers, electricians, plasterers, cement masons, brick and stone masons, roofers, cabinet makers, floor covering installers, glaziers, painters, and others engaged in home and commercial construction.
8. Duration	90 Hrs
9. Job Profile	The work environment will depend on the particular job--could be outside in all kinds of weather, or in a factory setting. Work boots will probably be required, and ear and eye protection may be required in some jobs.

10. COURSE CONTENT

Practical Competencies	Under Pinning Knowledge (Theory)
• Carry or move equipment, tools, and materials to the work site • Set up ladders • Mix cement • Build forms • Construct scaffolding • Cut carpeting • Carry lumber and bricks from delivery trucks to the construction site • Dig trenches • Tear out and remove old building materials on remodelling projects • Gather equipment and supplies at the construction site • Clean up at the end of work days • Assist trades persons such as carpenters,	

bricklayers, cement finishers, roofers and glaziers in construction activities • Load and unload construction materials, and move materials to work areas • Erect and dismantle concrete forms, scaffolding, ramps, catwalks shoring and barricades required at construction sites • Mix, pour and spread materials such as concrete and asphalt	

10. Tools and Equipment

No specific tools and equipments

Note : A helper performs a variety of duties on construction projects, transferring from one task to another as directed. Measures distances from grade stakes, drives stakes, and stretches tight line. Bolts, nails, align, and blocks up under forms. Signals operators of construction equipment to facilitate alignment, movement, and adjustment of machinery to conform to grade specifications. Levels earth to fine grade specifications, using pick and shovel. Mixes concrete, using portable mixer. Smoothes and finishes freshly poured cement or concrete, using float, trowel, or screed. Positions, joins, aligns, and seals pipe sections. Erects scaffolding, shoring, and braces. Mops, brushes, or spreads paints or bituminous compounds over surfaces for protection. Applies caulking compounds by hand or with caulking gun to seal crevices. Grinds, sands, or polishes surfaces, such as concrete, marble, terrazzo, or wood flooring, using abrasive tools or machines. Performs variety of tasks involving dexterous use of hands and tools, such as demolishing buildings, sawing lumber, dismantling forms, removing projections from concrete, mounting pipe hangers, and cutting and attaching insulating material.

Construction Labourers Perform tasks involving physical labour at building, highway, and heavy construction projects, tunnel and shaft excavations, and demolition sites. May operate hand and power tools of all types: air hammers, earth tampers, cement mixers, small mechanical hoists, surveying and measuring equipment, and a variety of other equipment and instruments. May clean and prepare sites, dig trenches, set braces to support the sides of excavations, erect scaffolding, clean up rubble and debris, and remove asbestos, lead, and other hazardous waste materials. May assist other craft workers. Exclude construction labourers who primarily assist a particular craft worker, and classify them under 'Helpers, Construction Trade

1. Module Name	**Earth Work Excavator**
2. Sector	Construction
3. Code	CON - 139
4. Entry Qualification	Know to Read, Write and communicate in local language
5. Age	14 years and above
6. Terminal Competency	At the end of the course, the trainee should be able to: • Excavate earth materials from the road way, borrow pits, side ditches, sub-cuts, drainage ditches, channel improvements, intersections, approaches, and parking areas. • The lines, grades, and dimensions as shown on the plans.
7. Preface	Excavation for subsurface structures will consist of open excavation and shaft and tunnel excavation. Where excavation to great depths is required, a variety of soils and rock may be encountered at a single site. Soils may range through a wide spectrum of textures and water contents. Rock encountered may vary from soft rock, very similar to a firm soil in its excavation requirements, to extremely hard rock requiring extensive blasting operations for removal. Groundwater may or may not be present.
8. Duration	150 Hrs
9. Job Profile	a) Labour contract b) Employable in construction companies. c) Employable on daily wages in PWD d) Self Employment

10. Course Content

Practical Competencies	Under Pinning Knowledge (Theory)
• Identify, use and store tools and equipments used in earth work excavation. • Take safety precautions and apply safety	• Importance of earth mason • Types of tools and equipment in earth work

procedures in excavation process • Measure length, area and volume of work done in FPS and MKS system • General site clearance • Earth Work Excavation in all soils using excavator and carting away the excavated earth outside the site or dumping the excavated earth as directed • Trim the pits excavated to required level in ordinary soil • Refill excavated earth as per directions • Sand and jelly filling • Excavation, including lifting and depositing the earth as specified • Shoring, pumping or bailing out water keeping the excavation free of water during the foundation masonry work is in progress • Setting out works, profiles etc. • Protection and supporting of existing services, i.e. pipe water main, cables etc., coming across during excavation • Fencing to guard against accidents • Initial lead of 50m and a lift of 1.5 m.	• Safety precaution in earth work • Measurement of length, area and volume in FPS and MKS system • Should have knowledge of all soils • Knowledge of sheet pile excavation support systems • Knowledge of excavation • Knowledge of dewatering • Knowledge of wet soil conditioning • Knowledge of transportation & disposal of excavated earth • Knowledge of general site clearance and restoration

11. Tools and Equipment

The following tools and equipments are required to train a batch of 20 students

SL. NO.	DESCRIPTIONS	QUANTITY
1.	Spade	10
2.	Rammer	10
3.	Kassi	10
4.	Boning rod	10
5.	Pickaxe	10
6.	Sledge hammer	10
7.	Cane basket	10
8.	Iron Pan	10
9.	Pickaxe with flat end	10
10.	Wedge	10
11.	Line and pins	10
12.	Crow bar	10

Building and Land

- Civil engineering workshop 20’ x 40’ – one with water and power source.
- Open land 20’ x 40’

1. Module Name	**GRANITE STONE DRESSER**
2. Sector	Construction
3. Code	CON 140
4. Entry Qualification	5th Std
5. Age	14 years and above
6. Terminal Competency	At the end of the course, trainee should be able to: • Select and use appropriate wedge as tool • Select and use appropriate hammer • Heat treating the tools for getting the right hardness • Use safe techniques of hammering • Visualising a possible line among the granite stone grains
7. Preface	Recognising the composition and quality of a granite stone from the noise that it produces when struck with a 4 pound hammer, assessing the quality of the rock from the grains, colour and pattern. From the pattern of grains on the fresh granite surface identifying a line along which wedges could be inserted at intervals to separate a block. Taking guidance from the team leader who is experienced. Supporting him and finally separating the sized block from the boulder.
8. Duration	200 Hrs (mostly on site experience)
9. Job Profile	a) Estimating the quantity of granite blocks that can be cut out of a boulder. b) Using steel wedges to cut the boulder blocks with minimum wastage. c) Keep wedges sharp and tempered using heat treatment regularly. (Employable in granite quarries as helpers)

Practical Competencies	**Under Pinning Knowledge (Theory)**
• Identify metal pieces readily available which could suit to be a wedge • Using wedge of appropriate length for creating a peg hole to insert a short and wide wedge • Fixing wedges at equal intervals along the line to be cut in a sequence. • Use of appropriate heavy hammer to create a split in the block along the desired line.	• Properties of steel from available sources. • The relationship between the wedge length, wedge diameter and the peg hole. • Relationship between the peg hole distance and the dimension of the block to be cut. • The combined effect of hammer weight and the swing to force the wedge inside the granite just to create a split. • Simple lever principles and the combined effect of more than one crowbar. • Understanding the mason's requirement

• Marking the block for further sizing if required. • Using appropriate hammer and hammer head to chip a fresh face of the rock. • Setting a heat treatment space at site using a mechanical or electric blower and available fuel like charcoal or coal. • Treating (heat treatment) the wedge and other tool heads. • Following safe procedures both at sharpening tools and onsite use of hammer and wedges. • Communication skills with other members to work as a team.	and making blocks accordingly. • Relationship between the head of the hammer, angle of impact on the area that could get exposed on the boulder. • Relationship between blower size, fuel used and temperature attainable for heat treatment of wedges other cutting tool heads. • Relationship between colour and temperature of metal. Also cooling time to heating time for effective tempering. • Knowledge of possible injuries and first aid procedures for the same. Improved sensitivity towards use of goggles and gloves. • Communicating with suitable language and with appropriate body language.

11. Tools and Equipment

SL. NO.	DESCRIPTION	QUANTITY
1.	Heavy hammer (16 to 18 lbs)	3
2.	Medium hammers (8 to 12 lbs)	6
3.	Light hammers (1 to 6 lbs)	8
4.	Crowbars (6ft)	4
5.	Short and wide wedges	10
6.	Medium sized wedges	6
7.	Long wedges for chiselling	4
8.	Blower	1
9.	Long tongs for heat treatment	2
10.	Goggles	10
11.	Single leather glove	10
12.	Sun hats	10
13.	Measuring tape	2
14.	Marking pencil or chalk	4

15.	Heavy hammer (16 to 18 lbs)	3
16.	Medium hammers (8 to 12 lbs)	6
17.	Light hammers (1 to 6 lbs)	8
18.	Crowbars (6ft)	4

6.Module Name	**GRANITE STONE DRESSER – Level 2**
7.Sector	Construction
8.Code	CON 241
9.Entry Qualification	5th Std + CON 140
10. Age	14 years and above
6. Terminal Competency	At the end of the course, trainee should be able to: • Guide in selecting and using appropriate wedge as tool • Guiding in use of appropriate hammer • Heat treating the tools for getting the right hardness • Use safe techniques of hammering • Visualising a possible line among the granite stone grains
9. Preface	Recognising the composition and quality of a granite stone from the noise that it produces when struck with a 4 pound hammer, assessing the quality of the rock from the grains, colour and pattern. From the pattern of grains on the fresh granite surface identifying a line along which wedges could be inserted at intervals to separate a block. He decides the line of cut, sequence of wedges and the appropriateness of the hammer to be used. All others support him and finally the separate the sized block from the boulder.
10. Duration	120Hrs (more expertise required to achieve good finishes)
9. Job Profile	a) Estimating the quantity of granite blocks that can be cut out of a boulder. b) Using steel wedges to cut the boulder blocks with minimum wastage.

	c) Ensuring that the wedges are kept sharp and tempered using heat treatment regularly.(Employable in granite quarries as for stone cutting)

10. Course Content

Practical Competencies	Under Pinning Knowledge (Theory)
• Identify metal pieces readily available which could suit to be a wedge • Using wedge of appropriate length for creating a peg hole to insert a short and wide wedge • Fixing wedges at equal intervals along the line to be cut in a sequence. • Use of appropriate heavy hammer to create a split in the block along the desired line. • Marking the block for further sizing if required. • Using appropriate hammer and hammer head to chip a fresh face of the rock. • Setting a heat treatment space at site using a mechanical or electric blower and available fuel like charcoal or coal. • Treating (heat treatment) the wedge and other tool heads. • Following safe procedures both at sharpening tools and onsite use of hammer and wedges. • Communication skills with other members to work as a team.	• Properties of steel from available sources. • The relationship between the wedge length, wedge diameter and the peg hole. • Relationship between the peg hole distance and the dimension of the block to be cut. • The combined effect of hammer weight and the swing to force the wedge inside the granite just to create a split. • Simple lever principles and the combined effect of more than one crowbar. • Understanding the mason's requirement and making blocks accordingly. • Relationship between the head of the hammer, angle of impact on the area that could get exposed on the boulder. • Relationship between blower size, fuel used and temperature attainable for heat treatment of wedges other cutting tool heads. • Relationship between colour and temperature of metal. Also cooling time to heating time for effective tempering. • Knowledge of possible injuries and first aid procedures for the same. Improved sensitivity towards use of goggles and gloves. • Leadership qualities and communicating in local language with appropriate body language.

11. Tools and Equipment

Heavy hammer (16 to 18 lbs)	3
Medium hammers (8 to 12 lbs)	6
Light hammers (1 to 6 lbs)	8
Crowbars (6ft)	4
Short and wide wedges	10
Medium sized wedges	6

Long wedges for chiselling	4
Blower	1
Long tongs for heat treatment	2
Goggles	10
Single leather glove	10
Sun hats	10
Measuring tape	2
Marking pencil or chalk	4

1. LEVEL	**Granolithic Flooring Mason**
2. SECTOR	Construction
3. CODE	**CON - 242**
4. ENTRY QUALIFICATION	Minimum 7^{th} std + CON 108
5. AGE	14 years and above
6. TERMINAL COMPETENCY	At the end of the course, the trainee should be able to : • Know the difference between Granolithic flooring and different types flooring • Cast and finish Granolithic flooring as per required specifications
7. PREFACE	It is a finishing coat provided over the concrete surface to form a hard, resistant to abrasion and durable flooring. Granolithic concrete is composed of cement, sand and specially selected aggregates. The grading of aggregates is very important.
8. DURATION	120 hrs
9. JOB PROFILE	a) Labour contract b) Employable in construction companies.

10. COURSE CONTENT

Practical Competencies	Under Pinning Knowledge (Theory)
• Identify, use and store materials, tools and equipments used in granolithic work. • Take safety precautions and apply safety procedures in construction process • Measure length, area and volume of work done in FPS and MKS system • Provide and lay 40mm thick granolithic flooring laid in panels consisting of consolidating, curing etc. complete. The rate also to include floor hardener of approved make as per specifications and instructions. • Lay Granolithic (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	Importance of granolithic mason • Types of materials, tools and equipment in granolithic mason work • Safety precaution in granolithic mason work • Measurement of length, area and volume in FPS and MKS system • Knowledge of materials and tools required for concreting • Knowledge to proportion concrete. • Knowledge of measuring and take materials for concrete work • Knowledge of mixing of materials for concreting • Knowledge of good housekeeping practice and safely in handling men and materials

finish within tolerances	and machineries.

11. TOOLS AND EQUIPMENT

The following tools and equipments are required to train a batch of 20 students

SL. NO.	DESCRIPTIONS	QUANTITY
1.	Coarse aggregate – 10, 20 & 40mm	80 Bags
2.	Wheelbarrow	2
3.	Shovel	4
4.	Line	4
5.	Level	4
6.	Hand Tamper	4
7.	Hearing Protection	20 sets
8.	Spades	10
9.	Gloves	20 pairs
10.	Measuring Tape	10
11.	Rammers	10
12.	Vibrators	5
13.	Mixers	1
14.	Screeds	10
15.	Power Tools	5
16.	Concrete Breakers	5
17.	Water Containers	10
18.	Moulds	10
19.	Tamping Rods	10
20.	Trowels	20

Building and Land

- Civil engineering workshop 20’ x 40’ – one with water and power source.
- Open land 20’ x 40’