GENERAL ELECTRICIAN

CBT Curriculum

National Vocational Certificate Level 2

Version 1 - July 2015

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1. INTRODUCTION

An electrician is a tradesperson specializing in electrical wiring of buildings, stationary machines and related equipment. Electricians may be employed in the installation of new electrical components or the maintenance and repair of existing electrical infrastructure. Electricians may also specialize in wiring and cables. Electricians work in a variety of settings, including homes, businesses, schools, hotels and hospitals - any type of facility that needs electricity to function.

Working conditions for electricians vary by specialization. Generally an electrician's work is physically demanding such as climbing ladders and lifting tools and supplies. Occasionally an electrician must work in a cramped space or on scaffolding, and may frequently be bending, squatting or kneeling, to make connections in awkward locations. Construction electricians may spend much of their days in outdoor or semi-outdoor noisy and dirty worksites. Industrial electricians may be exposed to the heat, dust, and noise of an industrial plant. Power systems electricians may be called to work in all kinds of adverse weather to make emergency repairs.

Overall objective of the course

Enable the trainees to perform routine skilled and semi-skilled tasks to carry out a variety of electrical/electronic installations & maintenance jobs and assist other team members in assigned preventive maintenance, installations, and repairs of electrical equipment, facilities and systems.

Competencies gained after completion of the course

The learner will gain following competencies through this training:

- Ensure Personal Safety at workplace.
- Interpret Electrical Drawing of building for fixing PVC Pipes /Other types of wiring.
- Perform Measurement of Plan Wiring.
- Calculate all electrical appliances load.
- Install electrical cables/wire.
- Perform repair and maintenance of electrical appliances.
- Ensure Occupational Health and Safety (OHS).
- Develop Professionalism.

Knowledge Proficiency

On successful completion of this course the trainee will be able to:

1. Explain the safety precautions, safety practice and first hand treatment for an electric shock.
2. Explain electricity and its sources of generation.
3. Explain Current, Volt, and Resistance their Units and relationship among them i.e. Ohm’s Law and its simple application.
4. Describe Series and Parallel Circuits.
5. Explain Voltage drop in the line.

6. Explain the estimation of material and tools for all domestic installations.
7. Define the construction of simple measuring instruments i.e. Voltmeter, Ammeter, Meger meter Watt and KWH Meter and their uses.
8. Differentiate between Single-phase and Three-phase Loads.
9. Describe the Single-phase Motor used on machine and their faults rectification.

Job Opportunities available immediately and in future

After completing this course, learner will have following career opportunities:

- Offer services as an electrician to an electrical shop, industry and to building contractors.
- Work as an Assistant Electrician in Public or Private Organizations.
- Seek employment in Industries (manufacture/assembly)
- Set up his/her enterprise.
- After gaining sufficient exposure he/she can work as Contractor for Annual Maintenance/Repair of residential/ institutional/ of small commercial buildings etc.
- Foreign Job Opportunities.

Entry requirements

Middle (Preferable Matriculation)

Minimum Qualification of Trainer

BE / BS Technology/ B. Tech (Pass/Hons)

OR

DAE in Electrical with 1 year work experience

OR

2 years certificate with 3 years work experience.

Medium of Instructions

English /Urdu/Local Language

Timeframe of assessment

Duration of Course:	Six Months
Total Hours:	800 hrs
Training Hours:	770hrs
Module Test:	25 hrs
Final Test:	5hrs
Per Week Hours:	30 hrs
Per Day Hours	05 hrs (6 days a week)

Suggested Personality Traits

- Person should be mentally and physically fit.
- Visually impaired or suffering from epilepsy may not be considered.

2. OVERVIEW OF THE CURRICULUM FOR GENERAL ELECTRICIAN

Module Title and Aim	Learning Units	Theory hours	Workplace hours	Timeframe of modules
Module 1: Ensure Personal Safety **Aim:** This module is designed to identify the basic knowledge and skills related to use of Personal Protective Equipment (PPE) including insulated gloves, Use of gloves, insulated shoes and mat and switching off of the main supply etc.	**LU1**: Wear Insulated Gloves and Shoes. **LU2**: Use of safety gloves. **LU3**: Use insulated electrical tools / kit. **LU4**: Use of Safety Mat at workplace. **LU5**: Switch off Main Power Supply while working.	10	50	60
Module 2: Interpret Electrical Drawing of Building For Fixing PVC Pipes &Other types of wiring **Aim:** This module is designed to learn the skills required for interpretation of electrical drawing of a building, identification of electrical points, use of PVC pipe and its fixing techniques etc.	**LU1**: Collect job documentation (e.g. drawing, map, history). **LU2**: Locate electrical points as per drawing. **LU3**: Perform measurement of PVC pipes of different sizes. **LU4**: Fix joints with PVC solution. **LU5**: Perform fixing of all Pipes with Mild Steel Wire. **LU6**: Check all Fan Box and Junction Box.	18	126	144
Module3: Perform Measurement of Plan Wiring **Aim:** This module is designed to perform measurements of rooms, distribution box, light plug, main circuit	**LU1**: Perform measurement of rooms. **LU2**: Perform measurement of Distribution Board to Switch Board. **LU3**: Perform measurement of Power Plugs for AC.	28	144	172

Module Title and Aim	Learning Units	Theory hours	Workplace hours	Timeframe of modules
to switch board, TV, telephone, intercom, internet cable, wall lights and leveling of switch board, chiseling with wall cutter and fixing of PVC pipes with box etc.	**LU4**: Perform measurement of Light Plug. **LU5**: Perform measurement of Main Circuit to Distribution Board. **LU6**: Perform measurement of TV, Telephone, Intercom, Internet Cable from Main to Junction Board. **LU7**: Perform leveling of switch boards (AC Light, Light plug, TV). **LU8**: Perform leveling of room Wall Lights. **LU9**: Perform chiseling with Wall Cutter. **LU10**: Perform fixing of PVC Pipes/Switch Box.			
Module 4: Calculate all Electrical Appliances Load **Aim:** This module is designed to provide knowledge and skills required to calculate electrical load, selection of cables& estimation of quantity required for electrical items.	**LU1**: Calculate load of Electrical & Electronic Appliances. **LU2**: Selection of Cables according to Room Load. **LU3**: Selection of size of cables according to appliances. **LU4**:Prepare estimates of required electrical items	18	80	98
Module 5: Install Electrical Cables/Wire **Aim:** This module is designed to	**LU1**:Install main distribution board **LU2**:Install earthing connections properly	32	96	128

Module Title and Aim	Learning Units	Theory hours	Workplace hours	Timeframe of modules
provide knowledge and skills for installation of main distribution boards, Earthing connections, main & sub circuits, cables, making joints and their testing as well.	**LU3**: Install cables from main circuit to sub circuit. **LU4**: Install cables from sub circuit to branch circuit. **LU5**: Install cables from branch circuit to electrical appliance. **LU6**: Check all wiring joints. **LU7**: Check wiring and earth testing. **LU8:** Install electrical appliances.			
Module 6: Perform Repair And Maintenance of Electrical Appliances. **Aim:** This module is designed to identify knowledge and skills required to diagnose faults, cause of fault and fixing the faults of electrical appliances.	**LU1**: Trace fault of Wiring/Appliances. **LU2**: Remove Fault (Wire Cable/Switch/Circuit Breaker). **LU3**: Repair/Replace electrical appliances.	12	30	42
Module 7: Ensure Occupational Health and Safety **Aim:** This module will help to understand knowledge and skills to meet health and safety standards in order to facilitate safe working environment.	**LU1**: Meet workplace health safety and security requirements for a safe working environment. **LU2**: Follow workplace health, safety and security procedures. **LU3**: Maintain own safe work area. **LU4**: Deal with emergency situations.	16	40	56

Module Title and Aim	Learning Units	Theory hours	Workplace hours	Timeframe of modules
Module 8: Develop Professionalism **Aim:** This module is designed to identify differences between professionalism and being professional. Being professional means ensuring appearance, manner, communication, interacting, attitudes, approach, skills, and openness to grow are developed. Professionalism is a combination of taught aspects, such as knowledge and skills, and learning gained through experience.	**LU1:** Communicate with co-workers. **LU2:** Manage Time. **LU3:** Upgrade Skills. **LU4:** Keep the workplace clean. **LU5:** Work in a team.	20	50	70

3. TEACHING AND LEARNING GUIDE FOR GENERAL ELECTRICIAN

3.1. Module-1: ENSURE PERSONAL SAFETY

Objective of the Module: This module is designed to identify the basic knowledge and skills related to use of Personal Protective Equipment (PPE) including insulated gloves, Use of gloves, insulated shoes and mat and switching off of the main supply etc.

Duration: 60 hours **Theory:** 10 hours **Practice:** 50 hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1: Wear insulated gloves and shoes.	**Trainee will be able to:** • Understand different types of insulated Gloves and Shoes. • Wear Safety Gloves as per safety instructions. • Wear Safety Shoes as per safety instructions. • Procedure of wearing different Safety Gloves & Safety Shoes	• Importance of Insulated Gloves and shoes at work environment. • Types of Safety Gloves i.e. High tension line and low tension line. • Limitation of insulation (tolerance limits w.r.t. Voltage) • Use of different Safety Gloves and Safety Shoes for an electrician. • Basic safety instructions at workplace.	**Total:**12 Hrs **Theory:** 2 Hrs **Practical :**10 Hrs	Safety Gloves, Safety Shoes, OHS related Posters	Class room / Electrical Lab

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU2: Use of Safety Gloves	**Trainee will be able to:** • Select the appropriate Safety Gloves. • Wear gloves while handling different tools & equipment. • Place safety gloves at appropriate location after using them.	• Difference between un-useable and useable safety gloves. • Use of safety gloves for different tasks. • OHS precautions when using safety gloves. • Issues which may arise when using damaged safety gloves.	**Total:** 12Hrs **Theory:** 2 Hrs **Practical :**10 Hrs	Safety Gloves, OHS related Posters	Class room / Electrical Lab
LU3: Use insulated electrical tools/kit	**Trainee will be able to:** • Select the appropriate tools / kit. • Handle different insulated tools as per requirement. • Place tools and kit at appropriate location after use.	• Difference between insulated and conductive tools. • Different uses of insulated tools. • OHS precautions when using insulated tools. • Hazards of using unsafe tools. • First aid treatment of electric shock.	**Total:** 12Hrs **Theory:** 2 Hrs **Practical :**10 Hrs	Electrician Tool kit, Safety Gloves, Safety Shoes, OHS related Posters	Class room / Electrical Lab

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU4: Use of Safety mat at workplace	**Trainee will be able to:** • Identify the appropriate Safety Mat at workplace. • Use Safety Mat while handling different equipment. • Place Safety Mat at appropriate location after use.	• Importance of Insulated Safety Mat. • Capacity of Insulated Safety Mats in accordance with workplace and job. • Procedure for issuance of Safety Mat from store.	**Total:** 12Hrs **Theory:** 2 Hrs **Practical :**10 Hrs	Safety Mat	Class room/ Electrical Lab
LU5: Switch off main power supply while working.	**Trainee will be able to:** • Identify location of Main Switch. • Turn off the Main Switch safely. • Tag off / Log off the Main Switch. • Power off Supply safely when needed.	• Define Electricity. • Introduction of Voltage, Current, Resistance, Power, Energy and their Units. • Laws of Resistance. • Types of Main Switches. • OHS precautions when switching off the Main Supply. • Use of Tester. • Issues which may arise during work when main supply is powered on.	**Total:** 12Hrs **Theory:** 2 Hrs **Practical :**10 Hrs	Electrician Tool kit, OHS/Security Tags, First Hand Treatment Chart, First Aid Box, Volt meter, Ammeter, Energy meter, Watt Meter, Ohm Meter, different types of main switches	Class Room/ Electrical Lab

3.2. Module-2: INTERPRET ELECTRICAL DRAWING OF BUILDING FOR FIXING PVC PIPES

Objective of the Module: This module is designed to learn the skills required for interpretation of electrical drawing of a building, identification of electrical points, use of PVC pipe and its fixing techniques etc.

Duration: 144 hours **Theory:** 18 hours **Practice:** 126 hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1: Collect job documentation (e.g. drawing, map, history)	**Trainee will be able to:** • Identify area/person to get the job documents. • Collect the appropriate job documents. • Interpret job documents before starting work.	• Importance of job documents. • Types of job documents (e.g. Drawing, Map, History). • Electrical symbols used in drawing/ building maps. • Procedure for issuance of job documents.	**Total:** 24Hrs **Theory:** 3 Hrs **Practical :**21 Hrs	Electrical drawing, maps and history sheets, Electrical symbols chart.	Class Room/ Electrical Lab
LU2: Locate electrical points as per drawing	**Trainee will be able to:** • Interpret Electrical Drawing accurately. • Identify location of electrical points as per electric drawing. • Verify location of electrical	• Types of Electrical Drawings/Documents • Symbols used for different electrical points. • Tagging techniques.	**Total:** 24Hrs **Theory:** 3 Hrs **Practical**	Electrical drawing, maps and history sheets, Electrical symbols chart, OHS and	Class Room/ Electrical Lab

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
	points as per electric drawing. • Apply tags to different electrical points.	• Locate electric points and tags according to electrical drawing.	**:**21 Hrs	Safety Tags	
LU3: Perform measurement of PVC Pipe and its cutting	**Trainee will be able to:** • Select appropriate measuring tools. • Take measurements of PVC pipes by using appropriate measuring units. • Cut PVC pipes using appropriate tools.	• Types of measuring tools. • Types of measuring units. • Measuring techniques. • Perform measuring of PVC pipes. • Select appropriate tool for cutting different sizes of PVC Pipes. • Observe safety measures while cutting PVC Pipes.	**Total:** 24Hrs **Theory:** 3 Hrs **Practical :**21 Hrs	Steel Rule, Measuring tape, Hacksaw, PVC pipe, Wooden Saw,	Class Room/ Electrical Lab
LU4: Fix joints with PVC jointing solution	**Trainee will be able to:** • Select appropriate PVC jointing solution. • Apply PVC jointing solution evenly on the joining ends. • Fix Joints firmly. • Check the joint strength.	• Importance of jointing solutions. • Types of solutions used for PVC jointing. • Health and safety precautions while using jointing solutions. • Procedure to apply PVC jointing	**Total:** 24Hrs **Theory:** 3 Hrs **Practical :**21 Hrs	PVC Pipe, PVC jointing solution, Hacksaw, Wooden Saw, Steel Rule, Measuring Tape, Junction	Class Room/ Electrical Lab

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
		solution. • Techniques of checking strength of joints.		Boxes	
LU5: Perform fixing of all pipes with mild steel wire	**Trainee will be able to:** • Lay pipes as per drawing. • Fix pipes with Mild Steel Wire. • Ensure fixing of pipes as per drawing.	• Interpretation of Drawing/Document. • Laying and fixing techniques. • Jointing techniques by using steel wire. • Checking of pipe fixing.	**Total:** 24Hrs **Theory:** 3 Hrs **Practical :**21 Hrs	Electrical Drawing, PVC Pipe, Steel Wire, Junction boxes,	Class Room/ Electrical Lab
LU6: Check all Fan and Junction Boxes	**Trainee will be able to:** • Verify Fan and Junction Boxes laid-out as per Drawing. • Perform necessary adjustments to fix fan, light and junction boxes as per drawing. • Identify blockage in laid-out elements. • Clear blockage, if required.	• Procedure for laying Fan and Junction Boxes. • Adjustment methods of point joints and junctions. • Procedure of clearing blockage in Fan and Junction Boxes.	**Total:** 24Hrs **Theory:** 3 Hrs **Practical :**21 Hrs	Electrical drawing, Steel wire maps and history sheets, Electrical symbols chart.	Class Room/ Electrical Lab

3.3 Module-3: PERFORM MEASUREMENT FOR WIRING

Objective of the Module: This module is designed to perform measurements of Rooms, Distribution Box, Light Plug, Main Circuit to Switch Board, TV, Telephone, Intercom, Internet Cable, Wall Lights and Leveling of Switch Board, Chiseling with Wall Cutter and fixing of PVC Pipes with Box etc.

Duration: 172 hours **Theory:** 28 hours **Practice:** 144 hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1: Perform overall measurements of rooms	**Trainee will be able to:** • Select appropriate measuring tools • Perform measurement of room. • Identify wiring points as per drawing. • Mark wiring points as per drawing. • Record measurements on appropriate document.	• Measuring units. • Measuring tools. • Basic mathematical calculations.	**Total:** 12Hrs **Theory:** 2 Hrs **Practical :**10 Hrs	Steel Rule, Measuring tape, Electrical Drawing, Blank Papers, Calculator	Class Room/ Electrical Lab/ Workplac e visit
LU2: Perform measurements from distribution board to switch board	**Trainee will be able to:** • Identify wiring routes from Distribution Board to Switch Board as per Electrical Drawing.	• Define wiring routes. • Measuring units. • Measuring tools.	**Total:** 12Hrs **Theory:** 2 Hrs	Steel Rule, Measuring tape, Electrical Drawing, Blank	Class Room/ Electrical Lab

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
	• Select appropriate Measuring Tools. • Take measurement of the distance between Distribution Board and Switch Board. • Record measurements on appropriate document.	• Basic mathematical calculations. • Differentiate between Distribution Board and Switch Board.	**Practical :**10 Hrs	Papers, Calculator, Distribution boards, Switch board	
LU3: Perform measurement of power plugs for AC	**Trainee will be able to:** • Identify the wiring route from distribution board to AC power plugs. • Select appropriate measuring tool. • Take measurement of the distance between Distribution Board and AC Power Plugs. • Record the measurements on appropriate document.	• Types of measuring units. • Measuring tools. • Basic mathematical calculations. • Procedure to record measurement.	**Total:** 12Hrs **Theory:** 2 Hrs **Practical :**10 Hrs	Steel Rule, Measuring tape, Electrical Drawing, Blank Papers, Calculator, Distribution boards, Power Plugs, Switch board	Class Room/ Electrical Lab
LU4: Perform measurement of light plugs	**Trainee will be able to:** • Identify the wiring route from switch board to light plugs. • Select appropriate measuring	• Measuring units. • Measuring tools.	**Total:** 12Hrs **Theory:**	Steel Rule, Measuring tape, Electrical Drawing,	Class Room/ Electrical Lab

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
	tool. • Take measurements of distances between Distribution Board, Switch Board and Light Plugs. • Record measurements on appropriate document.	• Basic mathematical calculations. • Identify Switch Board, Distribution Board, Light Power Plug.	2 Hrs **Practical :**10 Hrs	Blank Papers, Calculator, Switch board, Light plug, Switch board	
LU5: Perform measurement from main circuit to distribution board	**Trainee will be able to:** • Identify the wiring route from Energy Meter to Distribution Board. • Select appropriate measuring tools. • Take measurement of distance between Energy Meter and Distribution Board. • Record measurements on appropriate document.	• Measuring units. • Measuring tools. • Basic mathematical calculations. • Procedures for making connection of energy meter (Single &Three phase).	**Total:** 12Hrs **Theory:** 2 Hrs **Practical :**10 Hrs	Steel Rule, Measuring tape, Electrical Drawing, Blank Papers, Calculator, Switch board, Light plug, Distribution Board, Switch board, Energy Meter,	Class Room/ Electrical Lab
LU6: Perform measurement of TV, telephone, intercom, internet cable from main to	**Trainee will be able to:** • Identify wiring routes of TV, Telephone, Intercom, Internet Cables from Main Board to Junction Board.	• Measuring units. • Measuring tools.	**Total:** 12Hrs **Theory:**	Steel Rule, Measuring tape, Calculator, Wires (TV,	Class Room/ Electrical Lab

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
junction board	• Select appropriate measuring tool. • Take measurement of distances between Switch Boards of TV, Telephone, Intercom and Main Junction Board. • Record all measurements on appropriate document.	• Basic mathematical calculations. • Knowledge of communication wires • Procedure of communication wire & power cable must be separately laying	2 Hrs **Practical :**10 Hrs	Coaxial), Blank paper, Pen/Pencil	
LU7: Perform leveling of switch boards	**Trainee will be able to:** • Select leveling tools according to job requirement. • Perform leveling of switch boards (TV, telephone, intercom, internet connection etc.) • Ensure levels as per drawing.	• Measuring units. • Use of leveling tools. • Leveling techniques. • Basic mathematical calculations.	**Total:** 12Hrs **Theory:** 2 Hrs **Practical :**10 Hrs	Steel rule, Measuring tape, Sprit level, Calculator, Lead Pencil, Switch Boards, Electrical Drawing	Class Room/ Electrical Lab
LU8: Perform leveling of room wall lights	**Trainee will be able to:** • Select leveling tools according to job requirement. • Perform leveling of wall lights.	• Measuring units. • Use of leveling tools. • Leveling techniques.	**Total:** 31Hrs **Theory:** 6 Hrs	Steel rule, Measuring tape, Sprit level, Calculator, Lead	Class Room/ Electrical Lab

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
	• Ensure levels adjustment.	• Basic mathematical calculations.	**Practical :**25 Hrs	Pencil, Switch Boards, Electrical Drawing	
LU9: Perform chiseling with Wall Cutter	**Trainee will be able to:** • Select appropriate size of Wall Cutter/Chisel. • Perform chiseling at already marked points with Wall Cutter. • Check levels of chiseled points.	• Uses of Wall Cutter. • Types of Wall Cutters. • Chiseling techniques.	**Total:** 29Hrs **Theory:** 4 Hrs **Practical :**25 Hrs	Wall Cutter, Chisel, Hammer, Supply Board, Measuring tape, Sprit Level, Plum bob	Class Room/ Electrical Lab
LU10: Perform fixing of PVC Pipes/Switch Box	**Trainee will be able to:** • Identify appropriate PVC Pipe according to Drawing. • Fix Pipes and Switch Boxes as per drawing/desired location. • Check strength of PVC Pipe installations.	• Fixing techniques for PVC Pipes and Switch Boxes. • Types of PVC Pipes. • Sizes of Switch Boxes.	**Total:** 28Hrs **Theory:** 4 Hrs **Practical :**24 Hrs	PVC Pipes ,tools box ,switch box ,switch& sockets	

3.4 Module-4: CALCULATE ELECTRICAL LOAD OF APPLIANCES

Objective of the Module: This module is designed to provide knowledge and skills required to calculate electrical load, selection of cables& estimation of quantity required for electrical items.

Duration: 98 hours **Theory:** 18 hours **Practice:** 80 hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1: Calculate load of wiring	**Trainee will be able to:** • Enlist the equipment/appliances likely to be installed. • Note load of each electrical item. • Calculate load of all enlisted Electrical Appliances. • Record total load on appropriate document. • Identify Single or Three-phase Load.	• Power rating of equipment/ appliances. • Units of Current, Voltage and Power. • Basic mathematical calculations. • Circuit Tolerance. • Ohm's Law. • Conversion of different electrical quantities (Power, Current and Voltage). • Difference between Single and Three-phase Load.	**Total:** 24Hrs **Theory:** 4 Hrs **Practical :**20 Hrs	Multimeter, Tonge tester, Blank paper, Calculator, Lead Pencil.	Class Room/ Electrical Lab
LU2: Selection of cables	**Trainee will be able to:** • Interpret standard specification	• Read the standard specification	**Total:** 26Hrs	Standard Specificatio	Class Room/

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
according to room load	table of Cables/Wires**.** • Calculate the required room Load. • Select Cable size according to calculated load. • Verify the quality of cables (Aluminum/Copper) • Verify the size of cables (under gauge) • Verify the insulation of Cables.	table for cable/wire. • Load calculation. • Use of Standard Wire gauge (SWG) and Micrometer • Types of Cables/Wires. • Trademarks of cable manufacturing companies like, New AGE Cable, Pakistan Cable, Dawn Cable, GM Cables etc. • Basic mathematical calculations. • Conductor, Insulator and semi-Conductor.	**Theory:** 6 Hrs **Practical :**20Hrs	n Table, Standard Wire Gauge, Calculator, Micrometer, Cables (3/.029, 7/.029, 7/.036, 7/.044, 7/.064, 23/.0076)	Electrical Lab
LU3: Selection of size of cables according to appliances	**Trainee will be able to:** • Interpret standard specification Table of Cables/Wires. • Identify the required Load of appliances. • Select Cable size according to estimated load. • Verify the quality of cables (Aluminum / Copper).	• Interpret the Standard specification table for cable/wire. • Procedure for Load calculation. • Types of Cables/Wire. • Trademarks of cable manufacturing companies like, New AGE Cables, Pakistan Cables, Dawn Cables, GM Cables etc.	**Total:** 24Hrs **Theory:** 4 Hrs **Practical :**20 Hrs	Standard Specification Table, Standard Wire Gauge, Calculator, Micrometer, Cables (3/.029, 7/.029, 7/.036, 7/.044,	Class Room/ Electrical Lab

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
	• Verify the size of cables (under gauge). • Verify insulation of Cables.			7/.064, 23/.076)	
LU4: Prepare estimates of required electrical items	**Trainee will be able to:** • Interpret quantity of materials as per drawing. • Enlist quantity of material with specifications. • Prepare estimate of required items and accessories.	• Electrical symbols of Equipment's, Appliances and Accessories used in Electrical Drawings. • Types and specifications of Equipment and Appliances. • Techniques and procedure for preparing estimate of required material	**Total:** 24Hrs **Theory:** 4 Hrs **Practical :**20 Hrs	Blank paper, Calculator, Lead Pencil, Electrical Drawing,	Class Room/ Electrical Lab

3.5 Module-5: INSTALL ELECTRICAL CABLES/WIRES

Objective of the Module: This module is designed to provide knowledge and skills for installation of main distribution boards, Earthing connections, main & sub circuits, cables, making joints and their testing as well.

Duration: 128 hours **Theory:** 32 hours **Practice:** 96 hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1: Install main distribution board	**Trainee will be able to:** • Identify location of Distribution Boards as per Drawing. • Select Size of Distribution Board (DB) as per requirement. • Install Distribution Board. • Understand concept of voltage drop.	• Classification of electrical wiring (Domestic, Commercial and Industrial). • Various sizes of Distribution Board. • Fitting of Distribution Board. • Concept of voltage drop.	**Total:** 16Hrs **Theory:** 4 Hrs **Practical :**12Hrs	Electrical Drawing, Distribution Board,	Class Room/ Electrical Lab
LU2: Install Earthing connections	**Trainee will be able to:** • Select exact location for Earthing. • Ensure specification and digging for Earthing as per drawing.	• Importance of Earthing. • Types of Earthing materials and Earthing components. • Techniques and procedure for digging and installation of Earthing	**Total:** 16Hrs **Theory:** 4 Hrs **Practical :**12Hrs	Earth plate, Earth Wire, Earth Continuity Conductor, Earthing Material (used around earth	Class Room/ Electrical Lab

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
	• Select appropriate Earthing material to be used around earth plate. • Select proper size of Earthing wire, earth continuity conductor and Earthing plate. • Install Earthing System. • Connect Earthing system with main distribution box. • Perform Earthing test.	system. • Techniques and procedure of connecting Earthing system with main distribution box. • Types of testing (Current leakage teat ,Short circuit test , Insulation test , Continuity test) • Install Earthing System.		plate), Nut, Bolt, Electrician Tool Kit, Electrical Drawing, Earth Tester.Megger meter , Ohm Meter	
LU3: Install Cables from Main Circuit to sub Circuit	**Trainee will be able to:** • Select Cables as per calculation according to Color Code. • Verify quality and size of Cables. • Lay cables. • Connect cables to the Switch Boards (Sub Boards). • Insulate Joints with Insulation Tape.	• Color Coding Standards. • Types of Cables and Trademarks. • Possible cable damages. • Use of basic wiring tools (steel wire/Fish Wire). • Types of electrical wiring joints. • Types of Insulating Material.	**Total:** 16Hrs **Theory:** 4 Hrs **Practical :**12Hrs	Cables (3/.029, 7/.029, 7/.036), Steel wire, Fish Wire SWG, Micro meter Insulation Tape, Tool Kit, Electrical Drawing	Class Room/ Electrical Lab

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU4: Install cables from Sub Circuit to Branch Circuit	**Trainee will be able to:** • Select Cables as per calculation according to color code. • Verify quality and size of cables. • Lay cables. • Connect cables from sub circuit to branch circuit. • Insulate Joints with Insulation Tape.	• Types of Cables and Trademark. • Possible cable damages. • Use of basic wiring tools (Steel Wire/Fish Wire). • Types of electrical wiring joints. • Types of Insulating Material.	**Total:** 16Hrs **Theory:** 4 Hrs **Practical :**12Hrs	Cable(3/.029), Steel wire, Fish Wire SWG, Micro meter Insulation Tape, Tool Kit, Electrical Drawing	Class Room/ Electrical Lab
LU5: Install cables from Branch Circuit to Electrical Appliances	**Trainee will be able to:** • Select Cables as per calculation according to color code. • Verify quality and size of cables. • Lay cables. • Connect cables from Branch Circuit to Electrical Appliances. • Insulate Joints with Insulation Tape.	• Types of Cables and Trademark. • Possible cable damages. • Types of electrical wiring joints. • Types of Insulating Material.	**Total:** 16Hrs **Theory:** 4 Hrs **Practical :**12Hrs	Cable(3/.029, 23/.0076), Steel wire, Fish Wire SWG, Micro meter Insulation Tape, Tool Kit, Electrical Drawing	Class Room/ Electrical Lab

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU6: Check all wiring joints	**Trainee will be able to:** • Inspect the joints of whole wiring. • Firm the joints. • Perform soldering of all joints. • Insulate all joints.	• Types of tools/material used for connections. • Color codes standard. • Technique and procedure for connecting wire with boards. • Types of Joints. • Types of Electrical Circuits (Series, Parallel and Series-Parallel).	**Total:** 16Hrs **Theory:** 4 Hrs **Practical :**12Hrs	Electrical Drawing, Insulation Tape, Electrician Tools kit	Class Room/ Electrical Lab
LU7: Check Wiring and Earthing	**Trainee will be able to:** • Select appropriate Testing Tools/Equipment. • Examine (Physical) Wiring/Cabling. • Perform Continuity Test. • Perform Insulation Test. • Perform Earth Test. • Rectify the faults if found through Continuity, Insulation and Earth Tests.	• Types of Tools/equipment. • Disadvantages of lose connection • Techniques and procedure for performing Continuity, Insulation, earthing and appliance test. • Installation Techniques and Procedure of appliances. • Types and specification of appliances • Use of Meggar and Multimeter.	**Total:** 16Hrs **Theory:** 4 Hrs **Practical :**12Hrs	Meggar, Electrician Lamp, Multimeter , Electrical Drawing, Earth Tester	Class Room/ Electrical Lab

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU8: Install Electrical Appliances	**Trainee will be able to:** • Select electrical appliances to be installed. • Install appliances/equipment at designated places. • Connect main supply to the Distribution Boards. • Ensure functioning of appliances.	• Types of Electrical Appliances. • Techniques for installation of appliances.	**Total:** 16Hrs **Theory:** 4 Hrs **Practical :**12Hrs	Lamp Holder, Tube Lights, Ceiling Rose, Electrician Tool Kit, Electrical Drawing	Class Room/ Electrical Lab

3.6 Module-6: PERFORM REPAIR AND MAINTENANCE OF ELECTRICAL APPLIANCES.

Objective of the Module: This module is designed to identify knowledge and skills required to diagnose faults, cause of fault and fixing the faults of Electrical Appliances.

Duration: 42 hours **Theory:** 12 hours **Practice:** 30 hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1: Trace faults of Wiring/Appliances	**Trainee will be able to:** • Select Tools and equipment to trace faults. • Perform physical inspection of wiring and appliances. • Check the Supply lines. • Identify wiring faults. • Check the Appliances. • Identify fault in appliances.	• Types of tools used for identification of faults. • Types of possible wiring faults. • Types of possible Electrical Appliances related faults. • Techniques to identify faults. • Types of Electrical Circuits. • Types of Power Supply.	**Total:** 14Hrs **Theory:** 4 Hrs **Practical :**10Hrs	Electrician Tools Kit, Meggar, Test Lamp, Multimeter, Earth Tester, Insulation Tape,	Class Room/ Electrical Lab
LU2: Remove Fault (Wire Cable/Switch/Circuit Breaker)	**Trainee will be able to:** • Select tools for removal of already identified fault in parts. • Check specification of the	• Type of Tools for removing faults. • Types of faults in Electrical Appliances.	**Total:** 14Hrs **Theory:** 4 Hrs	Electrician Tools Kit, Meggar, Electrician Lamp, Multimeter	Class Room/ Electrical Lab

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
	damaged part. • Repair damaged parts of Electrical Appliances. • Replace irreparable part as per specification. • Check workability of replaced/Repaired parts.	• Types of Electrical circuits (series/parallel). • Techniques and procedure for tracing faults. • Techniques and procedure for rectification of faults. • Market information about availability and rates of spare parts.	**Practical :** 10 Hrs	, Earth Tester, Insulation Tape, Control Switches, Circuit Breaker	
LU3: Repair/Replace Electrical Appliances	**Trainee will be able to:** • Select tools required for removal of already identified basic fault in the appliances. • Check specification of the appliances. • Repair minor faults of appliances. • Report major faults to the person concerned. • Check workability of repaired parts of appliances.	• Types of faults. • Types of Electrical circuit. • Types of Power Supply. • Techniques and procedure for removing faults related to electrical appliances. • Market information about rates, trade and substitute of electric appliance etc. • Reporting of faults.	**Total:** 14Hrs **Theory:** 4 Hrs **Practical :** 10 Hrs	Electrician Tools Kit, Meggar, Electrician Lamp, Multimeter , Earth Tester, Insulation Tape, Control Switches, Circuit Breaker	Class Room/ Electrical Lab

3.7 Module-7: ENSURE OCCUPATIONAL HEALTH AND SAFETY

Objective of the Module: This module will help to understand knowledge and skills to meet health and safety standards in order to facilitate safe working environment.

Duration: 56 hours **Theory:** 16 hours **Practice:** 40 hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1 : Meet workplace health safety and security requirements for a safe working environment	**Trainee will be able to:** • Maintain safe working environment. • Use and maintain machinery, equipment, appliances and tools in a safe working condition. • Access information relating to Health and Safety issues. .	• Requirements for a safe working environment. • Ergonomics suitable for the work environment. • Maintenance procedures for using machinery, equipment, appliances and tools. • Preventive safety measures for machinery, equipment and appliances.	**Total:** 14Hrs **Theory:** 4 Hrs **Practical :** 10 Hrs	Safety Kit, OHS Charts, Tags	Class Room/ Electrical Lab
LU2 : Follow workplace health, safety and security procedures	**Trainee will be able to:** • Report hazardous situations, fatalities, injuries and illness to the person concerned.	• Hazard Identification processes. • Risk assessment and control processes.	**Total:** 14Hrs **Theory:** 4 Hrs	Safety Kit, OHS Charts, Tags	Class Room/ Electrical Lab

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
	• Control and minimise risks to prevent injury or illness.	• Precautionary measures and their utilisation to prevent health damages. .	**Practical :** 10 Hrs		
LU3 : Maintain safe Work Area.	**Trainee will be able to:** • Handle operations relating to cables appropriately. • Install electronic devices at a manageable distance as per requirements. • Handle sharp implements or tools properly. • Maintain safe distances between self and machinery, and machine-to-machine. • Use appropriate accessories and tools.	• Importance of safe working environment. • Work Ethics. • Use and handling of electrical and electronic equipment. • Precautions to prevent electrical hazards/shocks	**Total:** 14Hrs **Theory:** 4 Hrs **Practical :** 10 Hrs	Safety Kit, OHS Charts, Tags, Electrical Drawing	Class Room/ Electrical Lab
LU4 : Deal with emergency situations.	**Trainee will be able to:** • Ensure inexperienced workers in the performance of any hazardous work receive the necessary supervision.	• Rescue in emergency situations. • Suitable location of First Aid Box. • Identify and locate trained First Aid	**Total:** 14Hrs **Theory:** 4 Hrs	Safety Kit, OHS Charts, Tags, First Aid Box.	Class Room/ Electrical Lab

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
	• Ensure that everyone is safe in emergency situations. • Provide First Aid if required.	Responder.	**Practical :** 10 Hrs		

3.8 Module-8: DEVELOP PROFESSIONALISM

Objective of the Module: This module is designed to identify differences between professionalism and being professional. Being professional means ensuring appearance, manner, communication, interacting, attitudes, approach, skills, and openness to grow are developed. Professionalism is a combination of taught aspects, such as knowledge and skills, and learning gained through experience.

Duration: 70 hours **Theory:** 20 hours **Practice:** 50 hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1 : Communicate with co-workers	**Trainee will be able to:** • Communicate within department. • Communicate with other departments. • Communicate with Vendors. • Use various media to communicate effectively.	• Effective communication within and outside the organisation. • Clients and Vendors communication strategy. • Use of electronic and relevant media when required.	**Total:** 14Hrs **Theory:** 4Hrs **Practical:** 10 Hrs	Lead Pencil, Blank Paper, Eraser, Sharpener	Class Room
LU2 : Manage Time	**Trainee will be able to:** • Manage time to complete the assigned task. • Manage workload as per task. • Check work regularly to ensure accuracy for given task.	• Importance of time. • Task priorities. • Distribution of work among co-workers.	**Total:** 14Hrs **Theory:** 4Hrs **Practical:** 10 Hrs	Lead Pencil, Blank Paper, Eraser, Sharpener	Class Room

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
	• Handle time division with co-workers.				
LU3: Upgrade Skills	**Trainee will be able to:** • Participate in skill tests. • Attend seminars/ workshops. • Participate in skill competitions time to time. • Seek information about upcoming market trends.	• Importance of trends and market research to work role • Development of skill sets over time by way of seminars, workshops and competitions.	**Total:** 14Hrs **Theory:** 4Hrs **Practical:** 10 Hrs	Lead Pencil, Blank Paper, Eraser, Sharpener	Class Room
LU4: Keep the workplace clean.	**Trainee will be able to:** • Keep workplace well organised. • Ensure clean working environment. • Follow basic work ethics.	• Requirements of a clean and well organised workplace. • Effective and efficient organisation of work area. • Basic work ethics.	**Total:** 14Hrs **Theory:** 4Hrs **Practical:** 10 Hrs	Lead Pencil, Blank Paper, Eraser, Sharpener	Class Room
LU5: Work in a team.	**Trainee will be able to:** • Show the good team skills. • Show comfort and tolerance.	• Importance of being a good team player. • Basic work ethics at workplace.	**Total:** 14Hrs **Theory:** 4Hrs	Lead Pencil, Blank Paper, Eraser,	Class Room

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
	• Work as a good team player through active participation. • Present and observe good work ethics.		**Practical:** 10 Hrs	Sharpener	

4. ASSESSMENT GUIDE

- **General assessment guidance:**
- Methods of assessment
- Principles of assessment

- **Assessment strategy for the specific trade:**
- Sessional assessment
- Final assessment
- The assessment team

- **Planning aid for sessional assessment:**

Module 1: Ensure Personal Safety

Learning Units	Hours of theoretical assessment	Hours of practical assessment	Methodology	Scheduled Dates
LU1: Wear insulated gloves and shoes.				
LU2: Use of safety gloves				
LU3: Use insulated electrical tools / kit				
LU4: Use of safety mat at workplace				
LU5: Switch off main power supply while working.				

5. LIST OF TOOLS, MACHINERY & EQUIPMENT

(For a class of 20 students)

Sr. No.	Name of Tools / Equipment	Quantity
1.	Adjustable ladder, 6 Ft	2 Nos
2.	Ammeter (Panel type 4″ x 4″) 0-30-AC 50 HZ	20 Nos
3.	Bearing puller(3 &4 inches)	(5+5) Nos
4.	Bench Vice 5″	05 Nos
5.	Center punch	20 Nos
6.	Chisels 6″, 12″	10 Nos each
7.	Circuit Breaker (Single, double, three pole)	20 Nos
8.	Drum Switch ON / OFF, REV / FOR, Star / Delta	10 Nos. Each
9.	Dust brush / File brush	20 Nos each
10.	Earth Resistance Tester	5 Nos
11.	Electric soldering iron 150 watt	10 Nos
12.	Farmer chisels 8″.	10 Nos
13.	Files (Flat) (36x22x13)cm	20 Nos each
14.	Files (Half round) 200 x 2 (36x22x14)	20 Nos
15.	Files (Raps cut) 150	20 Nos

Sr. No.	Name of Tools / Equipment	Quantity
16.	Files (Round) (30x25x14)cm	20 Nos
17.	Files (Triangular) 150 x 2(25x22x17)cm	20 Nos
18.	Fuse (15A, 25-30A)	20 Nos
19.	Hack saws	20 Nos
20.	Hammers 200 grams	20 Nos
21.	Hand Electric Drill Machine with hammering 0-13 mm	02)Nos
22.	High insulation rubber hand gloves	20 Nos
23.	Insulated long nose pliers with side cutter	20 Nos
24.	Insulated pliers with side cutter	20 Nos
25.	Insulated wire cutter	20 Nos
26.	Insulation Remover 150 mm	20 Nos
27.	Iron hammer 500 grm	10 Nos
28.	Jigsaw machine portable	1 No
29.	Knife(6 inches)	20 Nos
30.	Magnetic Contactors 2 + 2 220 Volts / 10 A 50Hz	10 Nos.
31.	Measuring tap 3m	20 Nos
32.	Motor Protection Switch Three Phase	10 Nos.
33.	Multi-meter (Analog)	06 Nos

Sr. No.	Name of Tools / Equipment	Quantity
34.	Multi-meter (Digital)	10 Nos
35.	Neon phase tester light duty pocket size	25 Nos
36.	Overload Relay 0.5 – 3.0 Amp	20 Nos.
37.	Pedestal drill machine(1/2 inch)	2 Nos
38.	Philips screw driver No 1, 2, 3.	20 Nos each
39.	Power factor meter	2 Nos
40.	Push Button Single Way / Two Way / Three Way	20 Nos. Each
41.	RLC Tester	2 Nos
42.	Rubber hammer	10 Nos
43.	Scissor 6	5 Nos
44.	Screw Driver 4″, 6″, 8″	25 Nos each
45.	Scriber	20 Nos
46.	Single phase energy meter 220V /10-20A	5 Nos
47.	Single Phase Motor 220 Volts 50Hz ½ HP	5 Nos.
48.	Steel foot rule.	20 Nos
49.	Test boy	20 Nos
50.	Three phase energy meter 30 A	5 Nos
51.	Three Phase Motor 380 Volts 50Hz 2 HP	5 Nos.

Sr. No.	Name of Tools / Equipment	Quantity
52.	Tong tester meter	20 Nos
53.	Tri square 150 x 100 mm	20 Nos
54.	Variable Power Supply 0-24V, 5A	5 Nos
55.	Vernier caliper 150 mm	20 Nos
56.	Vice clamps	20 Nos
57.	Volt meter (Panel type 4″ x 4″) 0-300V-AC 50 HZ	10 Nos
58.	Volt meter (Panel type 4″ x 4″) 0-600V-AC 50 HZ	10 Nos
59.	Wire stripper	5 Nos
60.	Wooden saw 300 mm	10 Nos

6. LIST OF CONSUMABLE SUPPLIES

1. Bulb 100 Watts
2. Cable 3/.029
3. Circuit Breakers
4. Flexible Wire 23/.076
5. Fuses
6. Insulated Tape
7. Lamp Holder
8. Measuring Tape
9. Meter Battery (Cells)
10. Soldering Iron
11. Soldering Wire
12. Switches
13. Two Pin Sockets

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