REPUBLIC OF KENYA

COMPETENCY BASED CURRICULUM
FOR
ELECTRICAL INSTALLATION

LEVEL 3

TVET CDACC
P.O. BOX 15745-00100
NAIROBI

FOREWORD

The provision of quality education and training is fundamental to the Government's overall strategy for social economic development. Quality education and training will contribute to achievement Kenya's development blue print and sustainable development goals.

Reforms in the education sector are necessary for the achievement of Kenya Vision 2030 and meeting the provisions of the Constitution of Kenya 2010. The education sector had to be aligned to the Constitution and this resulted to the formulation of the Policy Framework for Reforming Education and Training (Sessional Paper No. 4 of 2016). A key feature of this policy is the radical change in the design and delivery of the TVET training. This policy document requires that training in TVET be competency based, curriculum development be industry led, certification be based on demonstration of competence and mode of delivery allows for multiple entry and exit in TVET programmes.

These reforms demand that Industry takes a leading role in curriculum development to ensure the curriculum addresses its competence needs. It is against this background that this Curriculum has been developed.

It is my conviction that this curriculum will play a great role towards development of competent human resource for the Electrical sector's growth and sustainable development.

PRINCIPAL SECRETARY
VOCATIONAL AND TECHNICAL TRAINING
MINISTRY OF EDUCATION

PREFACE

Kenya Vision 2030 aims to transform the country into a newly industrializing, "middle-income country providing a high quality life to all its citizens by the year 2030". Kenya intends to create a globally competitive and adaptive human resource base to meet the requirements of a rapidly industrializing economy through life-long education and training. TVET has a responsibility of facilitating the process of inculcating knowledge, skills and attitudes necessary for catapulting the nation to a globally competitive country, hence the paradigm shift to embrace Competency Based Education and Training (CBET).

The Technical and Vocational Education and Training Act No. 29 of 2013 and the Sessional Paper No. 4 of 2016 on Reforming Education and Training in Kenya, emphasized the need to reform curriculum development, assessment and certification. This called for a shift to CBET to address the mismatch between skills acquired through training and skills needed by industry as well as increase the global competitiveness of Kenyan labour force.

TVET Curriculum Development, Assessment and Certification Council (TVET CDACC) in conjunction with Electrical Sector Skills Advisory Committee (SSAC) and CAP Youth Empowerment Institute have developed this curriculum.

The curriculum is designed and organized with an outline of learning outcomes; suggested delivery methods, training/learning resources and methods of assessing the trainee's achievement. The curriculum is competency-based and allows multiple entry and exit to the course.

I am grateful to the Council Members, Council Secretariat, Electrical SSAC, expert workers and all those who participated in the development of this curriculum.

PROF. CHARLES M. M. ONDIEKI, PHD, FIET (K), CON. ENG. TECH.
CHAIRMAN, TVET CDACC

ACKNOWLEDGMENT

This curriculum has been designed for competency-based training and has independent units of learning that allow the trainee flexibility in entry and exit. In developing the curriculum, significant involvement and support was received from various organizations.

I appreciate CAP Youth Empowerment Institute and Electrical Engineering Sector Skills Advisory Committee (SSAC) who enabled the development of this curriculum.

I recognize with appreciation the role of the SSAC in ensuring that competencies required by the industry are addressed in this curriculum. I also thank all stakeholders in the Electrical sector for their valuable input and all those who participated in the process of developing this curriculum.

I am convinced that this curriculum will go a long way in ensuring that workers in Electrical sector will acquire competencies that will enable them perform their work more efficiently.

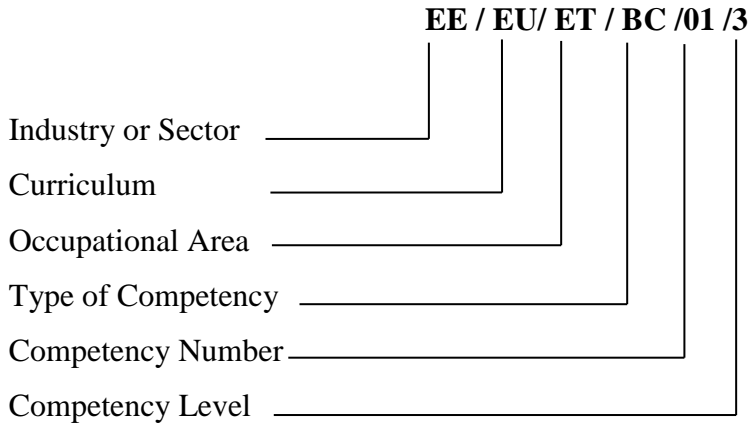 **DR. LAWRENCE GUANTAI M'ITONGA, PhD**
COUNCIL SECRETARY/CEO
TVET CDACC

Table of Content

ACRONYMS

BC	Basic Competency
IEE	Institute of Electrical Engineers
EE	Electrical Engineers
PC	Personal Computer
CDACC	Curriculum Development, Assessment and Certification Council
CPU	Central Processing Unit
CR	Core Competency
NCA	National Construction Authority
PVC	Polyvinyl Chloride
ICT	Information Communication Technology
KCPE	Kenya Certificate of Primary Education
KCSE	Kenya Certificate of secondary Education
KNQA	Kenya National Qualifications Authority
NEMA	National Environmental Management Authority
OS	Occupational Standard
OSHA	Occupation Safety and Health Act
OSHS	Occupation Safety and Health Standards
PPE	Personal Protective Equipment
SOPs	Standard Operating Procedures
SSAC	Sector Skills Advisory Committee
TVET	Technical and Vocational Education and Training

KEY TO UNIT CODE

EE / EU/ ET / BC /01 /3

Industry or Sector

Curriculum

Occupational Area

Type of Competency

Competency Number

Competency Level

COURSE OVERVIEW

Description of the course

This course is designed to equip individuals with competencies for installing and maintaining electrical wiring, lighting, power circuits and related equipment in domestic premises.

Units of Learning

This course consists of basic and core units of learning as indicated below:

Basic Units of Learning

Unit of Learning Code	Unit of Learning Title	Duration in Hours	Credit Factor
EE/CU/ET/BC/01/3	Communication Skills	15	1.5
EE/CU/ET/BC/02/3	Numeracy skills	15	1.5
EE/CU/ET/BC/03/3	Digital Literacy	20	2
EE/CU/ET/BC/04/3	Entrepreneurial Skills	40	4
EE/CU/ET/BC/05/3	Employability Skills	20	2
EE/CU/ET/BC/06/3	Environmental Literacy	15	1.5
EE/CU/ET/BC/01/3	Occupational Safety and Health Practices	15	1.5
	Total	**140**	**14**

Core Units of Learning

Unit of Learning Code	Unit of Learning Title	Duration in Hours	Credit Factor
EE/CU/ET/CR/01/3	PVC sheathed cabling, conduiting, trunking and cable trays laying	300	30
EE/CU/ET/CR/02/3	Single phase electrical installation and maintenance	400	30
EE/CU/ET/CR/03/3	Fixing and maintenance of light fittings, power outlets and basic appliances	400	40
	Industrial Attachment	300	30
Sub -Total		**1400**	**130**
Grand-Total		**1540**	**144**

The total duration of the course is **1540 Hours** which include **300 Hours** of industrial attachment.

Entry Requirements

An individual entering this course should have any of the following minimum requirements:

a) Kenya Certificate of Primary Education (KCPE) with at least two year's experience.

OR

b) Equivalent qualifications as determined by Kenya National Qualifications Authority (KNQA).

Industrial attachment
An individual enrolled in this course will be required to undergo an attachment for a period of three months. An individual enrolled in one of the core units of learning will be required to undergo a one month's attachment.

Assessment
The course will be assessed at two levels: internally and externally. Internal assessment is continuous and is conducted by the trainer who is monitored by an accredited internal verifier while external assessment is the responsibility of TVET CDACC.

Certification
A candidate will be issued with a Certificate of Competency for each core unit of competency. To attain the qualification Level III in Electrical Installation, the candidate must demonstrate competence in all the units of competency as given in qualification pack. These certificates will be issued by TVET CDACC in conjunction with training provider.

BASIC UNITS OF COMPETENCY

COMMUNICATION SKILLS
UNIT CODE: EE/CU/ET/BC/01/3

Relationship to Occupational Standards
This unit addresses the unit of competency: Demonstrate communication skills.

Duration of Unit: 15 Hours

Unit Description
This unit describes the competencies required to gather, interpret and convey information in response to workplace requirements.

Summary of Learning Outcomes
1. Obtain and convey workplace information
2. Speak English at a basic operational level
3. Participate in workplace meetings and discussions
4. Complete relevant work related documents

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Obtain and convey workplace information	• Communication process • Modes of communication	• Written • Oral questioning • Observation

Learning Outcome	Content	Suggested Assessment Methods
	• Medium of communication • Effective communication • Barriers to communication • Flow of communication • Sources of information • Types of questions • Organizational policies • Workplace etiquette • Ethical work practices in handling communication	

2. Speak English at a basic operational level	• English grammar
	   o Nouns
	   o Verbs
	   o Adjectives
	   o Adverbs
	   o Pronouns
		• Written
		• Oral
		• Role play

Learning Outcome	Content	Suggested Assessment Methods

	o Prepositions
	• English speaking
	   o Pronunciation
	   o Simple conversations
	• Taking verbal instructions
	• Reading and writing in English
	• Forms of expression in English	

3. Participate in workplace meetings and discussions	• Nature of workplace meetings. • Meeting protocols • Workplace interactions	• Oral questioning • Observation • Written tests
4. Complete relevant work-related documents	• Types and purposes of workplace documents and forms • Methods used in filling forms and documents • Recording workplace data	• Written tests • Oral questioning • Observation

Learning Outcome	Content	Suggested Assessment Methods
	• Process of distributing workplace forms and documents • Report writing. • Types of workplace reports	

Suggested Delivery Methods
- Discussion
- Role play
- Brainstorming
- Viewing of related videos

Recommended Resources
- Desktop computers/laptops
- Projectors
- Report writing templates
- Pens
- Note books

NUMERACY SKILLS
UNIT CODE: EE/CU/ET/BC/02/3

Relationship to Occupational Standards

This unit describes the competencies required by a worker in order to competently identify and undertake simple numerical processes.

Duration of Unit: 15 Hours

Unit Description

This unit describes the competencies required by a worker in order to competently identify and undertake simple numerical processes.

Summary of Learning Outcomes

1. Use whole numbers and money up to one hundred thousand for work.
2. Locate, compare and use highly familiar measurement for work.
3. Use highly familiar maps and diagrams for work.
4. Identify and use some common 2D shapes for work.
5. Locate specific information in highly familiar tables, graphs and charts for work.

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Use whole numbers and money up to one hundred thousand for work	- Whole numbers - Use of zeros - Use of fractions - Sizes - Grouping of numbers - Addition and subtraction of whole numbers and money up to 1000,000 - Numerical information - Symbols	- Oral questioning - Written tests - Practical test - Observation
2. Locate, compare and use highly familiar measurement for work	- Measurements - Units of measurements and their use - Digital time am and pm - Calendars	- Oral - Written - Practical test - Observation
3. Use highly familiar maps and diagrams for work	Use of maps and diagrams simple symbols and pictorial	- Oral - Written - Practical test - Observation

Learning Outcome	Content	Suggested Assessment Methods
	• Giving simple oral directions to locate objects	
4. Identify and use some common 2D shapes for work	• Two dimensional shapes • Describe common objects in terms of size and shape • Compare objects • Group common objects based on shape, size, color and features	• Oral • Written • Practical test • Observation
5. Locate specific Information in highly familiar tables, graphs and charts for work	• Simple tables • Features of simple graphs and charts • Numerical information in tables, graphs and charts	• Oral • Written • Practical test • Observation

Suggested Delivery Methods
- Instructor led facilitation of theory
- Practical demonstration of tasks by trainer
- Practice by trainees/role play
- Discussion
- Observations and comments and corrections by trainers

Recommended Resources
- Common 2D shapes objects
- Calculator
- Basic measuring instruments
- Mathematical tables

DIGITAL LITERACY
UNIT CODE: EE/CU/ET/BC/03/3

Relationship to Occupational Standards
This unit addresses the unit of competency: Demonstrate digital literacy.

Duration of Unit: 20 Hours

Unit Description
This unit covers the competencies required to effectively demonstrate digital literacy in a working environment. It entails identifying and using digital devices such as smartphones, tablets, laptops and desktop computers for purposes of communication and performing work related tasks at the work place.

Summary of Learning Outcomes
1. Identify computer hardware and software
2. Apply security measures to data, hardware and software
3. Apply computer software in solving tasks
4. Apply internet and email in communication at workplace

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Identify computer hardware and software	• Definition of a computer • Functions of a computer • Components of a computer • Classification of computers • Computer software	• Written • Oral • Observation
2. Apply security measures to data, hardware and software	• Data security and control • Security threats and control measures • Types of computer crimes • Detection and protection against computer crimes	• Written tests • Oral presentation • Observation
3. Apply computer software in solving tasks	• Operating systems • Word processing • Spread sheets • Data base	• Oral questioning • Observation • Project

Learning Outcome	Content	Suggested Assessment Methods
4. Apply internet and email in communication at workplace	• Computer networks • Uses of internet • Electronic mail (e-mail) concept	• Oral questioning • Observation • Oral presentation • Written report

Suggested Delivery Methods
- Instructor led facilitation of theory
- Demonstration by trainer
- Practical work by trainee
- Viewing of related videos
- Group discussions

Recommended Resources
Tools and equipment
- Desk top computers
- Laptop computers
- Other digital devices
- Printers
- Storage devices
- Computer software

ENTREPRENEURIAL SKILLS
UNIT CODE: EE/CU/ET/BC/04/3

Relationship to Occupational Standards
This unit addresses the unit of competency: Demonstrate entrepreneurial skills.

Duration of Unit: 40 Hours

Unit Description
This unit describes the competencies required to demonstrate entrepreneurial competencies. It includes, acquiring and developing entrepreneurial culture, identifying entrepreneurial opportunities, starting a small business, running and growing a small business.

Summary of Learning Outcomes
1. Acquire and develop entrepreneurial culture
2. Identify entrepreneurial opportunities
3. Start a small business
4. Run a small business
5. Grow a small business

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Acquire and develop entrepreneurial culture	- Definition of entrepreneur - Common terminologies in entrepreneurship - Entrepreneurship in national development - Entrepreneurship and employment creation - Formal and informal employment - Entrepreneurial culture - How, why, when and who to be an entrepreneur - Habits that promote entrepreneurial development - History and development of entrepreneurship	- Observation - Individual/ - group assignments - Written - Oral

Learning Outcome	Content	Suggested Assessment Methods
	• Factors that inhibit entrepreneurship • Managing factors that inhibit entrepreneurial development • Importance of entrepreneurship	
2. Identify entrepreneurial opportunities	• Myths associated with entrepreneurship • Types, characteristics, qualities and role of entrepreneurs • SWOT / PESTEL analysis • Conducting a business survey • Generating Business ideas • Business opportunities • Evaluation of business opportunities	• Observation • Individual/ group assignments • Written • Oral
3. Start a small business	• Factors to consider when starting a small business	• Observation • Individual/ group

Learning Outcome	Content	Suggested Assessment Methods
	• Legal requirement for starting a small business • Procedure of starting a small business • The dos and don'ts of starting a small business • Challenges faced when starting a small business and mitigating factors • Location of a small business • Forms of business ownership • Resources required to start a small business • Launch of a small business	assignments • Written • Oral
4. Run a small business	• Organizational structure of a small business • Small business' planning	• Oral • Observation • Individual/ group assignments

Learning Outcome	Content	Suggested Assessment Methods
	• Managed small business finances • Book keeping for small businesses • Small business records maintenance • Separating business and personal finances • Business support services • Marketing for small businesses • Production/ operation process for goods/services for small business • Small business resource requirements and acquisition • Basic business social responsibility • Basic word processing concepts in small business management	• Written

Learning Outcome	Content	Suggested Assessment Methods
	• Basic computer application software • Management of small business	
5. Grow a small business	• Methods of growing/expanding a small business • Resources for growing small business • Small business growth plan • ICT and business growth	• Observation • Individual / group assignments • Written

Suggested Delivery Methods
- Instructor led facilitation of theory
- Demonstration by trainer
- Practice by trainee
- Role play
- Case study

Recommended Resources

- Case studies for small businesses
- Business plan template
- Laptop/ desktop computer
- Telephone
- Writing materials

EMPLOYABILITY SKILLS
UNIT CODE: EE/CU/ET/BC/05/3

Relationship to Occupational Standards
This unit addresses the unit of competency: Demonstrate employability skills.

Duration of Unit: 20 Hours

Unit Description
This unit covers competencies required to demonstrate employability skills. It involves competencies for exuding self-awareness and ability to deal with everyday life challenges, applying critical safe work habits and working harmoniously in a team, participating in planning and organizing work activities, applying learning, creativity and innovativeness in workplace functions, pursuing professional growth and managing time effectively in the workplace.

Summary of Learning Outcomes
1. Develop self-awareness and ability to deal with life challenges.
2. Demonstrate critical safe work habits for employees.
3. Demonstrate workplace teamwork.
4. Plan and organize work activities.
5. Maintain professional growth and development in the workplace.

6. Demonstrate learning, creativity and innovativeness in the workplace.

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods

1. Develop self-awareness and ability to deal with life challenges	• Attributes of a housekeeping attendant
	• Formulating personal goals, objectives and targets
	• Acquiring and maintaining a positive self-image
	• Ways for overcoming life challenges
	• Maintaining self esteem
	   o Grooming standards
	   o Self-presentation
	• Handling emotions
	• Monitoring and evaluating one's performance
		• Observation
		• Written
		• Oral interview
		• Third party reports

Learning Outcome	Content	Suggested Assessment Methods
	• Accountability	
2. Demonstrate critical safe work habits for employees	• Stress and stress management • Time management • Safety in the workplace • Drug and substance abuse • Safe use of leisure time	• Observation • Written • Oral interview • Third party reports
3. Demonstrate workplace teamwork	• Team work • Conflicts and their resolution • Complementing team activities • Gender diversity	• Observation • Oral interview • Written • Third party reports
4. Plan and organize work activities	• Making work schedules • Identifying work goals/objectives and deliverables • Maintaining work records	• Observation • Oral interview • Written • Third party reports

Learning Outcome	Content	Suggested Assessment Methods
	• Decision making • Problem solving • Negotiation	
5. Maintain professional growth and development in the workplace	• Identifying training needs and career opportunities • Licenses and certifications for professional growth and development • Managing work priorities and commitments • Performance improvement	• Observation • Oral interview • Written • Third party reports
6. Demonstrate learning, creativity and innovativeness in the workplace	• Managing own learning • Networking • Taking initiative/proactivity • Flexibility • Identifying opportunities • Workplace innovation	• Observation • Oral interview • Written • Third party reports

Suggested Methods of Delivery
- Instructor lead facilitation of theory
- Demonstrations
- Simulation/role play
- Group discussion
- Presentations
- Assignments

Recommended Resources
- Computers
- Stationery
- Charts
- Video clips
- Audio tapes
- Radio sets
- TV sets
- LCD projectors

ENVIRONMENTAL LITERACY
UNIT CODE: EE/CU/ET/BC/06/3

Relationship to Occupational Standards
This unit addresses the unit standard: Demonstrate environmental literacy.

Duration of Unit: 15 Hours

Unit Description
This unit describes the competencies required by a worker to control environmental hazard, control environmental pollution and comply with workplace sustainable resource use.

Summary of Learning Outcomes
1. Control environmental hazard
2. Control environmental Pollution
3. Demonstrate sustainable resource use

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Control environmental hazard	• Purposes and content of Environmental Management and Coordination Act 1999	• Written questions • Oral questions

Learning Outcome	Content	Suggested Assessment Methods
	• Purposes and content of Solid Waste Act. • Storage methods for environmentally hazardous materials • Disposal methods of hazardous wastes • Types and uses of PPE in line with environmental regulations • Occupational Safety and Health Standards (OSHS)	• Observation of work procedures
2. Environmental pollution control	• Types of pollution • Environmental pollution control measures • Types of solid wastes • Procedures for solid waste management • Different types of noise pollution	• Written questions • Oral questions • Observation of work procedures • Role play

Learning Outcome	Content	Suggested Assessment Methods
	• Methods for minimizing noise pollution	
3. Demonstrate sustainable resource use	• Types of resources • Techniques in measuring current usage of resources • Calculating current usage of resources • Methods for minimizing wastage • Waste management procedures • Principles of 3Rs (Reduce, Reuse, Recycle) • Methods for economizing or reducing resource consumption	• Written questions • Oral questions • Observation of work procedures • Role play

Suggested Delivery Methods
- Instructor led facilitation of theory
- Discussion
- Demonstration by trainer

- Practice by trainee
- Observations and comments and corrections by trainers

Recommended Resources
- Standard operating and/or other workplace procedures manuals
- Specific job procedures manuals
- Solid Waste Act
- Environmental Management and Coordination Act 1999
- Machine/equipment manufacturer's specifications and instructions
- Personal Protective Equipment (PPE)

OCCUPATIONAL SAFETY AND HEALTH PRACTICES
UNIT CODE: EE/CU/ET/BC/07/3

Relationship to Occupational Standards
This unit describes the competencies required by a worker in an industry to practice and promote safety and health at work.

Duration of Unit: 15 Hours

Unit Description
This unit describes the competencies required by a worker in an industry to practice and promote safety and health at work.

Summary of Learning Outcomes
1. Prepare to practice safety and health at work.
2. Comply and promote compliance of workers to organization's occupational safety and health instructions and requirements.

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Prepare to practice safety and health at work	• Awareness of legislation that outlines the minimum standards for occupational safety	• Oral questions • Written questions

Learning Outcome	Content	Suggested Assessment Methods
	and health requirements/ regulations. • Benefits of implementing an occupational safety and health program. • Safety requirements/ regulations of own work and of other workers. • Workplace standards and procedures for incidents and emergencies. • Prevention and control Measures for avoiding accidents, injuries and sickness.	• Observation of work procedures
2. Comply and promote compliance of workers to organization's occupational	• Safety instructions and safety signs. • Safe handling of tools, equipment and materials.	• Written questions • Oral questions • Observation of work procedures

Learning Outcome	Content	Suggested Assessment Methods
safety and health instructions and requirements	• Execution of own work and of co-workers according to safe work procedures. • Use of safe guards and safety devices. • Reporting of hazards, incidents, injuries and sickness in the workplace.	

Suggested Delivery Methods
- Instructor led facilitation of theory
- Practical demonstration of tasks by trainer
- Practice by trainee
- Observations and comments and corrections by trainers

Recommended Resources
- Occupational safety and health standards
- Standard operating and/or other workplace procedures manuals
- Specific job procedures manuals
- Client/supplier instructions
- Organizational or external personnel

- Machine/equipment manufacturer's specifications and instructions
- Quality standards

CORE UNITS OF COMPETENCY

PVC SHEATHED CABLING, CONDUITING, TRUNKING AND CABLE TRAYS LAYING
UNIT CODE: EE/CU/ET/CR/01/3

Relationship to Occupational Standards
This unit addresses the unit of competency: Perform PVC sheathed cabling, conduiting, trunking and cable trays laying.

Duration of Unit: 300 Hours

Unit Description
This unit describes the competencies required by an electrician in order to safely install electrical metallic and non-metallic conduits, trunking, cable trays, wire ways and distribution board frames based on the required performance standards.

Summary of Learning Outcomes
1. Apply workplace safety
2. Perform basic metal works
3. Install PVC Sheathed cables
4. Install electrical metallic/non- metallic (PVC) conduits
5. Install wire ways, trunking and cable trays
6. Install distribution board frames and auxiliary components

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Apply workplace safety	- Meaning of term PPE - Purpose of PPE - Types of PPE - Safe and correct handling, use, maintenance and storage of different types of PPE - Organizational safety rules - Safety and environmental regulations - Occupational risks e.g. falling from heights, bites from insects, cuts - Types of hazards e.g electric shock, arc flash, blast, burns, fire - Sources of hazards and ways of preventing them	- Direct observation - Oral questioning - Practical tests - Written tests

Learning Outcome	Content	Suggested Assessment Methods
	• Types of fires and fire fighting • First aid • Methods of resucitation	
2. Perform basic metal works	• Use of safety harness and PPE • Types of metals e.g. Mile steel, steel • Purpose of the metals • Application of metals	• Direct observation • Oral questioning • Practical tests • Written tests
3. Install PVC Sheathed cables	• Use of safety harness and PPE • Meaning of PVC sheathed cables • Types of sheathed cables • PVC sheathed cables wiring methods • Applications of sheathed cables	• Direct observation • Oral questioning • Practical tests • Written tests
4. Install electrical metallic/non - metallic conduits	• Use of safety harness and PPE • Interpretation of electrical drawings and plans	• Written tests • Direct observation and Oral questioning

Learning Outcome	Content	Suggested Assessment Methods
	• Identification, use, maintenance and storage of tools and equipment • Materials specification • Use of materials	• Practical tests
5. Install wire ways, trunkings and cable trays	• Use of safety harness and PPE • Interpretation of electrical drawings and plans • Use of tools and equipment • Types of trunkings and cable trays • Procedure in installation of wire ways, trunkings and cable trays	• Written tests • Direct observation and oral questioning • Practical tests
6. Install distribution board frames and auxiliary components	• Use of safety harness and PPE • Use of tools and equipment • Interpretation of electrical drawings and plans	• Direct observation and oral questioning • Practical tests • Written tests

Learning Outcome	Content	Suggested Assessment Methods
	• Procedure in installation of distribution board frames and auxiliary components • Earthing of the distribution boards • Conducting final checks for work manship, conformity with instructions and job requirements • Maintenance of tools • Storage of tools • Good housekeeping • Documentation and reporting	

Suggested Delivery Methods
- Instructor led facilitation of theory
- Demonstration by trainer
- Practical work by trainee
- Products show rooms and field visits
- On-site job training
- Viewing of related videos

Tools and Equipment
- Spirit levels, hack saws, plumb bobs and line, steel files, stock and die, metal pipe benders, bending springs, electric drills, earth rods/mats/spikes, grinding machine, chisels, mason's hammers.
- PPE including working gloves, overalls/dustcoats, safety shoes, helmets, goggles, safety harness.

Materials and supplies
- Distribution boards
- consumer control units
- utility boxes
- junction boxes
- PVC conduits and accessories
- Metallic conduits and accessories
- Trunking
- Cable trays
- Screws
- Glues
- Bolts and nuts

SINGLE PHASE ELECTRICAL INSTALLATION AND MAINTENANCE
UNIT CODE: EE/CU/ET/CR/02/3

Relationship to Occupational Standards
This unit addresses the Unit of Competency: perform single phase electrical installation and maintenance.

Duration of Unit: 400 Hours

Unit Description
This unit covers the competencies for installing lighting, power points, consumer's control unit and power intake point.

Summary of Learning Outcomes
1. Apply workplace safety
2. Interpret electrical drawings
3. Select correct types and sizes of cables
4. Install cables for lighting and power points
5. Install power intake point
6. Install consumer's control unit
7. Inspect and test the complete installation
8. Repair and maintain the installation

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Apply workplace safety	• Meaning and purpose of PPE • Types of PPE • Safe and correct handling, use, maintenance and storage of different types of PPE • Organizational safety rules • Safety and environmental regulations • Occupational risks e.g. falling from heights, slipery floors, bites from insects, cuts • Types of hazards e.g electric shock, arc flash, blast, burns, fire • Sources of hazards and ways of preventing them	• Direct observation • Oral questioning • Practical tests • Written tests

Learning Outcome	Content	Suggested Assessment Methods

	• Types of fires and fire fighting
	• First aid
	  ○ Meaning of first aid
	  ○ Procedure of rescuing a victim from electric shock
	  ○ Remedies for burns, blisters and cuts
	  ○ Methods of resucitation	

2. Interpret electrical drawings	• Identification of intake point equipment • Identification of installation equipment and accessories e.g. switches, lamp holders • Identification of electrical symbols and abbreviations • Types of drawings • Schematic/layout • Circuit • Wiring	• Direct observation • Oral questioning • Practical tests • Written tests

Learning Outcome	Content	Suggested Assessment Methods
3. Select correct sub-circuits, types and sizes of cables	• Meaning of insulators, conductors and cables • Types of conductors (e.g copper, aluminium) and their applications • Properties of conductors e.g. conductivity, temperature, weight, strength • Types of insulators (e.g. PVC, rubber, porcelain, fibre) • Properties of insulators e.g. resistivity • Factors to consider when selecting cables e.g. load, length • Identification of sub-circuits • Types and sizes of cables	• Direct observation and oral questioning • Written tests

Learning Outcome	Content	Suggested Assessment Methods
	• Measurements and estimations of cable lengths and sizes • Relevant IEE regulations	
4. Perform cable jointing and termination	• Meaning of cable joint and termination • Types of cable joints and termination • Purpose and application of cable joints and termination • Relevant IEE regulations	• Direct observation • Oral questioning • Practical tests • Written tests
5. Install cables for lighting and power points	• Communication methods at site e.g. verbal, walkie-talkie, mobile phones • Use of safety harness and PPE • Identification of tools and equipment • Assembling of working tools and equipment	• Direct observation and oral questioning • Practical tests • Written tests

Learning Outcome	Content	Suggested Assessment Methods
	• Identification of lighting and power points • Preparation of cables e.g. stripping, pairing • Drawing in of cables • Cable joints • Labeling of circuits • Conducting final checks for work manship, conformity with instructions and job requirements • Good housekeeping • Maintenance of tools • Storage of tools • Documentation and reporting • Relevant IEE regulations	
6. Install power intake point	• Meaning of power intake point • Identification of sequence of control equipment	• Direct observation • Oral questioning • Practical tests

Learning Outcome	Content	Suggested Assessment Methods
	• Mounting of components • Wiring of intake point • Earth lead and earth electrode installation • Bonding of all metal parts • Provision of draw wire for power authority • Conducting final checks for work manship, conformity with instructions and job requirements • Good housekeeping • Maintenance of tools • Storage of tools • Documentation and reporting • Relevant IEE regulations	• Written tests
7. Inspect and test the complete installation	• Meaning of inspection and testing • Sections of the installation to be	• Direct observation • Oral questioning

Learning Outcome	Content	Suggested Assessment Methods

	inspected
	• Types of visual and physical checks
	• Completion installation tests
	  o Verification of polarity test
	  o Insulation resistance test
	  o Earth continuity tests
	  o Ring circuit continuous test
	• Conducting final checks for work manship, conformity with instructions and job requirements
	• Good housekeeping
	• Maintenance of tools
	• Storage of tools
	• Documentation and reporting
	• Relevant IEE regulations
		• Practical tests
		• Written tests

Learning Outcome	Content	Suggested Assessment Methods

8. Repair and maintain the installation	• Meaning of repair and maintenance
	• Types of maintenance
	  o Routine
	  o Breakdown
	  o Periodic
	  o Overhaul
	• Repair and replacements of faulty components
	• Maintenance procedures
	• Conducting final checks for work manship, conformity with instructions and job requirements
	• Good housekeeping
	• Maintenance of tools
	• Storage of tools
	• Documentation and reporting
	• Relevant IEE regulations
		• Direct observation
		• Oral questioning
		• Practical tests
		• Written tests

Suggested Delivery Methods
- Instructor led facilitation of theory
- Demonstration by trainer
- Practical tasks by trainee
- Site visits
- On- job training
- Viewing of related videos and models
- Dual training

Recommended Resources
Tools and Equipment
- Pliers
- Screwdrivers
- Hammers
- Wire splicers
- Electrician knives
- Phase Testers
- Wire gauge
- Wire cutters and strippers
- Steel tapes (draw wire)
- Tape measures
- Crimping and clamping tools
- Hack saw and blades
- Soldering guns
- Multimeters
- Insulation resistance testers
- Loop impedance testers

- Earth electrode resistance testers
- Clamp on ammeters
- PPEs including gloves, helmets, overalls/dust coats, safety boots

Materials
- Cables
- Earth rods/mats/spikes
- Cable lugs
- Glands
- Rubber boots
- Insulating tapes
- Strip connectors
- Earth rods/mats/spikes, clips

FIXING AND MAINTENANCE OF LIGHT FITTINGS, POWER OUTLETS AND BASIC APPLIANCES

UNIT CODE: EE/CU/ET/CR/03/3

Relationship to Occupational Standards
This unit of learning addresses the unit of competency: perform fixing of light fittings, power outlets, basic appliances repair and maintenance.

Duration of Unit: 400 Hours

Unit Description
This unit describes the competencies required by an electrician in order to fit, mount and install wiring devices and install lighting fixtures for connection to mains power.

Summary of Learning Outcomes
1. Apply workplace safety
2. Select wiring devices
3. Install wiring devices, lighting fixtures and basic appliances
4. Perform basic repair and maintenance of installation and appliances

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome		Suggested Assessment Methods
1. Apply workplace safety	• Meaning of term PPE • Purpose of PPE • Types of PPE • Safe and correct handling, use, maintenance and storage of different types of PPE • Organizational safety rules • Safety and environmental regulations • Occupational risks e.g. falling from heights, bites from insects, cuts • Types of hazards e.g electric shock, arc flash, blast, burns, fire • Sources of hazards and ways of preventing them	• Direct observation • Oral questioning • Practical tests • Written tests

Learning Outcome		Suggested Assessment Methods
	• Types of fires and fire fighting • First aid • Methods of resucitation	
2. Select wiring devices and basic appliances	• Identification of wiring devices • Identification of basic appliances • Testing the functionality of the devices and appliances	• Direct observation and oral questioning • Practical tests • Written tests
3. Install wiring devices, lighting fixtures and basic appliances	• Use of safety harness and PPE • Identification of power points • Types of lighting fixtures • Identification of lighting fixtures • Identification of tools and equipment • Assembling of tools and equpment	• Direct observation and oral questioning • Practical tests • Projects • Written tests

Learning Outcome		Suggested Assessment Methods
	• Termination and fitting of wiring devices, lighting fixtures and basic appliances • Earthing of the wiring devices, lighting fixtures and basic appliances • Labelling of final circuits on the distribution board • Conducting final checks for work manship, conformity with instructions and job requirements • Maintenance of tools • Storage of tools • Good housekeeping • Documentation and reporting	

Learning Outcome		Suggested Assessment Methods
4. Perform basic repair and maintenance of installation and appliances	• Meaning of repair and maintenance • Purpose and reasons of repair and maintenance • Fault identification • IEE regulations on fault identification, maintenance and repair process • Meaning of fault identification • Manufacture's manual use in fault identification and appliances repair process • Standards in appliances and installation maintenance and repair process	• Direct observation and oral questioning • Practical tests • Written tests

Suggested Delivery Methods
- Instructor led facilitation of theory
- Demonstration by trainer
- Practical work by trainee
- On job training
- Field visits
- Viewing of related videos and models

Recommended Resources
Tools and Equipment
- Pliers, screwdrivers, wrenches, wire splicers, electrician knives, ballpein hammers, electric drills, ladders and scaffolding, multimeters, spanners, spirit levels, tape measures, labelling machine, soldering iron.
- PPE including gloves, helmets, overalls/dust coats, safety boots.

Personal Protective Equipment (PPE)
- Switches (e.g. light switches, double pole switch, float, pressure control), socket outlets, industrial sockets.
- Light fittings (e.g. fluorescent, 2D fitting, ball fittings, panels, security lights, snake lights).
- Earth rods/mats/spikes, circuit breakers, consumer control units, distribution boards, isolators, changeovers, instant water heaters, hand dryers, electric water pumps.