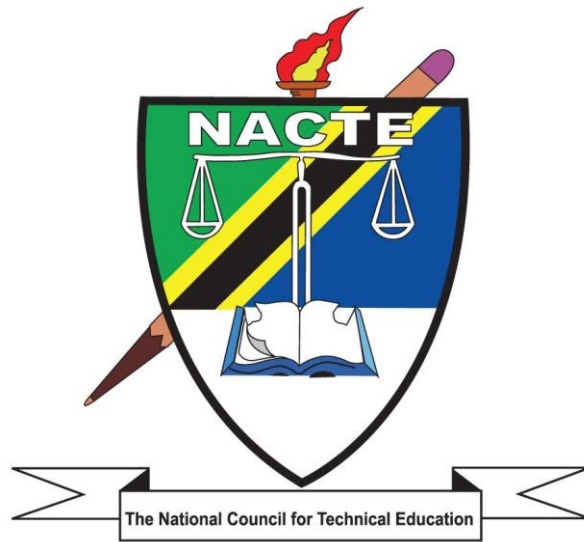


NATIONAL COUNCIL FOR TECHNICAL EDUCATION



NOVEMBER 2022

PROPOSED OCCUPATIONAL STANDARDS

OCCUPATION: ELECTRICAL ENGINEERING TECHNICIAN

LEVEL: NTA 6

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FOREWORD

The National Council for Technical Education (NACTE) is a corporate body established by the National Council for Technical Education Act, Cap.129. The Act provides a legal framework for the Council to coordinate the provision of technical education and training in Tanzania. The mandate of NACTE is three-fold, namely; Regulatory, Quality Assurance and Policy Advisory.

In discharging its mandate, the Council has been charged with the responsibilities, among others, to:

- (a) assist technical institutions in the transmission of knowledge, principles and training in the field of technical education and training for the benefit of the people of Tanzania;
- (b) assist technical institutions in the overall development of the quality of education they provide and to promote and to maintain approved academic standards;
- (c) establish and make awards in technical education which are consistent in standard and comparable to related awards in Tanzania and internationally; and
- (d) ensure that the quality of education required for the awards is met and maintained throughout the duration of the delivery of the course.

In the course of execution of these responsibilities, the Council has been instituting various measures aiming at advancing the quality of training provided in technical institutions in respect of the changing demands of the labour market, both local and international.

To achieve the above obligation, NACTE, under the Ministry of Education, Science and Technology implemented the East Africa Skills for Transformation and Regional Integration Project (EASTRIP), a project aiming at promoting regional integration through supporting the regional corridors and sector markets, developing common standards and qualifications, and promoting mobility of students, faculty, and graduates. The project supports the Government of Tanzania to address shortage of skills in five sectors namely:

- (a) Energy;
- (b) Construction;
- (c) Information and Communication Technology (ICT);
- (d) Transportation; and
- (e) Agribusiness.

To address the skills, miss-match and shortage in the five (5) sectors in the country, the project funded, among others, a component of Development of Occupational Standards for Technical and Vocational Education and Training (TVET). In this regard, NACTE endeavoured to identify qualified and highly experienced experts in the five sectors from both the industry and training institutions to carry out the development of Occupational Standards. The exercise was carried out at Morogoro Teachers College – Morogoro from 16th July to 10th August, 2021. The output of the exercise is Occupational Standards for 12 occupations. Occupational standards for Electrical Engineering Technicians are among the occupational standards for 12 occupations which have been developed.

Since Occupational Standards are statements of work performance reflecting the ability to successfully complete the functions required in an occupation, as well as the application of knowledge, skills, attitudes and understanding in an occupation, it is the Council's expectations that the developed standards will form a robust base for decision making and provide explicit guidance to policy makers, curriculum developers, educators, employers and other stakeholders in matters related to manpower planning as well as execution of Technical and Vocational Education and Training undertakings.

Prof. J. W. Kondoro
Chairman

Dar es Salaam
October 2022

ACKNOWLEDGEMENT

The National Council for Technical Education (NACTE) is charged with the mandate to be the Quality Assurance organ of the Government in matters related to Technical and Vocational Education and Training (TVET) and production of qualified manpower for both local and international labour markets. In order to realize this obligation, NACTE endeavours to institute policies, guidelines and standards and to set the quality benchmarks for training institutions.

However, this is only possible if there is a strong base, linking the training institutions on one hand and the demands of the industry/labour market for relevant manpower on the other hand. Therefore, the Council undertook a step to develop Occupational Standards in sectors considered to be the engine to steer the country's desire to achieve an industrial economy. This exercise would not be a success without the input and support from our stakeholders. I am indebted to acknowledge some of them here.

I wish to acknowledge and appreciate the support from the Ministry of Education, Science and Technology through the East Africa Skills for Transformation and Regional Integration Project (EASTRIP) for the financial support which facilitated the preparation of this document. I wish also to appreciate Eng. Dir. Simon Baregu and Mrs Leah Lukindo for the tireless efforts and commitment in facilitating and guiding the standards development process, Ms. Eileen Tzamburakis and Ms. Chausiku Yakweli Ibrahim for compiling and type setting the final document; and the NACTE Secretariat for coordinating the whole activity.

In a very special way I wish further to extend my sincere gratitude to this team of wonderful experts who tirelessly dedicated their time and availed their invaluable intellect in the preparation of this document. I would like to recognise the colossal inputs of the following experts

S/N	Name	Designation	Organization
	Eng. Decklan P. Mhaiki	Chief Technical Advisor	Tanzania Electric Supply Company Limited (TANESCO)
	Eng. Sophia Mgonja	Chief Technical Advisor	Tanzania Electric Supply Company Limited

S/N	Name	Designation	Organization
	Eng. Msherwa John	Principal Coordinator	(TANESCO) The National Council for Technical Education (NACTE)
	Eng. Mary K. Mhayaya	Consulting Engineer	Tanzania Ports Authority (TPA)
	Dir. Erick Mgaya	Senior Lecturer	Arusha Technical College (ATC)

In addition, the Council hopes to further enhance the internationalization of Occupational Standard and promote the modernization and internationalization of industries in Tanzania, so as to facilitate Tanzania's integration into the international market and tap its development potential. Therefore, the Council invited the China - Africa Vocational Education Alliance, China - Africa (Chongqing) Vocational Education Alliance, and Chinese vocational colleges to participate in the development, revision, and review of the Occupational Standard documents. It is firmly believed that they will provide strong support for the development of vocational education and related industries in Tanzania based on their rich experience in vocational education, relying on China's advanced and complete industrial chain as well as its status in the international market.

Therefore, I would like to express my heartfelt appreciation to this professional team composed of Chinese colleges, institutions and experts for their hard work and dedication. They've made great contributions to the compilation of this document. I would like to thank the following colleges and experts for their support.

S/N	Unit	Name	Title/Professional Field
1	Changzhou College of Information Technology	Zhang Zhibai	Professor / Automation
2		Shi Xiaohu	Associate Professor / Automation
3		Zhou Lianping	Associate Professor / Automation
4		Sun	Associate Professor /

		Chuanqing	Automation
5		Lu Xiaochang	Lecturer / Automation
6		Zhang Jin	Lecturer / Automation
7		Shi Xinmin	Associate Professor / Mechanical Design
8		Zhu Min	Associate Professor / Automation
9	Chengdu Industry And Trade College	Li Jiangling	Associate Professor / Automation
10		Yang Tao	Lecturer / Automation
11		Zhang Xiaomei	Lecturer / Automation
12		Tian Zhiyong	Senior Technician / Automation
13		Liang Yi	Associate Professor / Automation
14		Lv Yu	Associate Professor / Automation
15	Guangdong Polytechnic of Industry and Commerce	Liu Yibiao	Associate Professor / Intelligent Control
16		He Jing	Lecturer / Control Engineering
17		Li Jianing	Lecturer / Control Engineering

Dr. A. B. Rutayuga
Executive Secretary

Dar es Salaam
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ABBREVIATIONS

ABC	Aerial Bundle Conductor
AC	Alternating Current
CAD	Computer Aided Design
CBET	Competence Based Education and Training
DC	Direct Current
GPS	Global Positioning Systems
HV	High Voltage
KVA	Kilo Volt Ampere
LV	Low Voltage
MV	Medium Voltage
NACTE	National Council for Technical Education
NOS	National Occupational Standards
OS	Occupational Standards
PLC	Programmable Logical Circuit
PPE	Personal Protective Equipment
TET	Technical Education and Training
TVET	Technical and Vocational Education and Training

GLOSSARY OF TERMS

Circumstantial knowledge:	Detailed knowledge, which allows the decision-making in regard to different circumstances and cross cutting issues
Competence:	The ability to use knowledge, understanding, practical and thinking skills to perform effectively to the workplace standards required in employment.
Competency:	A description of the ability one possesses when able to perform a given occupational task effectively and efficiently.
Competency-based education:	An instructional program that derives its content from validated tasks and bases assessment on the learner's performance
Curriculum:	A description or composite of statements about “what is to be learned” by the trainee/student in a particular instructional programme; a product that states the “intended learning outcomes”.
Educational/Training programme:	The complete curriculum and instruction (what and how) that is designed to prepare a person for employment in a job or other particular performance situation.
Occupation:	A specific position requiring the performance of specific tasks – essentially the same tasks are performed by all employees having the same title. (Example: baker)
Occupational analysis:	A process used to identify the tasks that are important to employees in any given occupation
Occupational area	This is a broad grouping of related jobs. Example: food service
Occupational Standards:	Specific requirements of competences people are expected to demonstrate in a particular occupational area, including knowledge and relevant attitudes. They also act as performance tool of assessment of the pre – scribed outcomes.
Occupational/job analysis:	A process used to identify the tasks that are important to employees in any given occupation.
Performance criteria:	indicate the expected end results or outcome in form of evaluative statements.

Skill:	The ability to perform occupational tasks with a high degree of proficiency within a given occupation. Skill is conceived of as a composite of three completely interdependent components: cognitive, affective, and psychomotor.
Standard:	it is a set of statement, which if proved true under working conditions, means that an individual is meeting an expected level and type of performance
Task analysis:	The process of analysing each task to determine the steps, related knowledge, attitudes, performance standards, tools and materials needed, and safety concerns required of employees performing it.
Task:	A work activity that has a definite beginning and ending, is observable or measurable, consists of two or more definite steps, and leads to a product, service, or decision.
Underpinning Knowledge:	This is crucial knowledge that an individual must acquire in order to demonstrate competences that are associated in performing a given task.
Verification:	The process of having experts review and conform the importance of the task (competency) statements identified through occupational analysis. Other questions, such as the degree of task learning difficulty are also frequently asked. This process is also sometimes referred to as validation.
Occupational Competence	The application of knowledge and skills to perform consistently to the standards required in the work context.

1.0. INTRODUCTION

Technical Education and Training (TET) is one of the most important education sub-sectors in Tanzania, responsible for developing a skilled workforce to support the country's industrialization economic agenda. Tanzania's Development Vision 2025 intends to raise the country's economy to a middle-income status. This requires a skilled workforce that is aligned with the needs of the public and private sectors of the economy. The National Council for Technical Education has begun the job of drafting Occupational Standards that will eventually be adopted as National Occupational Standards for TET in order to ensure that it meets the needs of the labour market and the country's economic agenda.

National Occupational Standards (NOS) are performance criteria that are matched with labour market demands. Each National Occupation Standard describes functions, performance standards, and knowledge/understanding for one important function or task. They combine skills, knowledge, and attitudes to describe best practice. They are useful tools for establishing job roles, personnel recruiting, supervision, and appraisal, as well as TET standards. They're also helpful for benchmarking and harmonizing qualifications on a national and international level. Standards, in general, provide a solid framework for high-quality TET that is labour market-relevant, current and consistent in delivery across all public and private institutions.

However, it must be noted that, Occupational Standards and Training standards/qualifications standards are different. Occupational standards are defined in terms of activities performed by a person in a selected occupation (e.g., an electrical engineer designs electrical wiring circuits, performs trouble shooting in electrical wiring, etc.) and they are usually defined by employers following procedures agreed upon by all stakeholders. Education and training standards are developed from the activities defined in occupational standards, and they include learning objectives to ensure that the necessary skills and knowledge are developed by a person to enable him or her to function at an agreed level in an occupation. Education and Training standards are used to define curricula in training institutions. It is however critical that there must be a direct link between the occupational standards and the training standards to respond to demands of the labour market.

In TET delivery, Tanzania adopted the Competence Based Education (CBET) approach. The CBET approach focuses on providing learners with the skills and knowledge required to meet

the occupational standards. Occupational standards are thus the starting point for developing competency-based training (CBET) programs. TET institutions will be required to benchmark their curricula with relevant occupational standards.

Occupational Standards are developed based on a given occupation's current and future demands. As a result, they serve as a means of bridging the gap between the worlds of employment and technical education and training (TET).

The Electrical Engineering Technician Occupation has its own set of occupational standards. The document explains how the occupational standards were developed, as well as the scope, the occupational profile in the form of DACUM charts, and the Occupational Standards.

2.0. OCCUPATIONAL STANDARD DEVELOPMENT PROCESS

The Occupational standards development process began with an examination of major documents that guide Tanzanian skill development. The 10-year National Skills Development Strategy (2016-2026) was one of the documents reviewed, and it outlined six (6) economic sectors that should be prioritized when developing skills development programmes. These sectors include: Transport and logistics, Tourism and Hospitality, Agribusiness, Construction, Energy and ICT. NACTE labour market reports were also used in the literature review to determine the skills demand in the Tanzanian labour market as a whole.

After the literature review, a workshop comprised of expert workers and educators with substantial knowledge and experience in the occupation conducted an occupational analysis utilizing the DACUM approach to produce the occupational profile. The analysis resulted in DACUM Charts, which are attached as **Appendix 1** to this document.

The occupational standards were then developed. Experts in Occupational Analysis and the Development of Occupational Standards facilitated the workshop. Interviews, online surveys, and a stakeholder forum were used to validate the occupational standards. Engineers, supervisory technicians on the job, and experienced Electrical Engineering technicians were key informants in the survey to discover occupational trends. This information was used to gain insight from the workplaces regarding trends and changes in the profession, including how well graduates are prepared for working in the occupation. A total of online surveys were completed by experts from the labour market across the country. Apart from the survey aiding in defining the scope for the occupational analysis, they served to engage a

wide cross-section of experts in the occupation. The stakeholders' forum was attended by 100 participants from different parts of the country representing various companies.

3.0. THE SCOPE AND OVERVIEW OF THE OCCUPATION STANDARDS FOR ELECTRICAL ENGINEERING TECHNICIANS

These standards cover a broad range of duties and tasks that can be performed by an Electrical Engineering Technician. However, the occupational standards are not meant to replace individual job descriptions, they are to be used for guidance in defining skill levels and knowledge for the technician in specific settings or positions. The Electrical Engineering Technician may perform tasks in a number of key areas of the occupational standards, but not necessarily in all areas. For example, in large operations other individuals may be employed or designated to perform specific tasks.

An Electrical Engineering Technician is responsible for managing the electrical systems of an establishment, ensuring the safety of the network and cables to support daily operations. He/She performs all the duties related to installing and maintaining electrical equipment in homes, businesses, factories, and infrastructure.

Generally, an Electrical Engineering Technicians analyse schematics and specifications to construct electrical systems, run diagnostic tests, and perform repairs for any defects and inconsistencies. They assemble electrical equipment, replace malfunctioning components, upgrade systems, and advise management of high-quality electrical supplies. These Occupational Standards highlight core knowledge, skills, competences and personal attributes that an Electrical Technician must possess to successfully complete the duties assigned to him/her, which include:

- a) Performing maintenance of electrical systems
- b) Performing maintenance of electric machines
- c) Installing electrical systems
- d) Installing electrical machines
- e) Performing maintenance of electrical machines
- f) Performing maintenance of electrical systems
- g) Supervising subordinates
- h) Managing resources
- i) Working in compliance with OSHA's safety and health regulations

The Occupational standards have been clustered to fit into NTA qualification levels i.e. NTA level 4,5, and 6.

4.0. VALIDITY PERIOD

The occupational standards will be valid for 3-5 years due to the fast-changing nature of technology. The review will proceed in the same manner as the previous one, with new occupational standards being developed based on current labour market Information.

5.0. OCCUPATIONAL STANDARDS

5.1. OCCUPATIONAL STANDARDS FOR ELECTRICAL ENGINEERING TECHNICIAN – NTA LEVEL 6

OCCUPATION	ELECTRICAL ENGINEER TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	PERFORM MAINTENANCE ON ELECTRICAL SYSTEMS	DUTY NO	601
TASK TITLE	PERFORM PREVENTIVE MAINTENANCE ON ELECTRICAL SYSTEMS	TASK NO	6011
Performance Criteria	A person carrying out this task should be able to apply knowledge, skills and understanding to supervise preventive maintenance on electrical systems in factories and industries as per preventive maintenance schedule and in accordance with standard principles and current versions of regulations & standards governing the electrical field.		
Range Statements	The task will be performed in factories and industries. For successful performance of the task, the following will be required: Tools and Equipment: Personal Protective Equipment (PPE), Measuring equipment & instruments (Digital Multi-meter, Megger tester & Phase tester), Electrician’s toolkit, PLC Kit, Manufacture Instruction Manual, Repair Kit for Wire and Cable Insulation Sheaths, Relay Protection and Adjustment Kit, Infrared Temperature Detector, Computer and cable fault indicator. Materials: Mutton cloth.		
EVIDENCE REQUIREMENTS			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able do the following: 1. Analyse typical cause of major system failures; 2. Select the type of preventive action to take to prevent recurrence; 3. Follow the equipment operation procedures; 4. Confirm that all required resources: materials, The equipment and tools comply with the regulations, and the operator holds corresponding qualifications; develop maintenance plans for all kinds of electrical equipment and systems as required; 5. Utilize a computer		Detailed knowledge about: 1.0. Methods This person performing this task must be able to explain how to: 1.1. Test electrical systems; 1.2. Perform preventive maintenance on electrical systems. 2.0. Principles The person must be able to explain the principles of: 2.1. Implementing electrical system isolation measures to ensure the safety of personnel and equipment. 2.2. Safe operation of electrical systems. 3.0. Theories The person must be able to explain: 3.1. Electrical Engineering; 3.2. Network Analysis; 3.3. Ohms Law;	

maintenance management system; (CMMS) to schedule preventive maintenance tasks for various electrical systems; - Determine which activities should be given priority; - Provide instructions clearly to subordinates; - Liaise with user department for power cut; - Acquire the permit to commence the preventive maintenance tasks; - Carry out the preventive maintenance of electrical systems as appropriate; - Test of electrical systems in accordance with the drawings and manuals; - Connect the electrical systems to power supply; - Observe health and safety precautions when performing the task - Clean tools and working area; - Store tools and safety gears; and - Prepare a maintenance report.	- Watt's Law; - Kirchhoff's Current Law; - Kirchhoff's Voltage Law; - Mesh Current Analysis; - Nodal Voltage Analysis; - Simulation of electrical systems; - Mathematical modelling of electrical systems; - Electrical systems power layout interpretation and - Electronic circuit design; - Principles of commonly used sensors; - Types of commonly used sensors; - Installation and commissioning of commonly used sensors; - PLC hardware composition; - Programming software application; - Basic instructions application; - Electric machine structures and principles; - Commonly used low-voltage electrical components; and - General low-voltage electrical lines. 4.0. Essential skills - Numerical analysis skills; - Communication skills; - Problem solving skills; - Leadership skills; - Time management; - Punctuality; - Team Spirit; - Honesty and integrity - Trustworthy; - Dedication; - Materials science; - Computer skills; and - Report writing Skills. 5.0. Math Skills - Material & labour cost estimation
Description of the end Product or Service:	Preventive maintenance is performed as per technical requirement and in accordance with the current versions of regulations and standards governing the electrical field and the electrical systems are functioning properly with with the lowest failure rate.
Circumstantial knowledge:	Detailed knowledge about: - International colour code regulations; - Safe handling of tools and equipment; - Health, safety and environment; - Waste disposal methods; and

OCCUPATION	ELECTRICAL ENGINEER TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	SUPERVISE MAINTENANCE ON ELECTRICAL SYSTEMS	DUTY NO	601
TASK TITLE	SUPERVISE CORRECTIVE MAINTENANCE ON ELECTRICAL SYSTEMS	TASK NO	6012
Performance Criteria	A person carrying out this task must be able to apply knowledge, skills and understanding to supervise corrective maintenance on electrical systems in factories and industries as per technical requirement and in accordance with standard principles and the current versions of regulations and standards governing the electrical field.		
Range Statements	The task will be performed in factories and industries. For successful performance of the task, the following will be required: Tools and Equipment needed: Personal Protective Equipment (PPE), Computer, Measuring equipment & instruments (Digital Multi-meter, Megger tester & Phase tester), simulator, Electrician’s toolkit, PLC Kit, Vacuum cleaner and cable fault locator, spike, wire stringing machine, electroscope, withstanding voltage tester, Manufacture Instruction Manual, Repair Kit For Wire and Cable Insulation Sheaths, Relay Protection and Adjustment Kit, Infrared Temperature Detector, conduit bender, coil winding machine and infrared temperature sounder. Materials needed: Lubricants, clean cloth, oil, silica gel, wire, connectors, conduit, pipe bending machine, cable lugs and cable ties.		
EVIDENCE REQUIREMENTS			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able do the following: 1. Identify malfunction of electrical system; 2. Observe health and safety precautions when performing the task 3. Allocate tasks to subordinates with instructions; 4. Identify tools, equipment and measuring instruments to be used during corrective maintenance; 5. Isolate power supply to faulty electrical system; 6. Review layout drawings of electrical systems together with subordinates; 7. Investigate the cause of failure;		Detailed knowledge about: 1.0. Methods This person performing this task must be able to explain how to: 1.1. Perform corrective maintenance of electrical systems; 1.2. Test electrical systems testing. 2.0. Principles The person must be able to explain the principles of: 2.1. Troubleshooting and repair of electrical systems; and 2.2. Implementing electrical system isolation measures to ensure the safety of personnel and equipment. 3.0. Theories The person must be able to explain: 3.1. Preventive and corrective maintenance concepts 3.2. Electrical Engineering;	

8. Estimated cost for maintenance and repair; 9. Make request for resources: material, labour, equipment and tools; 10. Plan the work schedule; 11. Communicate with sections that will be affected with shutdown during corrective maintenance; 12. Acquire the permit to commence the preventive maintenance tasks; 13. Repair the electrical system while adhering to safety rules; 14. Adhere to safety rules and regulations; 15. Test the electrical systems as appropriate and in accordance with drawings and maintenance manuals; 16. Restore power supply to the electrical systems; 17. Clean tools and working area; 18. Store tools and safety gears; and 19. Prepare work report.	3.3. Network Analysis; 3.4. Ohms Law; 3.5. Watt's Law; 3.6. Kirchhoff's Current Law; 3.7. Kirchhoff's Voltage Law; 3.8. Electrical systems power layout interpretation; 3.9. Simulation of electrical systems; 3.10. Mathematical models of electrical systems; and 3.11. Electronic circuit design. 3.12 Principles of commonly used sensors; 3.13 Types of commonly used sensors; 3.14 Installation and Commission of commonly used sensors; 3.15 PLC hardware composition; 3.16 Programming software application; 3.17 Basic instructions application; 3.18 Electric machine structures and principles; 3.19 Commonly used low-voltage electrical components; and 3.20 General low-voltage electrical lines. 4.0. Essential skills 4.1. Measurements & instrumentation; 4.2. Communication skills; 4.3. Problem solving skills; 4.4. Leadership skills; 4.5. Punctuality; 4.6. Team spirit; 4.7. Trustworthy; 4.8. Dedication; 4.9. Time management; 4.10. Materials science; 4.11. Computer skills; 4.12. Report writing skills; and Math Skills Material Costs Estimation
Description of the end Product or Service:	Corrective maintenance is performed in accordance with the current versions of regulations and standards governing the electrical field and the electrical systems are functioning properly.
Circumstantial knowledge:	Detailed knowledge about: 1. International Colour code regulation; 2. Safe handling of tools and equipment; 3. Health, safety and environment; and 4. Waste disposal Methods; and

OCCUPATION	ELECTRICAL ENGINEER TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	MAINTENANCE ON ELECTRICAL MACHINES	DUTY NO	602
TASK TITLE	PREVENTIVE MAINTENANCE ON ELECTRICAL MACHINES	TASK NO	6021
Performance Criteria	A person carrying out this task should be able to apply knowledge, skills and understanding to monitor preventive maintenance on electrical machines in factories and industries as per preventive maintenance schedule and in accordance with standard principles and current versions of regulations & standards governing the electrical field.		
Range Statements	The task will be performed in factories and industries. For successful performance of the task, the following will be required: Tools and Equipment: Personal Protective Equipment (PPE), Computer, Measuring equipment & instruments (Digital Multi-meter, Megger tester & Phase tester), Electrician’s toolkit, PLC Kit , Manufacturer Instruction Manual, Repair Kit For Wire and Cable Insulation Sheaths, Relay Protection and Adjustment Kit, Infrared Temperature Detector and cable fault indicator. Materials: clean cloth, lubricants, grease, oil, silica gel and diesel.		
EVIDENCE REQUIREMENTS			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able do the following: 1. Analyse typical cause of major machine failures; 2. Observe health and safety precautions when performing the task 3. Select right tools, equipment and safety gear for the task 4. Select the type of preventive action to take to prevent recurrence; 5. Follow manufacturers’ guidelines on maintenance schedules for specific electrical machines; 6. Utilize a computer maintenance management system; (CMMS) to schedule preventive maintenance tasks for various electrical machines; 7. Describe the sequence of activities; 8. Confirm that all required resources; material, labour,		Detailed knowledge about: 1.0. Methods This person performing this task must be able to explain how to: 1.1. Test electrical systems; 1.2. Perform preventive maintenance on electrical systems. 2.0. Principles The person must be able to explain the principles of: 2.1. Implementing electrical system isolation measures to ensure the safety of personnel and equipment. 2.2. Operation of electrical machines. 3.0. Theories The person must be able to explain: 3.1. Electrical Engineering; 3.2. Network Analysis; 3.3. Ohms Law; 3.4. Watt’s Law; 3.5. Kirchhoff’s Current Law; 3.6. Kirchhoff’s Voltage Law; 3.7. Simulation of electrical machines; 3.8. Mathematical Modelling of electrical machines; 3.9. Electronic circuit design; and	

equipment and tools are available; 9. Provide instructions clearly to subordinates; 10. Liaise with user department for machine outage; 11. Acquire the permit to commence the preventive maintenance tasks; 12. Carry out preventive maintenance of electrical machines as appropriate; 13. Monitor the test of electrical machines in accordance with the drawings and manuals; 14. Connect the electrical machine to power supply; 15. Clean tools and working area; 16. Store tools and safety gears; and 17. Prepared the report on the work done.	3.10. Electrical machines power layout interpretation 3.11 Principles of commonly used sensors; 3.12 Types of commonly used sensors; 3.13 Installation and commissioning of commonly used sensors; 3.14 PLC hardware composition; 3.15 Programming software application; 3.16 Basic instructions application; 3.17 Electric machine structures and principles; 3.18 Commonly used low-voltage electrical components; and 3.19 General low-voltage electrical lines. 4.0. Essential skills 4.1. Numerical analysis skills; 4.2. Communication skills; 4.3. Problem solving skills; 4.4. Leadership skills; 4.5. Time management; 4.6. Punctuality; 4.7. Team Spirit; 4.8. Trustworthy; 4.8 Honesty and integrity; 4.9. Dedication; 4.10. Materials science; 4.11. Computer skills; 4.12. Report writing Skills. 5.0. Math Skills 5.1. Material & labour cost estimation
Description of the end Product or Service:	Preventive maintenance is done in accordance with the current versions of regulations and standards governing the electrical field., the electrical machines are functioning properly with the lowest failure rate.
Circumstantial knowledge:	Detailed knowledge about: 1. International colour code regulations; 2. Safe handling of tools and equipment; 3. Health, safety and environment; and 4. Waste disposal methods.

OCCUPATION	ELECTRICAL ENGINEERING TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	MAINTENANCE ON ELECTRICAL MACHINES	DUTY NO	602
TASK TITLE	PERFORM CORRECTIVE MAINTENANCE ON ELECTRICAL MACHINES	TASK NO	6022
Performance Criteria	A person carrying out this task must be able to apply knowledge, skills and understanding to perform corrective maintenance on electrical machines in factories and industries as per technical requirement and in accordance with standard principles and the current versions of regulations and standards governing the electrical field.		
Range Statements	The task will be performed in factories and industries under supervision of an Electrical Engineer. For successful performance of the task, the following will be required: Tools and Equipment needed: Personal Protective Equipment (PPE), Computer, Measuring equipment & instruments (Digital Multi-meter, Megger tester & Phase tester), simulator, Electrician’s toolkit, ladder, Vacuum cleaner, withstanding voltage tester, Manufacture Instruction Manual, Repair Kit For Wire and Cable Insulation Sheaths, Relay Protection and Adjustment Kit, conduit bender and coil winding machine. Materials needed: Lubricants, clean cloth, oil, silica gel, insulation material, varnish, paint, wire, connectors, cable lugs and cable ties.		
EVIDENCE REQUIREMENTS			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able do the following: 1. Identify malfunction of electrical machines; 2. Allocate tasks to subordinates with instructions; 3. Identify tools, equipment and measuring instruments to be used during corrective maintenance; 4. Observe health and safety precautions when performing the task 5. Isolate part of the electrical machines with fault; 6. Review layout drawing of electrical machines together with subordinates; 7. Investigate the cause of failure; 8. Estimate cost of maintenance and repair; 9. Prepare work plan; 10. Make requisition of resources: material, labour, equipment and		Detailed knowledge about: 1.0. Methods This person performing this task must be able to explain how to: 1.1. troubleshooting of electrical machines; 1.2. Test electrical machines. 2.0. Principles The person must be able to explain the principles of: 2.1. Troubleshooting and repair of electrical machines 2.2. Implementing electrical system isolation measures to ensure the safety of personnel and equipment. 3.0. Theories The person must be able to explain: 3.1. Electrical Engineering; 3.2. Mechanical technology; 3.3. Ohms Law; 3.4. Watt’s Law; 3.5. Kirchhoff’s Current Law; 3.6. Kirchhoff’s Voltage Law;	

tools; 11. Plan the work schedule; 12. Communicate with sections that will be affected with shutdown during corrective maintenance; 13. Acquire the permit to commence the preventive maintenance tasks; 14. Repair the electrical machines; 15. Adherence to safety rules and regulations; 16. Test electrical machines as appropriate and in accordance with drawings and maintenance manuals; 17. Restore power for the affected areas; 18. Clean tools and working area; 19. Store tools and safety gears; and 20. Prepare work report.	3.7. Electronic circuit design; 3.8. Electrical systems power layout interpretation; 3.9. Simulation of electrical systems; and 3.10. Mathematical modelling of electrical systems. 3.12 Principles of commonly used sensors; 3.13 Types of commonly used sensors; 3.14 PLC hardware composition; 3.15 Programming software application; 3.16 Basic instructions application; 3.17 Electric machine structures and principles; 3.18 Commonly used low-voltage electrical components; and 3.19 General low-voltage electrical lines. 4.0. Essential skills 4.1. Measurements & instrumentation; 4.2. Communication skills; 4.3. Problem solving skills; 4.4. Leadership skills; 4.5. Punctuality; 4.6. Team spirit; 4.7. Honesty and integrity; 4.8. Dedication; 4.9. Time management; 4.10. Materials science; 4.11. Computer skills; 4.12. Report writing skills; and 5.0. Math Skills 5.1. Material Costs Estimation
Description of the end Product or Service:	Corrective maintenance is performed in accordance with the current versions of regulations and standards governing the electrical field to ensure the electrical machines are functioning properly.
Circumstantial knowledge:	Detailed knowledge about: 1. International colour code regulation; 2. Safe handling of tools and equipment; 3. Health, safety and environment; and 4. Waste disposal methods.

OCCUPATION	ELECTRICAL ENGINEER TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	INSTALL ELECTRICAL MACHINES AND SYSTEMS	DUTY NO	603
TASK TITLE	INSTALL ELECTRICAL MACHINES	TASK NO	6031
Performance Criteria	The person carrying out this task should be able to apply knowledge, skills and understanding to install electrical machines in factories and industries as per client/contract specifications and in accordance with standard principles and current versions of regulations & standards governing the electrical field.		
Range Statements	The task will be performed in factories and industries under supervision of an Electrical Engineer. For successful performance of the task, the following will be required: Tools and Equipment: P.P.E, Multi-meter, Computer, Combination Pliers, electroscope, Hammer, Wire stripper, Electrician’s Toolkit, Insulation resistance tester, Ladder and Distribution boards. Materials: Insulation Material, Wires, Connectors, Conduits, Conduit Bender, Cable Lugs, Cable Ties, Other Electrical Accessories Notebook and pen.		
EVIDENCE REQUIREMENTS			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able do the following: 1. Prepare work plan for installation of electrical machines; 2. Provide work plan to subordinates; 3. Inspect tools and measuring instruments to be used during installation; 4. Observe health and safety precautions when performing the task 5. Prepare costs estimates for the required materials for installation; 6. Identify manpower to be engaged in the installation task; 7. Adhere to safety standards during work; 8. Acquire work permit to commence the installation; 9. Isolate electrical power prior to commencing the installation process;		Detailed knowledge about: 1.0. Methods This person performing this task must be able to explain how to: 1.1. Effectively supervise installation of electrical machines. 2.0. Principles The person must be able to explain the principles of: 2.1. Installing electrical machines; 2.2. Earthing of electrical machines; and 2.3. Starting of electrical machines 3.0. Theories The person must be able to explain: 3.1. Electrical Engineering; 3.2. Switching and Controlling of electrical machines 3.3. Machines installation procedures; 3.4. Electrical installation/power layout interpretation; 3.5. Network analysis; 3.6. Ohms law; 3.7. Kirchhoff’s current law; 3.8. Kirchhoff’s voltage law; 3.9. Mesh current analysis; 3.10. Nodal voltage analysis; and	

10. Install electrical machines in accordance with technical requirements; 11. Install cables and required accessories; 12. Test Installed electrical machines 13. Clean equipment, tools and working area; 14. Dispose wastes; 15. Store equipment, tools and safety gears; 16. Commission the installed machines to the client/end user department; and 17. Provide relevant documentation (installation drawings, instruction manuals & commissioning report) to the client/ end user department.	3.11. Switching and control of machines. 3.12 Principles of commonly used sensors; 3.13 Types of commonly used sensors; 3.14 Installation and commissioning of commonly used sensors; 3.15 PLC hardware composition; 3.16 Programming software application; 3.17 Basic instructions application; 3.18 Electric machine structures and principles; 3.19 Commonly used low-voltage electrical components; and 3.20 General low-voltage electrical lines. 4.0. Essential skills 4.1. Measuring skills and skills to use the instruments; 4.2. Leadership skills; 4.3. Interpersonal skills; 4.4. Communication skills; 4.5. Judgmental skills; 4.6. Punctuality; 4.7. Team Spirit; 4.8. Honesty and integrity; 4.9. Dedication; 4.10. Time Management; 4.11. Computer skills; and 4.12. Report writing skills. 5.0. Math Skills 5.1. Material Costs Estimation
Description of the end Product or Service:	Supervision of installation of electrical machines is performed as per standard principles and approved rules & regulations.
Circumstantial knowledge:	Detailed knowledge about: 1. International colour code regulation; 2. Safe handling of tools and equipment; 3. Health, safety and environment; and 4. Waste disposal methods.

OCCUPATION	ELECTRICAL ENGINEER TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	INSTALL ELECTRICAL MACHINES & SYSTEMS	DUTY NO	603
TASK TITLE	INSTALL ELECTRICAL SYSTEMS	TASK NO	6032
Performance Criteria	The person carrying out this task should be able to apply knowledge, skills and understanding to supervise installation of electrical systems in factories and industries as per client/contract specifications and in accordance with standard principles and current versions of regulations & standards governing the electrical field.		
Range Statements	The task will be performed in factories and industries under supervision of an Electrical Engineer. For successful performance of the task, the following will be required: Tools and Equipment: Personal Protective Equipment (PPE), Measuring instruments, Toolbox and Instruction’s Manual. Materials: Insulation tape, Wires, Connectors, Conduits, Conduit bender, Cable lugs, Cable ties, Other electrical & electronics accessories, clean cloth, Notebook and Pen.		
EVIDENCE REQUIREMENTS			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able do the following: 1. Prepare work plan for installation of electrical systems; 2. Provide work plan to subordinates; 3. Inspect tools and measuring instruments to be used during installation; 4. Observe health and safety precautions when performing the task 5. Estimate costs of materials required for installation; 6. Identify manpower to be engaged in the installation task; 7. Adhere to safety standards during work; 8. Acquire work permit to commence the installation; 9. Isolate electrical power prior to commencing the installation process, where necessary; 10. Install the electrical systems in accordance with technical requirements;		Detailed knowledge about: 1.0. Methods This person performing this task must be able to explain how to: 1.1. Effectively supervise installation of electrical systems. 2.0. Principles The person must be able to explain the principles of: 2.1. Installing electrical systems; and 2.2. Earthing of electrical systems. 3.0. Theories The person must be able to explain: 3.1. Electrical Engineering; 3.2. Switching and controlling of electric systems; 3.3. Systems installation procedures; 3.4. Electrical installation/power layout interpretation; 3.5. Network analysis; 3.6. Ohms law; 3.7. Kirchhoff’s current law; 3.8. Kirchhoff’s voltage law; 3.9. Mesh current analysis; and 3.10. Nodal voltage analysis. 3.11 Principles of commonly used sensors; 3.12 Types of commonly used sensors;	

11. Install the cables and required accessories; 12. Test the installed electrical machines; 13. Clean equipment, tools and working area; 14. Dispose wastes; 15. Store equipment, tools and safety gears; 16. Commission the installed machines to the client/end user department; and 17. Provide relevant documentation (installation drawings, instruction manuals & commissioning report) to the client/end user department	3.13 Installation and commissioning of commonly used sensors; 3.14 PLC hardware composition; 3.15 Programming software application; 3.16 Basic instructions application; 3.17 Electric machine structures and principles; 3.18 Commonly used low-voltage electrical components; and 3.19 General low-voltage electrical lines. 4.0. Essential skills 4.1. Measurements & instrumentation skills; 4.2. Leadership skills; 4.3. Interpersonal skills; 4.4. Communication skills; 4.5. Judgmental skills; 4.6. Punctuality; 4.7. Team spirit; 4.8. Honesty and integrity; 4.9. Dedication; 4.10. Time management; 4.11. Computer skills; and 4.12. Report writing skills. 5.0. Math Skills 5.1. Material Costs Estimation
Description of the end Product or Service	Supervision of installation of electrical systems is performed as per standard principles and approved rules & regulations.
Circumstantial knowledge:	Detailed knowledge about: 1. International colour code regulation; 2. Health, safety & environment; 3. Safe handling of equipment and tools; and 4. Waste disposal.

OCCUPATION	ELECTRICAL ENGINEER TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	INSTALL ELECTRICAL MACHINES & SYSTEMS	DUTY NO	603
TASK TITLE	CONSTURCT ELECTRICAL POWER LINES	TASK NO	6033
Performance Criteria	The person carrying out this task should be able to apply knowledge, skills and understanding to construct Electrical Power Lines in accordance with standard principles and current versions of regulations and standards governing the electrical field.		
Range Statements	The task will be performed in various outdoor areas where electrical power lines need to be constructed under supervision of an Electrical engineer. For successful performance of the task, the following will be required: Tools and Equipment: Personal Protective Equipment (PPE), Multi-meter, Computer, Ladder, Insulating clips, Lineman’s kit, Measuring equipment & instruments, Global Positioning System (GPS), Pulleys, Ropes, Wire stringing machine, phase tester, electroscope and withstanding voltage tester. Materials: Notebook, pen, clean cloth, Conductor, Connectors , Insulators, Stay wire, Earth Wire, Earth Mast, Poles, Base, Drum Jack, Tension Clamps, Aerial Bundle Conductor (ABC), Clamps and Other Accessories.		
EVIDENCE REQUIREMENTS			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	

The person performing this task must be able do the following: 1. Prepare drawing for the line route for LV & MV power lines; 2. Prepare Bill of Quantities (BOQ); 3. Obtain materials required from store; 4. Determine tools and equipment to be used during construction; 5. Determine list of manpower to be engaged in construction task; 6. Adhere health and safety regulations; 7. Carry out clearance of line route from any vegetation; 8. Observe health and safety precautions when performing the task 9. Countercheck excavated pole and stay holes dimensions; 10. Dress poles with fittings; 11. Dress poles with fittings; 12. Perform erection and assembling of stays; 13. Administer backfilling and compaction holes; 14. Erect cables; 15. Fix cables on insulator or clamps; 16. Carry out termination of conductor; 17. Carry out site cleaning; 18. Store equipment, tools, safety gears and remaining materials; 19. Approve "As-Built Drawings"; 20. Inspect the constructed power line; 21. List spotted defects if any; 22. Connect power to the new line; and 23. Prepare work report.	Detailed knowledge about: 1.0. Methods This person performing this task must be able to explain how to: 1.1. Countercheck dimensions of excavated holes for poles & stays; 1.2. Safely erect poles; 1.3. Safely connect cables in series, without damage; 1.4. Fix cables on insulators or clamps; and 1.5. Terminate cable terminal production. 2.0. Principles: The person must be able to explain the principles of: 2.1. Constructing overhead electrical power lines safely. 3.0. Theories The person must be able to explain: 3.1. Electrical Engineering; 3.2. Network analysis; 3.3. Ohms law; 3.4. Kirchhoff's current law; 3.5. Kirchhoff's voltage law; 3.6. Mesh current analysis; 3.7. Nodal voltage analysis 3.8. Construction of power lines; 3.9. Pole climbing; and Faraday's law; 3.10. Interpretation of technical drawing. 3.11 Electrical system composition; 3.12 Load and current calculation; 3.13 Electrical lines. 4.0. Essential skills 4.1. Measurements & Instrumentation skills; 4.2. Communication skills; 4.3. Punctuality; 4.4. Team Spirit; 4.5. Honesty and integrity; 4.6. Dedication; 4.7. Time management skills; 4.8. Materials science; 4.9. Computer skills; 4.10. Report writing skills; and 4.11 Pole climbing skills. 5.0. Math Skills 5.1. Material Costs Estimation
Description of the end Product or	Construction of electrical power line is performed as

Service:	per technical requirement and in accordance with the current versions of regulations and standards governing the electrical distribution field.
Circumstantial knowledge:	Detailed knowledge about: 1. International colour code regulation; 2. Safe handling of construction tools & equipment; 3. Health safety and environment; and 4. Waste disposal Methods.

OCCUPATION	ELECTRICAL ENGINEER TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	INSTALL ELECTRICAL MACHIENS & SYSTEMS	DUTY NO	603
TASK TITLE	LAY ELECTRICAL POWER CABLES	TASK NO	6034
Performance Criteria	The person carrying out this task should be able to apply knowledge, skills and understanding to lay down electrical power cables in accordance with standard principles and current versions of regulations and standards governing the electrical field.		
Range Statements	The task will be performed in outdoor areas where electrical power cables need to be installed to connect new loads. For successful performance of the task, the following will be required: Tools and Equipment: Personal Protective Equipment (PPE), Multi-meter, Computer, Ladder, Lineman Toolkit, Measuring equipment & instruments, Global Positioning System (GPS), Ropes, Phase tester, Electroscope and Withstanding voltage tester. Materials: Power Cable, Connectors, Cable Lugs, Termination Kits, Cable Joint Connectors, Sand, Tape, Clamps and Other Accessories. The task will be performed under the supervision of an Electrical Engineer.		
EVIDENCE REQUIREMENTS			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	

The person performing this task must be able do the following: 1. Obtain drawing for the power cable route; 2. Prepare Bill of Quantities (BOQ); 3. Obtain materials required from store; 4. Determine required tools and equipment to be used during installation of the power cable; 5. Identify manpower to be engaged in the installation task; 6. Observe health and safety precautions when performing the task; 7. Carry out clearance of cable route from any vegetation; 8. Countercheck dimensions of excavated trench for the power cable; 9. Spread of sand on the trench; 10. Lay underground cable on the trench (confirm that slack is also included on the length of the cable); 11. Perform cable jointing where necessary; 12. Perform backfilling & compaction of the trench; 13. Perform termination of the cable; 14. Test tensile strength of cables; 15. Test power cable insulation and resistance; 16. Clean site; 17. Oversee return of tools and equipment to store; 18. Monitor storage of equipment, tools, safety gears and all remaining materials; 19. Review "As-Built Drawings"; 20. Inspect the power cable terminal wiring; 21. Connect power to the cable; 22. List spotted defects if any; 23. Prepare work report.	Detailed knowledge about: 1.0. Methods This person performing this task must be able to explain how to: 1.1. Countercheck dimensions of the excavated cable trench; 1.2. Install cables correctly and safely without damage; 1.3. Select and use correct cable accessories according to the type and size of the cable; 1.4. Make cable joints and terminations correctly according to drawing; 1.5. Correctly use tools for each joint or termination; 1.6. Test cable. 2.0. Principles The person must be able to explain the principles of: 2.1. Installing underground electrical power cables safely; 2.2. Termination of power cables; and 2.3. Jointing of power cables. 3.0. Theories The person must be able to explain: 3.1. Electrical Engineering; 3.2. Network analysis; 3.3. Ohms law; 3.4. Kirchhoff's current law; 3.5. Kirchhoff's voltage law; 3.6. Mesh current analysis; 3.7. Nodal voltage analysis; 3.8. Faraday's law 3.9. Installation of power cables; and 3.10. Cable termination and joints. 3.11 Electrical system composition; 3.12 Load and current calculation; 3.13 Electrical lines. 4.0. Essential skills 4.1. Measuring skills and skills to use instruments;; 4.2. Communication skills; 4.3. Punctuality; 4.4. Team Spirit; 4.5. Honesty and integrity; 4.6. Dedication; 4.7. Time management skills; 4.8. Materials science;
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	4.9. Computer skills; 4.10. Report writing skills; and 4.11. Interpretation of technical drawing. 5.0. Math Skills 5.1. Material Costs Estimation
Description of the end Product or Service:	Installation of electrical power cable is performed as per technical requirement and in accordance with the current versions of regulations and standards governing the electrical field.
Circumstantial knowledge:	Detailed knowledge about: 1. International Colour code regulation for various types of cables; 2. Safe handling of installation tools & equipment; 3. Health, safety and environment; and 4. Waste disposal.

OCCUPATION	ELECTRICAL ENGINEER TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	MANAGE RESOURCES	DUTY NO	604
TASK TITLE	SUPERVISE SUBORDINATES	TASK NO	6041
Performance Criteria	The person carrying out this task should be able to use their knowledge and skills to supervise and manage subordinates in the workplace of the factory and industry according to the optimization of supervision management and ensure the safe and efficient operation of electrical equipment in the factory and industry as planned.		
Range Statements	The task of supervising subordinates will be performed when staff working is in factories, industries and construction site. For successful performance of the task, the following will be required: Tools and Equipment needed: Personal Protective Equipment (PPE). Materials needed: Notebook The task will be performed under minimal supervision of an electrical engineer.		
EVIDENCE REQUIREMENTS			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able do the following: 1. Prepare work plan; 2. Deliver the work plan to subordinates 3. Clarify the purpose and meaning of work tasks; 4. Provide detailed directions and instructions of the work plan; 5. Be a good example to lead subordinates to complete tasks; 6. Review and guide the subordinates' work regularly; 7. Conduct regular safety education 8. Conduct regular safety education and inspect the equipment in the area under charge regularly 9. Monitor adherence to safety standards during work; 10. Provide targeted technical guidance and training to subordinates 11. Put forward appropriate solution for sudden equipment failure, and offer guidance;		Detailed knowledge about: 1.0. Methods This person performing this task must be able to explain how to: 1.1. Effectively supervise and manage subordinates to achieve optimum performance. 1.2. Prepare work plan and assign work tasks; 1.3. Provide technical skills training and guidance for work tasks; 1.4. Organize regular study of relevant standards and regulations; 1.5. Carry out team building; 2.0. Principles The person must be able to explain the principles of: 2.1. Leadership and organizational coordination skills 2.2. Ability to mobilize team work enthusiasm 2.3.Capacity of team building and teamwork skills; 2.4. Technical skills guidance ability. 3.0. Theories The person must be able to explain: 3.1. Management model; 3.2. Leadership Theory; 3.3. Motivation Theory	

12. Hold regularly scheduled work meetings; 13. Build Teamwork at work place; 14. Motivate subordinates.	3.4. Mentoring Theory; and 3.5. Hierarchy of Needs Theory 4.0. Essential skills 4.1. Leadership Skills; 4.2. People Skills; 4.3. Communication Skills; 4.4. Mentoring Skills; 4.5. Judgmental Skills; 4.6. Professional Technical Skills; 4.7. Good punctuality; 4.8. Team Spirit; 4.9. Honesty and trustworthiness; 4.10. Dedication; 4.11. Time Management; 4.12. Computer skills; and 4.13. Report writing Skills. 4.13. Report writing skills. 5.0. Math Skills 5.1. Material Costs Estimation
Description of the end Product or Service	Supervision of subordinates is performed as per performance and implemented rule and regulations.
Circumstantial knowledge:	Detailed knowledge about: 1. Safe handling of tools used for working and equipment; 2. Safe handling of measuring tools; 3. Health, safety and environment; and 4. Waste disposal methods.

OCCUPATION	ELECTRICAL ENGINEERING TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	MANAGE RESOURCES	DUTY NO	604
TASK TITLE	PARTICIPATE IN PROCUREMENT	TASK NO	6042
Performance Criteria	A person carrying out this task must be able to apply knowledge and skills to participate in procurement activities in factories and industries as per best practices in procurement and in line with the current procurement laws and regulations.		
Range Statements	The task of participating in procurement will be performed for acquisition of goods, works and consultancy services in factories and industries. For guaranteeing successful performance of the task, the following will be required: Tools and Equipment needed: Computer. Materials needed: Notepad The task will be performed under necessary supervision of an electrical engineer.		
EVIDENCE REQUIREMENTS			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able do the following: 1. Collect information on procurement needs; 2. Prepare Bill of Quantity (BOQ); 3. Prepare cost estimates of the procurement project; 4. Prepare technical specifications; 5. Make market research and supplier inquiry 6. Prepare the procurement requirements 7. Conduct technical verification of procurement project 8. Assist the procurement department in formulating bidding documents 9. Assist in tendering and bid evaluation 10. Participate in contract negotiations 11. Connect with suppliers		Detailed knowledge about: 1.0. Methods This person performing this task must be able to explain how to: 1.1. Confirm the procurement requirements; 1.2. Prepare the technical specifications and procurement budget; 1.3. Analyse bills of material and drawings to understand key requirement; and 1.4. Prepare the procurement requirements 2.0. Principles The person must be able to explain the principles of: 2.1.Selecting the best qualified; 2.2.Batches; 2.3. Competition; 2.4. Time management; 2.5. Range; 2.6.Profession; 2.7. Modes. 3.0. Theories The person must be able to explain: 3.1. Supply Chain Management Theory 3.2. Procurement Management Theory 3.3. Current Public Procurement Act and its Regulations. 4.0. Essential skills 4.1. Verbal & Written Communication Skills;	

	4.2. Punctuality; 4.3. Honesty and trustworthiness; 4.4. Dedication; 4.5. Compliance with laws and rules; 4.6. Time Management; 4.7. Proficiency with personal computers and networking, specifically Microsoft Excel; 4.8. Report writing Skills; and 5.0. Math Skills 5.1. Material Costs Estimation
Description of the end Product or Service:	Appropriate goods, works and services are acquired as per technical standards.
Circumstantial knowledge:	Detailed knowledge about: 1. Health, safety and environment; 2. Procurement procedures; and 3. Institutional Operations.

OCCUPATION	ELECTRICAL ENGINEERING TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	MANAGE RESOURCES	DUTY NO	604
TASK TITLE	MANAGE MATERIALS	TASK NO	6043
Performance Criteria	The person carrying out this task must be able to manage acquisition, storage and use of materials in accordance with standard principles and latest version of the regulatory standards in the field of material management & standards governing the material management field.		
Range Statements	The task will be performed in factories and industries. For successful performance of the task, the following will be required: Tools and Equipment: Measuring instruments. Materials: Notebooks. The task will be performed under minimal supervision of an Electrical Engineer.		
EVIDENCE REQUIREMENTS			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able do the following: 1. Organize the preparation of electrical material plan and spare parts plan;; 2. Sep up a material ledger; 3. Inspect materials for quality control 4. Supervise and ensure good storage of materials; 5. Interpret bill of materials & determine material quantities and specifications that must be requisitioned from store; 6. Process documentation for requisition of materials from store; 7. Collect materials from the warehouse according to the materials list. 8. Manage use of materials; 9. Process documentation for return of unused materials to store; 10. Return all unused materials to store; and 11. Write a report.		Detailed knowledge about: 1.0. Methods This person performing this task must be able to explain how to: 1.1. Interpret bill of materials; 1.2. Control quality of materials; 1.3. Correctly list the materials to be applied for use from the warehouse item by item 1.4. Correctly calculate quantities of materials required; and 1.5. Correctly complete all documentation required for return of materials to store. 2.0. Principles The person must be able to explain the principles of: 2.1. Materials Management 3.0. Theories The person must be able to explain: 3.1. Supply Chain Management Theory 3.2. Reasons for and purpose and methods of materials management process 3.3. Interpretation of bill of quantity; 4.0. Essential skills 4.1. Communication skills; 4.2. Punctuality; 4.3. Team Spirit; 4.4. Trustworthy; 4.5. Dedication;	

	4.6. Time Management Skills; 4.7. Computer Skills; and 4.8. Report writing Skills. 5.0. Math Skills 5.1. Material Costs Estimation
Description of the end Product or Service:	Management of materials is performed in accordance with basic principles and processes of materials management.
Circumstantial knowledge:	Detailed knowledge about: 1. Basic Material Science; 2. Safe handling of different materials; 3. Safety and health legislations and regulations (OSHA); and 4. Waste disposal methods

OCCUPATION	ELECTRICAL ENGINEERING TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	MANAGE RESOURCES	DUTY NO	604
TASK TITLE	MANAGE TOOLS & EQUIPMENT	TASK NO	6044
Performance Criteria	The person carrying out this task must be able to manage tools & equipment at work place as per best practices and manufacturer’s recommendations.		
Range Statements	The task will be performed in factories, industries and or at work place/construction site. For successful performance of the task, the following will be required: Tools and Equipment: Personal Protective Equipment (P.P.E.), measuring instruments and computer Materials: Shelves, bins, racks and drawers. The task will be performed with minimal supervision of an engineer.		
EVIDENCE REQUIREMENTS			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able do the following: 1. Prepare and manage electrical equipment records; 2. Maintain the neatness and proper organization of the storage room 3. Select correct tools and equipment for the tasks; 4. Observe health and safety precautions when performing the task 5. Organize equipment records, record the important maintenance, parts replacement and technical transformation of the equipment into the equipment records, and inquire the information of tools, equipment and spare parts according to the coding principle; 6. Input basic information and technical standards of equipment; 7. Periodically check and test the safety of tools and equipment, and establish test files 8. Monitor safe use of tools and equipment;		Detailed knowledge about: 1.0. Methods This person performing this task must be able to explain how to: 1.1. Manage tools and equipment; 1.2. Properly store tools and equipment; and 1.3. Monitor usage of tools and equipment; 1.4. Input basic information and technical standards of tools, equipment; 1.5. Test the status of tools and equipment; 1.6. Maintain the status of tools and equipment. 2.0. Principles The person must be able to explain the principles of: 2.1. Management of tools and equipment. 2.2. Operating procedures for tool and equipment information management systems; 2.3. Tools and equipment status testing procedures; 2.4. Tools and equipment status maintenance procedures. 3.0. Theories The person must be able to explain: 3.1. Inventory management theories. 3.2. Equipment management system and process; 3.3. Basic knowledge of equipment management information system; 3.4. Theories of tools and equipment quality management;	

9. Inspect tools and equipment after use to ensure they are properly cleaned and in good order; 10. Return tools & equipment to storage; 11. Maintain adequate stock level of electrical tools and equipment in; 12. Maintain list and quantity of electrical tools and equipment available in storage. 13. Organize and file drawings and documents of tools and equipment; 14. Write feasibility reports for new tools and equipment.	4.0. Essential skills 4.1. Communication skills; 4.2. Punctuality; 4.3. Team Spirit; 4.4. Trustworthy; 4.5. Dedication; 4.6. Time Management Skills; 4.7. Computer skills; 4.8. Report writing skills; and 4.9. Concluding and organizing skills.
Description of the end Product or Service:	Tools & Equipment are properly used and stored in line with manufacturers' instructions. Proper documentation of available resources is available.
Circumstantial knowledge:	Detailed knowledge about: 1. Safe handling of measuring equipment; 2. Safe handling of tools; 3. Safety, health and environment; and 4. Waste disposal methods.

TABLE NO. 1: DACUM CHART FOR ELECTRICAL ENGINEERING LEVEL 6

DUTIES	TASKS	EMABLERS
1.0. Perform Maintenance on Electrical Systems	1.1. Perform Preventive Maintenance on Electrical Systems 1.2. Supervise Corrective Maintenance on Electrical Systems	Generic Skills and Knowledge • Using communication skills to work with others, reporting to superiors • Knowledge on safety, health & environment • Use of Manufacturer's Manual • Use of manufacturer's manual • Skills and knowledge on: ✓ Conduct unit measurement with measuring tools ✓ instrumentation ✓ Computer programming languages • Machine elements • Interpretation of technical drawings • Basic Material science Tools and Equipment • Personal Protective Equipment (PPE) such as Safety boots, safety goggle, gloves, hearing protection, helmets. • Measuring equipment & instruments • Toolbox • PLC Kit • Vacuum cleaner • Repair kit for wires/cables insulation sheath • Injection kit • Cable fault locator • Computer Materials • Lubricants, grease, clean cloth, oil, silica gel, diesel • Code for Operators • Team spirit, honesty and trustworthiness, time management and dedication
2.0. Maintenance on Electrical Machines	2.1. Preventive Maintenance on Electrical Machines 2.2. Perform Corrective Maintenance on Electrical Machines	Generic Skills and Knowledge • Using communication skills to work with others, reporting to superiors • Knowledge on safety, health & environment • Use of manufacturer's manual

DUTIES	TASKS	EMABLERS
		• Use of manufacturer's manual • Skills and knowledge on: ✓ Conduct unit measurement with measuring tools ✓ instrumentation ✓ Computer programming languages • Machine elements • Interpretation of on of technical drawing • Basic Material science Tools and Equipment • Personal Protective Equipment (PPE) such as Safety boots, safety goggle, gloves, hearing protection, helmets. • Measuring equipment & instruments • Toolbox • PLC Kit • Vacuum cleaner • Repair kit for wires/cables insulation sheath • Injection kit • Cable fault locator • Computer Materials • Lubricants, grease, clean cloth,, oil, silica gel, diesel • Code for Operators • Team spirit, honesty and trustworthiness, time management and dedication
3.0. Install Electrical Machines & Systems	3.1. Install Electrical Machines 3.2. Install Electrical Systems 3.3. Construct of Electrical Power Lines 3.4. Lay Electrical Power Cables	Generic Skills and Knowledge • Using communication skills to work with others, reporting to superiors • Knowledge on safety, health & environment • Use of manufacturer's manual • Skills and knowledge on: ✓ Conduct unit measurement with measuring tools ✓ instrumentation ✓ Computer programming languages • Machine elements • Interpretation of technical

DUTIES	TASKS	EMABLERS
		drawing • Basic Material science Tools and Equipment • Personal Protective Equipment (PPE) such as Safety boots, safety goggle, gloves, hearing protection, helmets. • Measuring equipment & instruments • Toolbox • PLC Kit • Vacuum cleaner • Computer Materials • Lubricants, grease, clean cloth, oil, silica gel, diesel • Code for Operators • Team spirit, honesty and trustworthiness, time management and dedication
4.0. Manage Resources	4.1. Supervise Subordinates 4.2. Participate in Procurement 4.3. Manage Materials 4.4. Manage Tools & Equipment	Generic skills and knowledge • Using communication skills to work with others, reporting to superiors • Knowledge on safety, health & environment • Management skills ✓ Decision Making skills ✓ Interpersonal skills ✓ Conflict Resolution skills ✓ Time management skills ✓ Mentorship skills Tools and Equipment • Measuring instruments Materials • Notebooks Worker behaviours • Team spirit, corporative, trustworthy and commitment