NATIONAL COUNCIL FOR TECHNICAL EDUCATION

NOVEMBER 2022

PROPOSED OCCUPATIONAL STANDARDS

OCCUPATION: AUTOMOTIVE ENGINEERS

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 12occupations. Occupational standards for Automotive 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
NOVEMBER 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 Mrs Leah Lukindo and Eng. Dr. Simon Baregu and for the tireless efforts and commitment in facilitating and guiding the standards development process, Ms. Eileen Tzamburakis, Ms. Chausiku Yakweli Ibrahim and Ms. Nuru Shirima 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	Title	Organization
1	Sharif Z. Mwangi, Engineer	Lecturer	Dar es Salaam Institute of Technology (DIT)
2	Dr. Cecilia China	Researcher	Tanzania Industrial Research and

			Development Organization (TIRDO)
3	Dr. Rashid Suleiman	Lecturer	Sokoine University of Agriculture (SUA)

In addition, NACTE wishes to further enhance the internationalization of occupational standards and promote the modernization and internationalization of industries, thereby facilitating Tanzania's integration into the international market and expanding its development potential. Therefore, NACTE has invited China-Africa Vocational Education Alliance and China-Africa (Chongqing) Vocational Education Alliance to participate in the development, revision and review of occupational standards documents in collaboration with Chinese vocational institutions, so as to make use of their rich experience in vocational education efforts and rely on China's advanced and complete industrial chain and position in the international market to contribute to the development of vocational education and related industries in Tanzania.

Therefore, I would like to express my sincere gratitude to this specialized team of many Chinese institutions and experts. I thank them for their hard work and dedication, and for contributing their wisdom and experience to the preparation of this document. I would like to thank the following institutions and experts for their support:

S/N	Institute	Name	Title/area of expertise
1	Chengdu Aeronautic Polytechnic	Liu Yu	Lecturer/Auto Repair
2		Pu Yunfei	Lecturer/Auto Repair
3		Liu Qiaoyan	Lecturer/Auto Repair
4		Liu Binliang	Senior Technician/Auto Repair
5		Li Chunming	Senior Technician/Auto Repair

Finally, I would like to thank all stakeholders in the project approval process for their strong support and for their expert insight and input regarding the validity of the content and the preparation of this document for the general public.

Dr. A. B. Rutayuga — Dar es Salaam

EXECUTIVE SECRETARY — **NOVEMBER 2022**

ABBREVIATIONS

ABS - Anti -Lock Braking System

ATF - Automatic Transmission Fluid

CAD - Computer Aided Design

CBET - Competence Based Education and Training

ICT - Information Computer Technology

IGT - Ignition Timing

IGF - Ignition Confirmation

MOPP - Maintenance Operating Policy and Procedure

NACTE - National Council for Technical Education

NOS - National Occupational Standards

OS - Occupational Standards

PLC - Programmable Logic Controller

PPE - Personal Protective Equipment

RPM - Revolutions Per Minute

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 Competence:	The application of knowledge and skills to perform consistently to the standards required in the work context.
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.
Performance Criteria:	Indicate the expected end results or outcome in form of evaluative statements.
Skills:	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.
Standards:	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.
Tasks:	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 Process:	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.

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 in 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 Competency-based Education and Training (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 Education and 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 Automotive 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 Occupational Standards development 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 Automotive 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 ……. participants from different parts of the country representing various companies.

3.0. THE SCOPE AND OVERVIEW OF THE OCCUPATION STANDARDS FOR AUTOMOTIVE ENGINEERS

These standards cover a broad range of duties and tasks that can be performed by an Automotive 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 Automotive 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.

Automotive Technicians work under minimal supervision of an engineer to inspect, repair, and maintain automobiles and other gasoline, diesel, or alternate-fuelled vehicles. In smaller shops, Technicians complete a wide variety of repairs from simple engine tune-ups to tearing down, repairing, and rebuilding of complete power systems and Body repair. Generally, the Automotive Engineering Technician performs the following duties:

a) Perform Vehicle General Service
b) Maintain Petrol and Diesel Engines
c) Maintain Engine Tune up
d) Maintain Transmission Systems
e) Perform Vehicle Diagnosis
f) Maintain Hybrid Vehicles
g) Maintain Brake System
h) Maintain Suspension Systems
i) Maintain Steering System
j) Repair Starting System
k) Repair Charging Systems
l) Repair Ignition System
m) Repair Lighting Systems
n) Repair Automotive Air Conditioning System

o) Repair Vehicle Body

p) Repair Vehicle Auxiliary Appliances and Anti-Theft Alarm Systems

The Occupational standards have been clustered 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 AUTOMOTIVE ENGINEERS NTA 6

OCCUPATION	AUTOMOTIVE ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	REPAIR STARTING SYSTEM	**DUTY NO.**	601
TASK TITLE	REPAIR STARTING SYSTEM CIRCUIT	**TASK NO.**	6011
PERFORMANCE CRITERIA	A person performing this task must be able to repair starting system circuit as per technical requirements and manufacturer's service manual.		
RANGE STATEMENT	This task can be performed in the automotive workshop under the supervision of Automotive/Mechanical Engineer. The following tools and equipment will be required: 1. Full set of Automotive tool box; 2. Pitch/ramp; 3. Circuit tester lamps; 4. Interior and exterior protection suite; 5. Power source; 6. Battery charger; 7. P.P.E, such as Safety Shoes, Goggles, Gloves, Work clothes; 8. Wire harness repair tools; 9. Stethoscope; 10. Multimeters; 11. Lifter.		

EVIDENCE REQUIREMENTS	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Observe health and safety precautions when performing the task; 2. Select right tools and equipment for the task; 3. Inspect battery; 4. Maintain battery; 5. Service Starter switch; 6. Replace starter fuse; 7. Replace starter relay; 8. Check 30, 50, and C Terminals; 9. Repair starter circuits; 10. Test Starting operation; 11. Clean tools, equipment and workplace; 12. Store tools and equipment.	**Detailed knowledge about:** **1.0. Methods:** The person performing this task must be able to explain how to prepare the service schedule for: 1.1. Repair starting circuit; 1.2. Check and replace starter parts; 1.3. Repair starter switch; 1.4. Check each connection terminal; 1.5. Test starting operation. **2.0. Principles:** The person must be able to explain the principles of repairing starting circuit. **3.0. Theories:** The person must be able to explain: 3.1. Starting systems components and operation; 3.2**.** Possible **f**aults in starting systems and their causes. **4.0. Essential skills:** 4.1. Communication skills; 4.2. Customer care skills; 4.3. Team work skills; 4.4. Report writing skills;

	4.5. Entrepreneurial skills; 4.6. Learning skills.
DESCRIPTION OF END PRODUCTS/SERVICE	Starting System circuit is repaired as per technical specifications and manufacturer's manual.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Safe handling of working tools; 2. Safe handling of measuring instruments; 3. Occupational health and safety; 4. Maintenance operating policy and procedure (MOPP); 5. Waste disposal methods.

OCCUPATION	AUTOMOTIVE ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	REPAIR STARTING SYSTEM	**DUTY NO.**	601
TASK TITLE	REPAIR STARTER ASSEMBLY	**TASK NO.**	6012
PERFORMANCE CRITERIA	A person performing this task must be able to service starter assembly as per technical requirements and manufacturer's Service manual.		
RANGE STATEMENT:	This task can be performed in the automotive workshop under the supervision of Automotive/Mechanical Engineer. The following tools and equipment will be required: 1. Full set of Automotive tool box; 2. Pitch/ramp; 3. Interior and exterior protection suite; 4. Power source; 5. P.P.E, such as Safety Shoes, Goggles, Gloves, Work clothes; 6. Stethoscope; 7. Battery jumper wires; 8. Multimeters; 9. Vernier calipers; 10. Current clamp; 11. Bench vise; 12. Separate car battery; 13. Lifter.		

EVIDENCE REQUIREMENTS

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Observe health and safety precautions when performing the task; 2. Select right tools and equipment for the task; 3. Dismount starter motor from engine; 4. Dismantle Starter Motor; 5. Clean starter parts; 6. Check the starter clutch sub-assembly, and check the solenoid starter switch assembly; 7. Assemble starter motor; 8. Perform bench Test; 9. Mount Starter Motor to the engine; 10. Perform on vehicle test; 11. Clean tools, equipment and	**Detailed knowledge about:** **1.0. Methods:** The person performing this task must be able to explain how to: 1.1. Disassemble the starter from the engine; 1.2. Disassemble and assemble the starter; 1.3. Perform starter bench tests; 1.4. Perform vehicle tests. **2.0. Principles:** The person must be able to explain the principles of repairing stator motor. **3.0. Theories:** The person must be able to explain: 3.1. Starting systems components and operation; 3.2 Possible faults in starting system and their causes. **4.0. Essential skills:** 4.1. Communication skills;

workplace; 12. Store tools and equipment.	4.2. Customer care skills; 4.3. Team work skills; 4.4. Report writing skills; 4.5. Entrepreneurial skills; 4.6. Learning skills.
DESCRIPTION OF END PRODUCTS/SERVICE	Starter assembly is serviced as per technical specifications and Manufacturer's manual.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Safe handling of working tools; 2. Safe handling of measuring instruments; 3. Occupational health and safety; 4. Maintenance operating policy and procedure (MOPP); 5. Waste disposal methods.

OCCUPATION	AUTOMOTIVE ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	REPAIR STARTING SYSTEM	**DUTY NO.**	601
TASK TITLE	TROUBLESHOOT STARTING SYSTEM	**TASK NO.**	6013
PERFORMANCE CRITERIA	A person performing this task must be able to troubleshoot starting system as per technical requirements and manufacturer service manual.		
RANGE STATEMENT:	This task can be performed in the automotive workshop under the supervision of Automotive/Mechanical Engineer. The following tools and equipment will be required: 1. Full set of Automotive tool box; 2. Pitch/ramp; 3. Circuit tester lamps; 4. Interior and exterior protection suite; 5. Power source; 6. Battery charger; 7. P.P.E, such as Safety Shoes, Goggles, Gloves, Work clothes; 8. Stethoscope; 9. Vehicle fault diagnosis tester; 10. Multimeters; 11. Automotive oscilloscope; 12. Lifter; 13. Wire harness repair tools.		

EVIDENCE REQUIREMENTS

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Obtain the required tools and equipment for the task; 2. Observe health and safety precautions when performing the task; 3. Test battery voltage; 4. Check the fixing condition and tighten the terminals; 5. Fix open circuit faults; 6. Fix short circuit faults; 7. Repair resistive faults; 8. Perform vehicle tests; 9. Clean tools, equipment and workplace; 10. Store tools and equipment.	**Detailed knowledge about:** **1.0. Methods:** The person performing this task must be able to explain how to: 1.1. Troubleshoot starting circuit; 1.2. Rectify faults. **2.0. Principles:** The person must be able to explain the principles of troubleshooting Starting system. **3.0. Theories:** The person must be able to explain: 3.1. Starting systems components and operation; 3.2. Troubleshooting Starting systems; 3.3. Possible faults in starting systems, their causes and remedies. **4.0. Essential skills:** 4.1. Communication skills; 4.2. Customer care skills;

	4.3. Team work skills; 4.4. Report writing skills; 4.5. Entrepreneurial skills; 4.6. Learning skills.
DESCRIPTION OF END PRODUCTS/SERVICE	Troubleshooting of starting system is performed as per technical specifications and manufacturer's manual.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Safe handling of working tools; 2. Safe handling of measuring instruments; 3. Occupational health and safety; 4. Maintenance operating policy and procedure (MOPP); 5. Waste disposal methods.

OCCUPATION	AUTOMOTIVE ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	REPAIR CHARGING SYSTEMS	**DUTY NO.**	602
TASK TITLE	REPAIR CHARGING SYSTEM CIRCUIT	**TASK NO.**	6021
PERFORMANCE CRITERIA	A person performing this task must be able to service charging system circuit as per technical requirements and manufacturer Service manual.		
RANGE STATEMENT	This task can be performed in the automotive workshop under the supervision of Automotive /Mechanical Engineer. The following tools and equipment will be required: 1. Full set of Automotive tool box; 2. Pitch/ramp; 3. Circuit tester lamps; 4. Power source; 5. Vehicle fault diagnosis tester; 6. P.P.E, such as Safety Shoes, Goggles, Gloves, Work clothes; 7. Stethoscope; 8. Multimeters; 9. Lifter; 10. Vehicle fault diagnosis tester; 11. Wire harness repair tools; 12. Automotive oscilloscope.		

EVIDENCE REQUIREMENTS	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Observe safety precautions when performing the task; 2. Select proper tools and equipment for the task; 3. Inspect charging circuit; 4. Repair charging circuit; 5. Service connectors; 6. Service loose connection of wire harness; 7. Test charging operation; 8. Clean tools, equipment and workplace; **9.** Store tools and equipment.	**Detailed knowledge about:** **1.0. Methods:** The person performing this task must be able to explain how to: 1.1. Repair charging circuit; 1.2. Demonstrate Charging circuit operation; 1.3. Troubleshoot Charging circuit; 1.4. Rectify faults; 1.5. Test circuit performance. **2.0. Principles:** The person must be able to explain the principles of service charging system circuit. **3.0. Theories:** The person must be able to explain: 3.1. Charging systems components and operation; 3.2. Possible faults in the charging system; 3.2. Troubleshooting Charging systems. **4.0. Essential skills:** 4.1. Communication skills;

	4.2. Customer care skills; 4.3. Team work skills; 4.4. Report writing skills; 4.5. Entrepreneurial skills; 4.6. Learning skills.
DESCRIPTION OF END PRODUCTS/SERVICE	Charging system circuit is serviced as per technical specifications and Manufacturer's manual.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Safe handling of working tools; 2. Safe handling of measuring instruments; 3. Occupational health and safety; 4. Maintenance operating policy and procedure (MOPP); 5. Waste disposal methods.

OCCUPATION	AUTOMOTIVE ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	REPAIR CHARGING SYSTEMS	**DUTY NO.**	602
TASK TITLE	REPAIR CHARGING CONTROL SYSTEM	**TASK NO.**	6022
PERFORMANCE CRITERIA	A person performing this task must be able to repair charging control system as per technical requirements and manufacturer's service manual.		
RANGE STATEMENT:	This task can be performed in the automotive workshop under the supervision of Automotive/Mechanical Engineer. The following tools and equipment will be required: 1. Full set of Automotive tool box; 2. Pitch/ramp; 3. Circuit tester lamps; 4. Power source; 5. Vehicle fault diagnosis tester; 6. P.P.E, such as Safety Shoes, Goggles, Gloves, Work clothes; 7. Stethoscope; 8. Multimeters; 9. Interior and exterior protection suite; 10. Wire harness repair tools; 11. Automotive oscilloscope; 12. Lifter.		

EVIDENCE REQUIREMENTS	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Observe safety precautions when performing the task; 2. Select proper tools and equipment for the task; 3. Service electronics devices; 4. Check ECU connection to alternator; 5. Service integrated voltage regulator; 6. Test the system operations; 7. Clean tools, equipment and workplace; 8. Store tools and equipment.	**Detailed knowledge about:** **1.0. Methods:** The person performing this task must be able to explain how to: 1.1. Repair charging circuit; 1.2. Demonstrate Charging circuit operation; 1.3. Troubleshoot Charging circuit; 1.4. Rectify faults; 1.5. Test circuit performance. **2.0. Principles:** The person must be able to explain the principles of repair charging system circuit. **3.0. Theories:** The person must be able to explain: 3.1. Electronic Charging systems components and operation; 3.2. Possible faults in the charging system and their causes; 3.3. Troubleshooting Electronic Charging systems.

	4.0. Essential skills: 4.1. Communication skills; 4.2. Customer care skills; 4.3. Team work skills; 4.4. Report writing skills; 4.5. Entrepreneurial skills; 4.6. Learning skills.
DESCRIPTION OF END PRODUCTS/SERVICE	Charging Control System is repaired as per technical requirement and Manufacturer's specifications.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Safe handling of working tools; 2. Safe handling of measuring instruments; 3. Occupational health and safety; 4. Maintenance operating policy and procedure (MOPP); 5. Waste disposal methods.

OCCUPATION	AUTOMOTIVE ENGINEERING TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	REPAIR CHARGING SYSTEMS	**DUTY NO.**	602
TASK TITLE	REPAIR ALTERNATOR	**TASK NO.**	6023
PERFORMANCE CRITERIA	A person performing this task must be able to repair alternator as per technical requirements and manufacturer's specifications.		
RANGE STATEMENT:	This task can be performed in the automotive workshop under the Supervision of Automotive/Mechanical Engineer. The following tools and equipment will be required: 1. Full set of Automotive tool box; 2. Pitch/ramp; 3. Power source; 4. P.P.E, such as Safety Shoes, Goggles, Gloves, Work clothes; 5. Stethoscope; 6. Multimeters; 7. Bench vise; 8. Interior and exterior protection suite; 9. Automotive oscilloscope; 10. Lifter.		

EVIDENCE REQUIREMENTS

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Observe safety precautions when performing the task; 2. Select proper tools and equipment for the task; 3. Dismount Alternator; 4. Dismantle alternator; 5. Clean Alternator parts; 6. Test diodes; 7. Test slip rings; 8. Test regulators; 9. Test rotor windings; 10. Test stator windings; 11. Inspect brushes; 12. Assemble alternator; 13. Remount alternator; 14. Test charging performance; 15. Store tools and equipment. 16. Clean tools equipment and workplace	**Detailed knowledge about:** **1.0. Methods:** The person performing this task must be able to explain how to: 1.1. Repair charging circuit; 1.2. Demonstrate Charging circuit operation; 1.3. Troubleshoot Charging circuit; 1.4. Rectify faults; 1.5. Test circuit performance. **2.0. Principles:** The person must be able to explain the principles of repairing an alternator. **3.0. Theories:** The person must be able to explain: 3.1. Electronic Charging systems components and operation; 3.2. Possible faults in charging system and their causes; 3.3. Troubleshooting Electronic Charging systems. **4.0. Essential skills:** 4.1. Communication skills;

	4.2. Customer care skills; 4.3. Entrepreneurship skills; 4.4. Team work skills; 4.5. Report writing skills; 4.6. Learning skills.
DESCRIPTION OF END PRODUCTS/SERVICE	The Alternator is repaired as per technical requirement and Manufacturer's specifications
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Safe handling of working tools; 2. Safe handling of measuring instruments; 3. Occupational health and safety; 4. Maintenance operating policy and procedure (MOPP); 5. Waste disposal methods.

OCCUPATION	AUTOMOTIVE ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	REPAIR CHARGING SYSTEMS	**DUTY NO.**	602
TASK TITLE	TROUBLESHOOT CHARGING SYSTEM	**TASK NO.**	6024
PERFORMANCE CRITERIA	A person performing this task must be able to troubleshoot the Charging System as per technical requirements and manufacturer's specifications.		
RANGE STATEMENT	This task can be performed in the automotive workshop under the supervision of Automotive/Mechanical Engineer. The following tools and equipment will be required: 1. Full set of Automotive tool box; 2. Pitch/ramp; 3. Circuit tester lamps; 4. Interior and exterior protection suite; 5. Power source; 6. Battery charger; 7. P.P.E, such as Safety Shoes, Goggles, Gloves, Work clothes; 8. Stethoscope; 9. Vehicle fault diagnosis tester; 10. Multimeters; 11. Automotive oscilloscope; 12. Lifter; 13. Wire harness repair tools.		

EVIDENCE REQUIREMENTS	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Observe safety precautions when performing the task; 2. Select proper tools and equipment for the task; 3. Test battery voltage; 4. Inspect the fan belt; 5. Adjust fan belt; 6. Secure connections; 7. Check fuses; 8. Test charging performance; 9. Clean tools, equipment and workplace; 10. Store tools and equipment.	**Detailed knowledge about:** **1.0. Methods:** The person performing this task must be able to explain how to: 1.1. Repair charging circuit; 1.2. Demonstrate Charging circuit operation; 1.3. Troubleshoot Charging circuit; 1.4. Rectify faults; 1.5. Test circuit performance. **2.0. Principles:** The person must be able to explain the principles of troubleshooting charging system. **3.0. Theories:** The person must be able to explain: 3.1. Electronic Charging systems components and operation; 3.2. Possible faults in the charging their causes;

	3.3 Troubleshooting Charging systems. **4.0. Essential skills:** 4.1. Communication skills; 4.2. Customer care skills; 4.3. Entrepreneurship skills; 4.4. Team work skills; 4.5. Report writing skills; 4.6. Learning skills.
DESCRIPTION OF END PRODUCTS/SERVICE	Troubleshooting of Charging System is performed as per technical requirement and Manufacturer's specifications.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Safe handling of working tools; 2. Safe handling of measuring instruments; 3. Occupational health and safety; 4. Maintenance operating policy and procedure (MOPP); 5. Waste disposal methods.

OCCUPATION	AUTOMOTIVE ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	REPAIR IGNITION SYSTEM	**DUTY NO.**	603
TASK TITLE	REPAIR IGNITION SYSTEM CIRCUIT	**TASK NO.**	6031
PERFORMANCE CRITERIA	A person performing this task must be able to repair ignition system circuit as per technical requirements and manufacturer's specifications.		
RANGE STATEMENT	This task can be performed in the automotive workshop under the supervision of Automotive/Mechanical Engineer. The following tools and equipment will be required: 1. Full set of Automotive tool box; 2. Pitch/ramp; 3. Circuit tester lamps; 4. Interior and exterior protection suite; 5. Power source; 6. Vehicle fault diagnosis tester; 7. P.P.E, such as Safety Shoes, Goggles, Gloves, Work clothes; 8. Stethoscope; 9. Battery charger; 10. Multimeters; 11. Automotive oscilloscope; 12. Lifter; 13. Wire harness repair tools.		

EVIDENCE REQUIREMENTS

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Observe safety precautions when performing the task; 2. Select proper tools and equipment for task; 3. Check battery voltage 12+; 4. Service Ignition switch; 5. Inspect ignition circuit parts; 6. Repair Primary Coil circuit; 7. Repair Secondary Coil circuit; 8. Check Sparks plug; 9. Replace Spark plug; 10. Test Ignition circuit; 11. Clean tools, equipment and workplace; 12. Store tools and equipment.	**Detailed knowledge about:** **1.0. Methods:** The person performing this task must be able to explain how to: 1.1. Repair Ignition circuit; 1.2. Demonstrate ignition circuit operation; 1.3. Troubleshoot ignition circuit; 1.4. Rectify faults; 1.5. Test circuit performance. **2.0. Principles:** The person must be able to explain the principles of repairing Ignition system circuit. **3.0. Theories:** The person must be able to explain: 3.1. Ignition systems components and operation; 3.2. Possible faults in the ignition system their causes; 3.3. Troubleshooting ignition systems.

	4.0. Essential skills: 4.1. Communication skills; 4.2. Customer care skills; 4.3. Entrepreneurship skills; 4.4. Team work skills; 4.5. Report writing skills; 4.6. Learning skills.
DESCRIPTION OF END PRODUCTS/SERVICE	Ignition system circuit is repaired as per technical requirement and Manufacturer's specifications.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Safe handling of working tools; 2. Safe handling of measuring instruments; 3. Occupational health and safety; 4. Maintenance operating policy and procedure (MOPP); 5. Waste disposal methods.

OCCUPATION	AUTOMOTIVE ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	REPAIR IGNITION SYSTEM	**DUTY NO.**	603
TASK TITLE	REPAIR ELECTRONIC IGNITION SYSTEMS	**TASK NO.**	6032
PERFORMANCE CRITERIA	A person performing this task must be able to repair electronic ignition systems per technical requirements and manufacturer's specifications.		
RANGE STATEMENT:	This task can be performed in the automotive workshop under the supervision of Automotive/Mechanical Engineer. The following tools and equipment will be required: 1. Full set of Automotive tool box; 2. Pitch/ramp; 3. Circuit tester lamps; 4. Interior and exterior protection suite (3 pcs); 5. Power source; 6. Battery charger; 7. P.P.E, such as Safety Shoes, Goggles, Gloves, Work clothes; 8. Stethoscope; 9. Vehicle fault diagnosis tester; 10. Multimeters; 11. Automotive oscilloscope; 12. Lifter; 13. Wire harness repair tools.		

EVIDENCE REQUIREMENTS

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Observe safety precautions when performing the task; 2. Select proper tools and equipment for the task; 3. Check battery voltage 12+; 4. Check igniter terminals; 5. Check ECU connections; 6. Test Ignition timing (IGT)Signal; 7. Test Ignition Confirmation (IGF); 8. Test Ne signal; 9. Check for Igniter operation; 10. Test ignition performance;	**Detailed knowledge about:** **1.0. Methods:** The person performing this task must be able to explain how to: 1.1. Repair the Ignition circuit; 1.2. Repair Electronic Ignition systems; 1.3. Demonstrate ignition circuit operation; 1.4. Troubleshoot ignition circuit; 1.5. Troubleshoot Electronic Ignition systems; 1.6. Rectify faults; 1.7. Test circuit performance. **2.0. Principles:** The person must be able to explain the principles of repairing electronic ignition system.

11. Clean tools, equipment and workplace; 12. Store tools and equipment; 13. Repair ignition circuits.	**3.0. Theories:** The person must be able to explain: 3.1. Electronic Ignition system components and operation; 3.2. Possible faults in an electronic ignition system and their causes; 3.3. Troubleshooting ignition systems. **4.0. Essential skills** 4.1. Communication skills; 4.2. Customer care skills; 4.3. Entrepreneurship skills; 4.4. Team work skills; 4.5. Report writing skills; 4.6. Learning skills.
DESCRIPTION OF END PRODUCTS/SERVICE	Electronic Ignition Systems are repaired as per technical requirement and Manufacturer's specifications.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Safe handling of working tools; 2. Safe handling of measuring instruments; 3. Occupational health and safety; 4. Maintenance operating policy and procedure (MOPP); 5. Waste disposal methods.

OCCUPATION	AUTOMOTIVE ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	REPAIR IGNITION SYSTEM	**DUTY NO.**	603
TASK TITLE	REPAIR MAGNETO IGNITION SYSTEMS	**TASK NO.**	6033
PERFORMANCE CRITERIA	A person performing this task must be able to repair Magneto Ignition Systems as per technical requirements and manufacturer's specifications.		
RANGE STATEMENT:	This task can be performed in the automotive workshop under the supervision of an Automotive /Mechanical Engineer. The following tools and equipment will be required: 1. Full set of Automotive tool box; 2. Pitch/ramp; 3. Circuit tester lamps; 4. Washing machine for interior and exterior protection suite (3 pcs); 5. Power source; 6. Battery charger; 7. P.P.E, such as Safety Shoes, Goggles, Gloves, Work clothes; 8. Stethoscope; 9. Vehicle fault diagnosis tester; 10. Multimeters; 11. Automotive oscilloscope; 12. Lifter; 13. Wire harness repair tools.		

EVIDENCE REQUIREMENTS

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Observe safety precautions when performing the task; 2. Select proper tools and equipment for the task; 3. Service Ignition switch; 4. Check Capacitive Discharge Ignition (CDI); 5. Repair Primary Coil circuit; 6. Repair Secondary Coil circuit; 7. Check Sparks plug; 8. Replace Spark plug; 9. Test Ignition circuit; 10. Clean tools, equipment and workplace; 11. Store tools and equipment.	**Detailed knowledge about:** **1.0. Methods:** The person performing this task must be able to explain how to: 1.1. Repair Magneto Ignition circuit; 1.2. Repair Electronic Ignition systems; 1.3. Demonstrate ignition circuit operation; 1.4. Troubleshoot ignition circuit; 1.5. Troubleshoot Magneto Ignition systems; 1.6. Rectify faults; 1.7. Test circuit performance. **2.0. Principles:** The person must be able to explain the principles of repairing Magneto Ignition system faults. **3.0. Theories:** The person must be able to explain: 3.1. Magneto Ignition systems components and operation;

	3.2. Possible faults in Magneto ignition systems and their causes. 3.3.Troubleshooting ignition systems. **4.0. Essential skills** 4.1. Communication skills; 4.2. Customer care skills; 4.3. Entrepreneurship skills; 4.4. Team work skills; 4.5. Report writing skills; 4.6. Learning skills.
DESCRIPTION OF END PRODUCTS/SERVICE	Magneto Ignition Systems are repaired as per technical requirement and Manufacturer's specifications.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Safe handling of working tools; 2. Safe handling of measuring instruments; 3. Occupational health and safety; 4. Maintenance operating policy and procedure (MOPP); 5. Waste disposal methods.

OCCUPATION	AUTOMOTIVE ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	REPAIR IGNITION SYSTEM	**DUTY NO.**	603
TASK TITLE	REPAIR DISTRIBUTORLESS IGNITION SYSTEMS	**TASK NO.**	6034
PERFORMANCE CRITERIA	A person performing this task must be able to repair Distributorless Ignition systems per technical requirements and manufacturer's specifications.		
RANGE STATEMENT:	This task can be performed in the automotive workshop under the supervision of Automotive /Mechanical Engineer. The following tools and equipment will be required: 1. Full set of Automotive tool box; 2. Pitch/ramp; 3. Circuit tester lamps; 4. Interior and exterior protection suite; 5. Power source; 6. Battery charger; 7. P.P.E, such as Safety Shoes, Goggles, Gloves, Work clothes; 8. Stethoscope; 9. Vehicle fault diagnosis tester; 10. Multimeters; 11. Automotive oscilloscope; 12. Lifter; 13. Wire harness repair tools.		

EVIDENCE REQUIREMENTS	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Observe safety precautions when performing the task; 2. Select proper tools and equipment for the task; 3. Service Ignition switch; 4. Check Electronic Control Unit (ECU) connections; 5. Check camshaft position Sensor; 6. Check crankshaft position sensor; 7. Check Coil terminals; 8. Replace defective components; 9. Test repaired/replaced system; 10. Determine ignition fault codes; 11. Clean tools, equipment and workplace; 12. Store tools and equipment; 13. Repair distributorless ignition	**Detailed knowledge about:** **1.0. Methods:** The person performing this task must be able to explain how to: 1.1. Repair distributorless ignition system circuits; 1.2. Repair Electronic Ignition systems; 1.3. Demonstrate ignition circuit operation; 1.4. Troubleshoot ignition circuit; 1.5. Troubleshoot distributorless Ignition systems; 1.6. Rectify faults; 1.7. Test circuit performance. **2.0. Principles:** The person must be able to explain the principles of repairing distributorless ignition system. **3.0. Theories:** The person must be able to explain: 3.1. Ignition systems components and operation; 3.2. Possible faults in distributorless ignition system and their causes;

system circuits.	3.3. Troubleshooting ignition systems. **4.0. Essential skills** 4.1. Communication skills; 4.2. Customer care skills; 4.3. Entrepreneurship skills; 4.4. Team work skills; 4.5. Report writing skills; 4.6. Learning skills.
DESCRIPTION OF END PRODUCTS/SERVICE	Distributor less Ignition Systems are repaired as per technical requirement and manufacturer's specifications.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Safe handling of working tools; 2. Safe handling of measuring instruments; 3. Occupational health and safety; 4. Maintenance operating policy and procedure (MOPP); 5. Waste disposal methods.

OCCUPATION	AUTOMOTIVE ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	REPAIR LIGHTING SYSTEMS	**DUTY NO.**	604
TASK TITLE	CHECK LIGHTING SYSTEM	**TASK NO.**	6041
PERFORMANCE CRITERIA	A person performing this task must be able to repair lighting system circuit as per technical requirements and manufacturer's specifications.		
RANGE STATEMENT:	This task can be performed in the automotive workshop under the supervision of Automotive /Mechanical Engineer. The following tools and equipment will be required: 1. Full set of Automotive tool box; 2. Headlamp tester; 3. Pitch/ramp; 4. Circuit tester lamps; 5. Interior and exterior protection suite; 6. Power source; 7. Battery charger; 8. P.P.E, such as Safety Shoes, Goggles, Gloves, Work clothes; 9. Multimeters; 10. Lifter.		

EVIDENCE REQUIREMENTS

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Observe safety precautions; 2. Select proper tools and equipment; 3. Check battery voltage; 4. Service lighting system components; 5. Perform headlamp light calibration; 6. Fix loose connections; 7. Test lighting performance; 8. Clean tools, equipment and workplace; 9. Store tools and equipment.	**Detailed knowledge about:** **1.0. Methods:** The person performing this task must be able to explain how to: 1.1. Check Lighting systems circuit; 1.2. Demonstrate lighting circuit system operation; 1.3. Calibrate headlamp. **2.0. Principles:** The person must be able to explain the principles of checking the operation of Lighting system. **3.0. Theories:** The person must be able to explain: 3.1. Lighting systems components and operation. **4.0. Essential skills** 4.1. Communication skills; 4.2. Customer care skills; 4.3. Entrepreneurship skills; 4.4. Team work skills; 4.5. Report writing skills; 4.6. Learning skills.
DESCRIPTION OF END	Lighting system circuit is repaired as per technical

PRODUCTS/SERVICE	requirement and Manufacturer's specifications.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed Knowledge about:** 1. Safe handling of working tools; 2. Safe handling of measuring instruments; 3. Occupational health and safety; 4. Maintenance operating policy and procedure (MOPP); 5. Waste disposal methods.

OCCUPATION	AUTOMOTIVE ENGINEERING TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	REPAIR LIGHTING SYSTEMS	**DUTY NO.**	604
TASK TITLE	REPAIR EXTERNAL LIGHTING LAMP CIRCUIT	**TASK NO.**	6042
PERFORMANCE CRITERIA	A person performing this task must be able to repair External Lighting Lamp circuit as per technical requirements and manufacturer's specifications.		
RANGE STATEMENT:	This task can be performed in the automotive workshop under the supervision of Automotive /Mechanical Engineer. The following tools and equipment will be required: 1. Full set of Automotive tool box; 2. Headlamp tester; 3. Pitch/ramp; 4. Circuit tester lamps; 5. Interior and exterior protection suite; 6. Power source; 7. Battery charger; 8. P.P.E, such as Safety Shoes, Goggles, Gloves, Work clothes; 9. Wire harness repair tools; 10. Multimeters; 11. Lifter.		

EVIDENCE REQUIREMENTS

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Observe safety precautions; 2. Select proper tools and equipment; 3. Check switches of headlamp, fog lamp and license plate lamp; 4. Service switches of headlamp, fog lamp and license plate lamp; 5. Repair external lighting system circuits; 6. Replace fuses of headlamp, fog lamp and license plate lamp; 7. Replace relays of headlamp, fog lamp and license plate lamp; 8. Replace bulbs of headlamp, fog lamp and license plate lamp; 9. Test repaired/replaced systems 10. Clean tools, equipment and workplace; 11. Store tools and equipment.	**Detailed knowledge about:** **1.0. Methods:** The person performing this task must be able to explain how to: 1.1. Repair external Lighting lamp circuit; 1.2. Troubleshoot external lighting system; 1.3. Test circuit performance. **2.0. Principles:** The person must be able to explain the principles of: 2.1. Repairing external lighting Lamp circuit; 2.2 Headlamp. **3.0. Theories:** The person must be able to explain: 3.1. External lighting system components and operation; 3.2. Troubleshooting external lighting systems. **4.0. Essential skills** 4.1. Communication skills; 4.2. Customer care skills; 4.3. Entrepreneurship skills;

	4.4. Team work skills; 4.5. Report writing skills; 4.6. Learning skills.
DESCRIPTION OF END PRODUCTS/SERVICE	External lighting Lamp circuit is repaired as per technical requirement and Manufacturer's specifications.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Safe handling of working tools; 2. Safe handling of measuring instruments; 3. Occupational health and safety; 4. Maintenance operating policy and procedure (MOPP); 5. Waste disposal methods.

OCCUPATION	AUTOMOTIVE ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	REPAIR LIGHTING SYSTEMS	**DUTY NO.**	604
TASK TITLE	REPAIR SIGNAL INDICATOR CIRCUIT	**TASK NO.**	6043
PERFORMANCE CRITERIA	A person performing this task must be able to repair Signal Indicator circuit as per technical requirements and manufacturer's specifications.		
RANGE STATEMENT:	This task can be performed in the automotive workshop under the supervision of Automotive /Mechanical Engineer. The following tools and equipment will be required: 1. Full set of Automotive tool box; 2. Pitch/ramp; 3. Circuit tester lamps; 4. Interior and exterior protection suite; 5. Power source; 6. Battery charger; 7. P.P.E, such as Safety Shoes, Goggles, Gloves, Work clothes; 8. Wire harness repair tools; 9. Multimeters; 10. Lifter.		

EVIDENCE REQUIREMENTS

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Observe health safety precautions when performing the task; 2. Select proper tools and equipment for the task; 3. Repair width lamp switch and circuit; 4. Repair direction indicator light switch and circuit; 5. Repair emergency lamp switch and circuit; 6. Repair taillight switch and circuit; 7. Repair back-up light switch; 8. Repair brake light switch and circuit; 9. Repair parking light switch and circuit; 10. Replace Flasher unit; 11. Test repaired/replaced system; 12. Clean tools, equipment and	**Detailed knowledge about:** **1.0. Methods:** The person performing this task must be able to explain how to: 1.1. Repair signal indicator circuit; 1.2. Troubleshoot signal indicator circuit; 1.3. Rectify faults; 1.4. Test circuit performance. **2.0. Principles:** The person must be able to explain the principles of repairing signal indicator circuit. **3.0. Theories:** The person must be able to explain: 3.1. Signal indicator circuit components and operation; 3.2. Troubleshooting signal indicator circuit. **4.0. Essential skills** 4.1. Communication skills; 4.2. Customer care skills; 4.3. Entrepreneurship skills; 4.4. Team work skills;

workplace; 13. Store tools and equipment.	4.5. Report writing skills; 4.6. Learning skills.
DESCRIPTION OF END PRODUCTS/SERVICE	Signal indicator circuit is repaired as per technical requirement and manufacturer's specifications
CIRCUMSTANTIAL KNOWLEDGE	**Detailed Knowledge about:** 1. Safe handling of working tools; 2. Safe handling of measuring instruments; 3. Occupational health and safety; 4. Maintenance operating policy and procedure (MOPP); 5. Waste disposal methods.

OCCUPATION	AUTOMOTIVE ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	REPAIR LIGHTING SYSTEMS	**DUTY NO.**	604
TASK TITLE	REPAIR INTERNAL LIGHTING CIRCUIT	**TASK NO.**	6044
PERFORMANCE CRITERIA	A person performing this task must be able to repair internal lighting circuit as per technical requirements and manufacturer's specifications.		
RANGE STATEMENT:	This task can be performed in the automotive workshop under the supervision of Automotive /Mechanical Engineer. The following tools and equipment will be required: 1. Full set of Automotive tool box; 2. Pitch/ramp; 3. Circuit tester lamps; 4. Interior and exterior protection suite; 5. Power source; 6. Battery charger; 7. P.P.E, such as Safety Shoes, Goggles, Gloves, Work clothes; 8. Wire harness repair tools; 9. Multimeters; 10. Lifter.		

EVIDENCE REQUIREMENTS	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Observe safety precautions when performing the task; 2. Select proper tools and equipment for the task; 3. Repair circuits of dome light, reading light, courtesy lamp, door light, trunk light, glove box light, footwell light and ambient light; 4. Repair switches of dome light, reading light, courtesy lamp, door light, trunk light, glove box light, footwell light and ambient light; 5. Replace lamp bulbs of dome light, reading light, courtesy lamp, door light, trunk light, glove box light, footwell light and ambient light; 6. Test repaired/replaced systems; 7. Clean tools, equipment and workplace;	**Detailed knowledge about:** **1.0. Methods:** The person performing this task must be able to explain how to: 1.1. Repair internal lighting circuit; 1.2 Troubleshoot internal lighting circuit; 1.3. Rectify faults; 1.4. Test circuit performance. **2.0. Principles:** The person must be able to explain the principles of repairing internal lighting circuit. **3.0. Theories:** The person must be able to explain: 3.1. Internal lighting components and operation; 3.2. Troubleshooting internal lighting circuit. **4.0. Essential skills** 4.1. Communication skills; 4.2. Customer care skills; 4.3. Entrepreneurship skills; 4.4. Team work skills; 4.5. Report writing skills;

8. Store tools and equipment.	4.6. Learning skills.
DESCRIPTION OF END PRODUCTS/SERVICE	Internal lighting circuit is repaired as per technical requirement and Manufacturer's specifications.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed Knowledge about:** 1. Safe handling of working tools; 2. Safe handling of measuring instruments; 3. Occupational health and safety; 4. Maintenance operating policy and procedure (MOPP); 5. Waste disposal methods.

OCCUPATION	AUTOMOTIVE ENGINEERING TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	MAINTAIN LIGHTING SYSTEMS	**DUTY NO.**	604
TASK TITLE	REPAIR INSTRUMENT CLUSTER	**TASK NO.**	6045
PERFORMANCE CRITERIA	A person performing this task must be able to repair Instrument Cluster as per technical requirements and manufacturer's specifications.		
RANGE STATEMENT:	This task can be performed in the automotive workshop under the supervision of Automotive /Mechanical Engineer. The following tools and equipment will be required: 1. Full set of Automotive tool box; 2. Pitch/ramp; 3. Circuit tester lamps; 4. Interior and exterior protection suite; 5. Power source; 6. Battery charger; 7. P.P.E, such as Safety Shoes, Goggles, Gloves, Work clothes; 8. Wire harness repair tools; 9. Multimeters; 10. Lifter.		

EVIDENCE REQUIREMENTS	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Observe safety precautions; 2. Select proper tools and equipment; 3. Repair Instrument cluster background lights; 4. Service Instrument cluster circuit; 5. Replace speedometer, tachometer, water temperature gauge and other devices; 6. Test repaired/replaced systems; 7. Clean tools, equipment and workplace; 8. Store tools and equipment.	**Detailed knowledge about:** **1.0. Methods:** The person performing this task must be able to explain how to: 1.1. Repair Instrument cluster elements; 1.2 Troubleshoot Instrument cluster circuit; 1.3. Rectify faults; 1.4. Test circuit performance. **2.0. Principles:** The person must be able to explain the principles of: 2.1. Instrument Cluster circuit; 2.2. Instrument Cluster information display. **3.0. Theories:** The person must be able to explain: 3.1. Instrument cluster circuit components and operation; 3.2. Troubleshooting Instrument cluster circuit. **4.0. Essential skills** 4.1. Communication skills; 4.2. Customer care skills; 4.3. Entrepreneurship skills; 4.4. Team work skills; 4.5. Report writing skills;

	4.6. Learning skills.
DESCRIPTION OF END PRODUCTS/SERVICE	Instrument Cluster is repaired as per technical requirement and manufacturer's specifications.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed Knowledge about:** 1. Safe handling of working tools; 2. Safe handling of measuring instruments; 3. Occupational health and safety; 4. Maintenance operating policy and procedure (MOPP); 5. Waste disposal methods.

OCCUPATION	AUTOMOTIVE ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	REPAIR AUTOMOTIVE AIR CONDITIONER SYSTEM	**DUTY NO.**	605
TASK TITLE	REPAIR AUTOMOTIVE AIR CONDITIONING COOLING SYSTEM	**TASK NO.**	6051
PERFORMANCE CRITERIA	A person performing this task must be able to service Automotive Air conditioner cooling systems as per technical requirements and manufacturer's specifications.		
RANGE STATEMENT:	This task can be performed in the automotive workshop under the supervision of Automotive /Mechanical Engineer. The following tools and equipment will be required: 1. Full set of Automotive tool box; 2. Refrigerant filling machine; 3. Refrigerant electronic leak detector; 4. Pitch/ramp; 5. Refrigerant identification instrument; 6. Simple pressure gauge set for air conditioning repair; 7. Vehicle fault diagnosis tester; 8. P.P.E, such as Safety Shoes, Goggles, Gloves, Work clothes; 9. Vacuum machine; 10. Thermometer; 11. Interior and exterior protection suite; 12. Refrigerant cylinder opener; 13. Lifter; 14. Power source.		

EVIDENCE REQUIREMENTS	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Observe safety precautions when performing the task; 2. Select proper tools and equipment for the task; 3. Inspect air conditioning parts; 4. Perform leakage test; 5. Fix air conditioning leakage points; 6. Identify refrigerant quality; 7. Replace worn out parts; 8. Replace ac filter drier; 9. Replace ac air cleaner; 10. Evacuate the AC system; 11. Refill refrigerant; 12. Test performance; 13. Clean tools, equipment and	**Detailed knowledge about:** **1.0. Methods:** The person performing this task must be able to explain how to: 1.1. Repair Automotive Air conditioning cooling systems; 1.2 Troubleshoot Automotive Air conditioning cooling systems; 1.3. Rectify faults; 1.4. Test Automotive Air conditioning cooling systems performance. **2.0. Principles:** The person must be able to explain the principles of servicing Automotive Air conditioning systems. **3.0. Theories:** The person must be able to explain:

workplace; 14. Store tools and equipment; 15. Release or recover refrigerant; 16. Use refrigerant filling machine to maintain the AC system; 17. Refill compressor oil; 18. Secondary vacuum after filling compressor oil.	3.1. Automotive Air conditioning components and roles; 3.2. Using air conditioning service tools and equipment; 3.3. Refrigerant temperature, pressure and state in each part of the refrigeration cycle. **4.0. Essential skills** 4.1. Communication skills; 4.2. Customer care skills; 4.3. Entrepreneurship skills; 4.4. Team work skills; 4.5. Report writing skills; 4.6. Learning skills.
DESCRIPTION OF END PRODUCTS/SERVICE	Automotive Air conditioner cooling systems is serviced as per technical requirement and manufacturer's specifications.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed Knowledge about:** 1. Safe handling of working tools; 2. Safe handling of measuring instruments; 3. Occupational health and safety; 4. Maintenance operating policy and procedure (MOPP); **5.** Waste disposal methods.

OCCUPATION	AUTOMOTIVE ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	REPAIR AUTOMOTIVE AIR CONDITIONER SYSTEM	**DUTY NO.**	605
TASK TITLE	REPAIR AUTOMOTIVE AIR CONDITIONING CONTROL MECHANISMS	**TASK NO.**	6052
PERFORMANCE CRITERIA	A person performing this task must be able to Service air conditioning control mechanisms as per technical requirements and manufacturer's specifications.		
RANGE STATEMENT:	This task can be performed in the automotive workshop under the supervision of Automotive /Mechanical Engineer. The following tools and equipment will be required: 1. Full set of Automotive tool box; 2. Pitch/ramp; 3. Circuit tester lamps; 4. Washing machine; 5. Power source; 6. Vehicle fault diagnosis tester; 7. P.P.E, such as Safety Shoes, Goggles, Gloves, Work clothes; 8. Stethoscope; 9. Multimeters; 10. Interior and exterior protection suite; 11. Automotive oscilloscope; 12. Thermometer; 13. Wire harness repair tools; 14. Lifter.		

EVIDENCE REQUIREMENTS	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Observe safety precautions when performing the task; 2. Select proper tools and equipment for the task; 3. Service air condoning switch; 4. Service compressor circuit; 5. Check ac fuses and relays; 6. Service cooling fan circuit; 7. Clean tools, equipment and workplace; 8. Store tools and equipment; 9. Test ac system functions; 10. Use diagnostic instrument to query and analyze control module fault information and operation data;	**Detailed knowledge about:** **1.0. Methods:** The person performing this task must be able to explain how to: 1.1. Service compressor circuit control components; 1.2. Service blower circuit control components; 1.3. Service the cooling fan circuit control components. **2.0. Principles:** The person must be able to explain the principles of: 2.1. Servicing compressor circuit control logic; 2.2. Servicing cooling fan circuit control logic. **3.0. Theories:** The person must be able to explain: 3.1. Use of air conditioning maintenance tools and equipment; 3.2. Working principle of compressor circuit control

11. Replace and debug the electromagnetic clutch.	components; 3.3. Working principle of cooling fan circuit control components. **4.0. Essential skills** 4.1. Communication skills; 4.2. Customer care skills; 4.3. Entrepreneurship skills; 4.4. Team work skills; 4.5. Report writing skills; 4.6. Learning skills.
DESCRIPTION OF END PRODUCTS/SERVICE	Air conditioning control mechanism is serviced as per technical requirement and manufacturer's specifications.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed Knowledge about:** 1. Safe handling of working tools; 2. Safe handling of measuring instruments; 3. Occupational health and safety; 4. Maintenance operating policy and procedure (MOPP); **5.** Waste disposal methods.

OCCUPATION	AUTOMOTIVE ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	REPAIR AUTOMOTIVE AIR CONDITIONER SYSTEM	**DUTY NO.**	605
TASK TITLE	REPAIR AUTOMOTIVE AIR CONDITIONING HEATING SYSTEM	**TASK NO.**	6053
PERFORMANCE CRITERIA	A person performing this task must be able to Service Automotive Air conditioning heating system as per technical requirements and manufacturer's specifications;		
RANGE STATEMENT:	This task can be performed in the automotive workshop under the supervision of Automotive /Mechanical Engineer. The following tools and equipment will be required: 1. Full set of Automotive tool box; 2. Pitch/ramp; 3. Washing machine; 4. Power source; 5. Vehicle fault diagnosis tester; 6. P.P.E, such as Safety Shoes, Goggles, Gloves, Work clothes; 7. Vacuum machine; 8. Interior and exterior protection suite; 9. Refrigerant cylinder opener; 10. Refrigerant electronic leak detector; 11. Simple pressure gauge set for air conditioning repair; 12. Refrigerant filling machine; 13. Lifter.		

EVIDENCE REQUIREMENTS	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Observe safety precautions when performing the task; 2. Select proper tools and equipment for the task; 3. Inspect water pipes of the whole car; 4. Repair heater cores; 5. Replace electrical heater; 6. Test air conditioning heating System; 7. Clean tools, equipment and workplace; 8. Store tools and equipment; 9. Disassemble and adjust the car instrument desk; 10. Disassemble and adjust the evaporator assembly.	**Detailed knowledge about:** **1.0. Methods:** The person performing this task must be able to explain how to: 1.1. Repair heater core; 1.2. Repair evaporator; 1.3. Disassemble and debug the instrument desk; 1.4. Disassemble and debug the evaporator assembly. **2.0. Principles:** The person must be able to explain the principles of warm air heating system control logic. **3.0. Theories:** The person must be able to explain: 3.1. Automotive Air conditioning water heating components and working principles; 3.2. Possible faults in Automotive Air conditioning heating system and causes;

	3.3. Using air conditioning service tools and equipment; 3.4. Types of heat source and working principle of automobile air conditioning warm air system. **4.0. Essential skills** 4.1. Communication skills; 4.2. Customer care skills; 4.3. Entrepreneurship skills; 4.4. Team work skills; 4.5. Report writing skills; 4.6. Learning skills.
DESCRIPTION OF END PRODUCTS/SERVICE	Automotive Air conditioning heating system is serviced as per technical requirement and manufacturer's specifications.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed Knowledge about:** 1. Safe handling of working tools; 2. Safe handling of measuring instruments; 3. Occupational health and safety; 4. Maintenance operating policy and procedure (MOPP); **5.** Waste disposal methods.

OCCUPATION	AUTOMOTIVE ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	REPAIR AUTOMOTIVE AIR CONDITIONER SYSTEM	**DUTY NO.**	605
TASK TITLE	REPAIR AUTOMOTIVE AIR CONDITIONING VENTILATION SYSTEM	**TASK NO.**	6054
PERFORMANCE CRITERIA	A person performing this task must be able to Service Automotive Air conditioning ventilation system as per technical requirements and manufacturer's specifications.		
RANGE STATEMENT:	This task can be performed in the automotive workshop under the supervision of Automotive /Mechanical Engineer. The following tools and equipment will be required: 1. Interior and exterior protection suite; 2. Power source; 3. Vehicle fault diagnosis tester; 4. Wire harness repair tools; 5. Circuit tester lamps; 6. Vehicle fault diagnosis tester; 7. Multimeter; 8. Oscilloscope; 9. Air conditioning pollen filter; 10. P.P.E, such as Safety Shoes, Goggles, Gloves, Work clothes.		

EVIDENCE REQUIREMENTS

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Observe safety precautions when performing the task; 2. Select proper tools and equipment for the task; 3. Check the inlet air control system; 4. Check the air outlet control system; 5. Replace air conditioning filter; 6. Check hot and cold control valve; 7. Repair mechanical damper control mechanism; 8. Repair electronic damper control mechanism; 9. Repair blower circuit 10. Clean tools, equipment and workplace; 11. Store tools and equipment.	**Detailed knowledge about:** **1.0. Methods:** The person performing this task must be able to explain how to: 1.1. Check the air supply system; 1.2. Repair mechanical damper control mechanism; 1.3. Repair electronic damper control mechanism; 1.4. Repair blower circuit. **2.0. Principles:** The person must be able to explain the principles of ventilation system control logic. **3.0. Theories:** The person must be able to explain: 3.1. Automotive Air conditioning ventilation system components and working principles; 3.2. Possible faults in Automotive Air conditioning ventilation system and causes; 3.3. Using air conditioning service tools and equipment. **4.0. Essential skills**

	4.1. Communication skills; 4.2. Customer care skills; 4.3. Entrepreneurship skills; 4.4. Team work skills; 4.5. Report writing skills; 4.6. Learning skills.
DESCRIPTION OF END PRODUCTS/SERVICE	Automotive Air conditioning ventilation system is serviced as per technical requirement and manufacturer's specifications.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed Knowledge about:** 1. Safe handling of working tools; 2. Safe handling of measuring instruments; 3. Occupational health and safety; 4. Maintenance operating policy and procedure (MOPP); 5. Waste disposal methods.

OCCUPATION	AUTOMOTIVE ENGINEERING TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	REPAIR VEHICLE BODY	**DUTY NO.**	606
TASK TITLE	INSPECT BODY DAMAGES	**TASK NO.**	6061
PERFORMANCE CRITERIA	A person performing this task must be able to inspect motor vehicle body damages as per technical requirements and manufacturer's specifications.		
RANGE STATEMENT:	This task can be performed in the automotive workshop under the supervision of Automotive /Mechanical Engineer. The following tools and equipment will be required: 1. Full set of Automotive tool box; 2. Lifter; 3. Interior and exterior protection suite; 4. Power source; 5. P.P.E, such as Safety Shoes, Goggles, Gloves, Work clothes; 6. Pitch/ramp.		

EVIDENCE REQUIREMENTS

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Observe safety precautions when performing the task; 2. Select proper tools and equipment for the task; 3. Inspect body damages; 4. Identify defective parts; 5. Record inspection results; 6. Determine costs of repairs; 7. Clean tools, equipment and workplace; 8. Store tools and equipment	**Detailed knowledge about:** **1.0. Methods:** The person performing this task must be able to explain how to: 1.1. Inspect vehicle body defects. **2.0. Principles:** The person must be able to explain the principles of repairing vehicle body damages. **3.0. Theories:** The person must be able to explain: 3.1. Vehicle body damage inspection method; 3.2. Criteria for judging damaged parts. **4.0. Essential skills** 4.1. Communication skills; 4.2. Customer care skills; 4.3. Entrepreneurship skills; 4.4. Team work skills; 4.5. Report writing skills; 4.6. Learning skills.
DESCRIPTION OF END PRODUCTS/SERVICE	Vehicle body damages are inspected as per technical requirement and manufacturer's specifications.

CIRCUMSTANTIAL KNOWLEDGE	**Detailed Knowledge about:** 1. Safe handling of working tools; 2. Safe handling of measuring instruments; 3. Occupational health and safety; 4. Maintenance operating policy and procedure (MOPP); **5.** Waste disposal methods.

OCCUPATION	AUTOMOTIVE ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	REPAIR VEHICLE BODY	**DUTY NO.**	606
TASK TITLE	PERFORM VEHICLE BODY PARTS DISASSEMBLY AND ASSEMBLY	**TASK NO.**	6062
PERFORMANCE CRITERIA	A person performing this task must be able to perform vehicle body parts disassembly and assembly as per technical requirements and manufacturer's specifications.		
RANGE STATEMENT	This task can be performed in the automotive workshop under the supervision of Automotive /Mechanical Engineer. The following tools and equipment will be required: 1. Full set of Automotive tool box; 2. Power source; 3. Rivet gun; 4. Bonding tools; 5. Rust removal tools; 6. Anti-corrosion construction equipment; 7. P.P.E, such as Safety Shoes, Goggles, Gloves, Work clothes, Masks, Ear plugs; 8. Interior and exterior protection suite; 9. Lifter; 10. Cutting machine.		

EVIDENCE REQUIREMENTS	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Observe safety precautions for performing the task; 2. Select proper tools and equipment for the task; 3. Disassemble damaged parts; 4. Prepare new parts; 5. Use riveting, bonding and other methods for steel and aluminium vehicle body plates mixed assembly; 6. Perform anti-corrosion treatment of vehicle body parts; 7. Clean tools, equipment and workplace; 8. Store tools and equipment.	**Detailed knowledge about:** **1.0. Methods:** The person performing this task must be able to explain how to: 1.1. Disassemble damaged parts; 1.2. Perform riveting and bonding of plates; 1.3. Perform corrosion protection. **2.0. Principles:** The person must be able to explain the principles of: 2.1. Riveting; 2.2. Bonding; 2.3. Corrosion protection. **3.0. Theories:** The person must be able to explain: 3.1. Knowledge of safe use of electric and pneumatic tools; 3.2. Parts assembly process; 3.3. Anti-corrosion process.

	4.0. Essential skills 4.1. Communication skills; 4.2. Customer care skills; 4.3. Entrepreneurship skills; 4.4. Team work skills; 4.5. Report writing skills; 4.6. Learning skills.
DESCRIPTION OF END PRODUCTS/SERVICE	Vehicle body parts disassembly and assembly is performed as per technical requirement and Manufacturer's specifications.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed Knowledge about:** 1. Safe handling of working tools; 2. Safe handling of measuring instruments; 3. Occupational health and safety; 4. Maintenance operating policy and procedure (MOPP); 5. Waste disposal methods.

OCCUPATION	AUTOMOTIVE ENGINEERING TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	REPAIR VEHICLE BODY	**DUTY NO.**	606
TASK TITLE	PERFORM VEHICLE BODY SHAPING REPAIR	**TASK NO.**	6063
PERFORMANCE CRITERIA	A person performing this task must be able to perform body shaping repair as per technical requirements and manufacturer's specifications.		
RANGE STATEMENT:	This task can be performed in the automotive workshop under the supervision of Automotive /Mechanical Engineer. The following tools and equipment will be required: 1. Full set of Automotive tool box; 2. Arc welding Machine; 3. Gas welding machine; 4. Lifter; 5. Interior and exterior protection suite; 6. Sheet metal repair tool kit; 7. Cutting machine; 8. Ventilation and air exchange equipment; 9. Power source; 10. P.P.E, such as Safety Shoes, Goggles, Gloves, Work clothes, Masks, Ear plugs; 11. Automotive frame aligner; 12. Sanding machine; 13. Meson machine; 14. Resistance spot welding machine.		

EVIDENCE REQUIREMENTS	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Observe safety precautions when performing the task; 2. Select proper tools and equipment for the task; 3. Perform correction of damaged vehicle body; 4. Perform welding of steel parts; 5. Perform welding of aluminium parts; 6. Perform grinding of body parts; 7. Perform shaping of deformed sheet metal parts; 8. Perform stress relief; 9. Perform gas welding operations; 10. Clean tools, equipment and workplace;	**Detailed knowledge about:** **1.0. Methods:** The person performing this task must be able to explain how to: 1.1. Calibrate the vehicle body; 1.2. Perform welding operations; 1.3. Perform shaping of deformed sheet metal parts; 1.4. Perform stress relief and gas welding operations. **2.0. Principles:** The person must be able to explain the principles of perform vehicle body shaping repair. **3.0. Theories:** The person must be able to explain: 3.1. Body calibration stand operating procedures; 3.2. Knowledge of welding of steel parts; 3.3. Knowledge of welding of aluminium parts;

11. Store tools and equipment.	3.4. Knowledge of shaping repair of sheet metal parts; 3.5. Knowledge of stress relief and gas welding. **4.0. Essential skills** 4.1. Communication skills; 4.2. Customer care skills; 4.3. Entrepreneurship skills; 4.4. Team work skills; 4.5. Report writing skills; 4.6. Learning skills.
DESCRIPTION OF END PRODUCTS/SERVICE	Body sheet metal processing is performed and colour appearance is as per technical requirement and manufacturer's specifications.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed Knowledge about:** 1. Safe handling of working tools; 2. Safe handling of measuring instruments; 3. Occupational health and safety; 4. Maintenance operating policy and procedure (MOPP); 5. Waste disposal methods.

OCCUPATION	AUTOMOTIVE ENGINEERING TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	REPAIR VEHICLE BODY	**DUTY NO.**	606
TASK TITLE	PERFORM BODY SPRAY PAINTING	**TASK NO.**	6064
PERFORMANCE CRITERIA	A person performing this task must be able to perform body spray painting as per technical requirements and manufacturer's specifications.		
RANGE STATEMENT	This task can be performed in the automotive workshop under the supervision of Automotive /Mechanical Engineer. The following tools and equipment will be required: 1. Full set of Automotive tool box; 2. Car wash machine; 3. Polishing equipment; 4. Lifter; 5. Interior and exterior protection suite; 6. Power source; 7. P.P.E, such as Safety Shoes, Glasses, Gloves,Work clothes; 8. Air compressor; 9. Paint lamp; 10. Paint spray booth; 11. Paint spray gun.		

EVIDENCE REQUIREMENTS

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Observe safety precautions when performing the task; 2. Select proper tools and equipment for the task; 3. Prepare body cleaning and spray; 4. Clean vehicle body before spray painting; 5. Perform paint colour mixing; 6. Perform undercoating spray painting; 7. Perform finish painting; 8. Polish the lacquer; 9. Clean tools, equipment and workplace; 10. Store tools and equipment.	**Detailed knowledge about:** **1.0. Methods:** The person performing this task must be able to explain how to: 1.1. Perform paint colour mixing; 1.2. Perform body spray painting. **2.0. Principles:** The person must be able to explain the principles of perform paint colour mixing. **3.0. Theories:** The person must be able to explain: 3.1. Paint colour mixing; 3.2. Body spray stages. **4.0. Essential skills** 4.1. Communication skills; 4.2. Customer care skills; 4.3. Entrepreneurship skills; 4.4. Team work skills; 4.5. Report writing skills;

	4.6. Learning skills.
DESCRIPTION OF END PRODUCTS/SERVICE	Body Spray Painting is performed and colour appearance is as per technical requirement and manufacturer's specifications.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed Knowledge about:** 6. Safe handling of working tools; 7. Safe handling of measuring instruments; 8. Occupational health and safety; 9. Maintenance operating policy and procedure (MOPP); 10. Waste disposal methods.

OCCUPATION	AUTOMOTIVE ENGINEERING TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	REPAIR VEHICLE BODY	**DUTY NO.**	606
TASK TITLE	PERFORM PAINTWORK MAINTENANCE	**TASK NO.**	6065
PERFORMANCE CRITERIA	A person performing this task must be able to perform paintwork maintenance as per technical requirements and manufacturer's specifications.		
RANGE STATEMENT:	This task can be performed in the automotive workshop under the supervision of Automotive /Mechanical Engineer. The following tools and equipment will be required: 1. Full set of Automotive tool box; 2. Lifter; 3. Car wash machine; 4. Power source; 5. P.P.E, such as Safety Shoes, Glasses, Gloves,Work clothes, Masks, Ear plugs; 6. Interior and exterior protection suite; 7. Polishing machine; 8. Grinder; 9. Waxing machine; 10. Glazing machine; 11. Hot air gun; 12. Spray gun.		

EVIDENCE REQUIREMENTS

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Observe safety precautions when performing the task; 2. Select proper tools and equipment for the task; 3. Clean the body properly; 4. Perform paintwork polishing; 5. Perform waxing of the paintwork; 6. Perform paint glazing, coating and crystallizing; 7. Execute vehicle body filming; 8. Clean tools, equipment and workplace; 9. Store tools and equipment.	**Detailed knowledge about:** **1.0. Methods:** The person performing this task must be able to explain how to: 1.1. Perform polishing; 1.2. Perform waxing; 1.3. Perform paintwork glazing, coating and crystallizing; 1.4. Execute vehicle body filming. **2.0. Principles:** The person must be able to explain the principles of perform paintwork maintenance. **3.0. Theories:** The person must be able to explain: 3.1. Theory of paintwork protection. **4.0. Essential skills** 4.1. Communication skills;

	4.2. Customer care skills; 4.3. Entrepreneurship skills; 4.4. Team work skills; 4.5. Report writing skills; 4.6. Learning skills.
DESCRIPTION OF END PRODUCTS/SERVICE	Body Spray Painting is performed and colour appearance is as per technical requirement and manufacturer's specifications.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed Knowledge about:** 1. Safe handling of working tools; 2. Safe handling of measuring instruments; 3. Occupational health and safety; 4. Maintenance operating policy and procedure (MOPP); 5. Waste disposal methods.

OCCUPATION	AUTOMOTIVE ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	REPAIR VEHICLE AUXILIARY APPLIANCES AND ANTI-THEFT ALARM SYSTEMS	**DUTY NO.**	607
TASK TITLE	REPAIR VEHICLE AUXILIARY APPLIANCES SYSTEM	**TASK NO.**	6071
PERFORMANCE CRITERIA	A person performing this task must be able to repair vehicle auxiliary appliances system as per technical requirements and manufacturer's specifications.		
RANGE STATEMENT	This task can be performed in the automotive workshop under the supervision of Automotive /Mechanical Engineer. The following tools and equipment will be required: 1. Full set of Automotive tool box; 2. Interior and exterior protection suite; 3. Power source; 4. Vehicle fault diagnosis tester; 5. P.P.E, such as Safety Shoes, Goggles, Gloves, Work clothes; 6. Battery charger; 7. Multimeters; 8. Circuit tester lamps; 9. Automotive oscilloscope; 10. Wire harness repair tools.		

EVIDENCE REQUIREMENTS

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Observe safety precautions; 2. Select proper tools and equipment; 3. Service Horn circuit; 4. Service Wiper circuit; 5. Repair washer circuits; 6. Test repaired/replaced accessories; 7. Clean tools, equipment and workplace; 8. Store tools and equipment; 9. Repair power window circuit; 10. Repair power mirror circuit; 11. Repair power seat circuit; 12. Repair power steering wheel circuit; 13. Repair power tailgate circuit.	**Detailed knowledge about:** **1.0. Methods:** The person performing this task must be able to explain how to: 1.1. Repair auxiliary appliances system; 1.2. Troubleshoot auxiliary appliances. **2.0. Principles:** The person must be able to explain the principles of repairing Vehicle auxiliary appliances. **3.0. Theories:** The person must be able to explain: 3.1. Structural components of auxiliary appliances system; 3.2. Methods of troubleshooting auxiliary appliances systems. **4.0. Essential skills** 4.1. Communication skills; 4.2. Customer care skills;

	4.3. Entrepreneurship skills; 4.4. Team work skills; 4.5. Report writing skills; 4.6. Learning skills.
DESCRIPTION OF END PRODUCTS/SERVICE	Vehicle auxiliary appliances system repaired as per technical requirement and manufacturer's specifications.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed Knowledge about:** 1. Safe handling of working tools; 2. Safe handling of measuring instruments; 3. Occupational health and safety; 4. Maintenance operating policy and procedure (MOPP); 5. Waste disposal methods.

OCCUPATION	AUTOMOTIVE ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	REPAIR VEHICLE AUXILIARY APPLIANCES AND ANTI-THEFT ALARM SYSTEMS	**DUTY NO.**	607
TASK TITLE	REPAIR ALARM SYSTEMS	**TASK NO.**	6072
PERFORMANCE CRITERIA	A person performing this task must be able to repair alarm systems as per technical requirements and manufacturer's specifications.		
RANGE STATEMENT	This task can be performed in the automotive workshop under the supervision of Automotive /Mechanical Engineer. The following tools and equipment will be required: 1. Full set of Automotive tool box; 2. Interior and exterior protection suite; 3. Power source; 4. Vehicle fault diagnosis tester; 5. P.P.E, such as Safety Shoes, Goggles, Gloves, Work clothes; 6. Battery charger; 7. Multimeters; 8. Circuit tester lamps; 9. Automotive oscilloscope; 10. Wire harness repair tools.		

EVIDENCE REQUIREMENTS	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Observe safety precautions when performing the task; 2. Select proper tools and equipment for the task; 3. Check alarm circuit; 4. Repair alarm circuit; 5. Replace alarm system; 6. Test repaired/replaced component; 7. Clean tools, equipment and workplace; 8. Store tools and equipment.	**Detailed knowledge about:** **1.0. Methods:** The person performing this task must be able to explain how to: 1.1. Repair alarm systems; 1.2. Troubleshoot alarm system. **2.0. Principles:** The person must be able to explain the principles of repairing alarm systems. **3.0. Theories:** The person must be able to explain: 3.1. Structural components of alarm systems; 3.2. Performing repair of Alarm systems. **4.0. Essential skills** 4.1. Communication skills; 4.2. Customer care skills; 4.3. Entrepreneurship skills; 4.4. Team work skills; 4.5. Report writing skills;

	4.6. Learning skills.
DESCRIPTION OF END PRODUCTS/SERVICE	Alarm system is repaired as per technical requirement and manufacturer's specifications.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed Knowledge about:** 1. Safe handling of working tools; 2. Safe handling of measuring instruments; 3. Occupational health and safety; 4. Maintenance operating policy and procedure (MOPP); 5. Waste disposal methods.

OCCUPATION	AUTOMOTIVE ENGINEERING TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	REPAIR VEHICLE AUXILIARY APPLIANCES AND ANTI-THEFT ALARM SYSTEMS	**DUTY NO.**	607
TASK TITLE	REPAIR IMMOBILIZER SYSTEMS	**TASK NO.**	6073
PERFORMANCE CRITERIA	A person performing this task must be able to repair immobilizer systems as per technical requirements and manufacturer's specifications.		
RANGE STATEMENT	This task can be performed in the automotive workshop under the supervision of Automotive /Mechanical Engineer. The following tools and equipment will be required: 1. Full set of Automotive tool box; 2. Interior and exterior protection suite; 3. Power source; 4. Vehicle fault diagnosis tester; 5. P.P.E, such as Safety Shoes, Goggles, Gloves, Work clothes; 6. Battery charger; 7. Multimeters; 8. Circuit tester lamps; 9. Automotive oscilloscope; 10. Wire harness repair tools.		

EVIDENCE REQUIREMENTS	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Observe safety precautions when performing the task; 2. Select proper tools and equipment for the task; 3. Check smart key parts; 4. Repair smart key; 5. Program smart key; 6. Inspect Global Positioning System (GPS); 7. Repair navigation circuit; 8. Test repaired systems; 9. Clean tools, equipment and workplace; 10. Store tools and equipment; 11. Repair remote control circuit; 12. Repair keyless entry system circuit; 13. Repair door lock circuit; 14. Check and test the immobilizer system.	**Detailed knowledge about:** **1.0. Methods:** The person performing this task must be able to explain how to: 1.1. Repair immobilizer systems; 1.2. Troubleshoot immobilizer systems. **2.0. Principles:** The person must be able to explain the anti-theft principles. **3.0. Theories:** The person must be able to explain: 3.1. Immobilizer systems parts; 3.2. Performing repair of immobilizer systems. **4.0. Essential skills** 4.1. Communication skills; 4.2. Customer care skills; 4.3. Entrepreneurship skills; 4.4. Team work skills; 4.5. Report writing skills;

	4.6. Learning skills.
DESCRIPTION OF END PRODUCTS/SERVICE	Immobilizer system is repaired as per technical requirement and manufacturer's specifications.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed Knowledge about:** 1. Safe handling of working tools; 2. Safe handling of measuring instruments; 3. Occupational health and safety; 4. Maintenance operating policy and procedure (MOPP); 5. Waste disposal methods.

TABLE 1: DACUM CHARTS FOR AUTOMOTIVE ENGINEERS NTA LEVEL 6

DUTIES	TASKS	ENABLERS
1.0. Repair Starting System.	1.1. Repair starting system circuit. 1.2. Repair starter assembly. 1.3. Troubleshoot starting system.	**Generic skills and knowledge** • Using communication skills to work with others, reporting to superiors • Use of manufacturer's manual • skills and knowledge on Vehicle Starting Systems, components and operations. • Machine elements • Interpretation of technical drawing • Basic Material science **Tools and Equipment** • PPE such as Safety Shoes, Goggles, Gloves, Hearing Protection, Hard Hats. • Full automotive tool box • Lifter, car maintenance work light, interior and exterior protection suite, battery charger, battery jumper wires • Multimeter, circuit test probes, current clamp, vehicle fault diagnosis tester, automotive oscilloscope, circuit tester lamps, wires for bench testing • Rubber hammer, vernier calipers, bench vise, wire harness repair tools, soldering iron, hot

DUTIES	TASKS	ENABLERS
		air gun **Materials** Starter Motor and Its parts, individual car batteries, fuses, relays, grease, insulating tape, heat shrinkable tubing, cleaning cloth **Worker Behaviours** Team spirit, trustworthy, time management and commitment
2.0. Repair Charging Systems.	2.1. Service charging system circuit. 2.2. Repair charging control system. 2.3. Repair alternator. 2.4 Troubleshoot charging system.	**Generic skills and knowledge** • Using communication skills to work with others, reporting to superiors • Use of manufacturer's manual • skills and knowledge on Charging systems • Charging Systems Components • Interpretation of technical drawing • Basic Material science **Tools and Equipment** • PPE such as Safety Shoes, Goggles, Gloves, Hearing

DUTIES	TASKS	ENABLERS
		Protection, Hard Hats. • Full Automotive tool box. • Lifter, car maintenance work light, interior and exterior protection suite, battery charger • Multimeter, circuit test probes • Vehicle fault diagnosis tester, automotive oscilloscope, circuit tester lamps • Rubber hammer, bench vise • Wire harness repair tools, soldering iron, hot air gun **Materials** Alternators, Voltage regulators, Diodes, fuses, relays, grease, insulating tape, heat shrinkable tubing, cleaning cloth, etc. **Worker Behaviours** Team spirit, trustworthy, time management and commitment

DUTIES	TASKS	ENABLERS
3.0. Repair Ignition System.	3.1. Repair ignition system circuit. 3.2. Repair electronic ignition systems. 3.3 Repair magneto ignition systems. 3.4. Repair distributorless ignition systems.	**Generic skills and knowledge** • Using communication skills to work with others, reporting to superiors • Use of manufacturer's manual • skills and knowledge on Automotive Ignition systems • Ignition systems Components • Interpretation of technical drawing • Basic Material science **Tools and Equipment** • PPE such as Safety Shoes, Goggles, Gloves, Hearing Protection, Hard Hats. • Full Automotive Tool Box • Lifter, car maintenance work light, interior and exterior protection suite, battery charger • Multimeter, circuit test probes • Vehicle fault diagnosis tester, automotive oscilloscope, circuit tester lamps • Wire harness repair tools, soldering iron, hot air gun **Materials** Distributor Caps, Ignition Coil, Igniters, Spark plugs, High Tension Leads, fuses, relays, insulating tape, heat shrinkable tubing, cleaning cloth **Worker Behaviours**

DUTIES	TASKS	ENABLERS
		Team spirit, trustworthy, time management and commitment

DUTIES	TASKS	ENABLERS
4.0 Repair Lighting Systems.	4.1. Check lighting system. 4.2. Repair external lighting lamp circuit. 4.3. Repair signal indicator circuit. 4. 4. Repair internal lighting circuit. 4.5. Repair instrument cluster.	**Generic skills and knowledge** • Using communication skills to work with others, reporting to superiors • Use of manufacturer's manual • skills and knowledge on Vehicle Lighting Systems. • Components of Lighting Systems • Interpretation of technical drawing • Basic Material science **Tools and Equipment** • PPE such as Safety Shoes, Goggles, Gloves, Hearing Protection, Hard Hats. • Full automotive Tool Box • Lifter, car maintenance work light, interior and exterior protection suite, battery charger • Multimeter, circuit test probes • Vehicle fault diagnosis tester, automotive oscilloscope, circuit tester lamps • Wire harness repair tools, soldering iron, hot air gun **Materials** Head Lamps, Indicator Lamps, Parking Lamps, Relays, fuses, insulating tape, heat shrinkable tubing, cleaning cloth, etc.

DUTIES	TASKS	ENABLERS
		Worker Behaviours Team spirit, trustworthy, time management and commitment

DUTIES	TASKS	ENABLERS
5.0. Repair Automotive Air Conditioning System.	5.1. Repair automotive air conditioning cooling system. 5.2. Repair automotive air conditioning control mechanisms. 5.3. Repair automotive air conditioning heating system. 5.4. Repair automotive air conditioning ventilation system.	**Generic skills and knowledge** • Using communication skills to work with others, reporting to superiors • Use of manufacturer's manual • skills and knowledge on Vehicle Automotive Air Conditioning • Components of Automotive Air conditioning • Interpretation of technical drawing • Basic Material science **Tools and Equipment** • PPE such as Safety Shoes, Goggles, Gloves, Hearing Protection, Hard Hats. • Full automotive Tool Box • Leak detector • Thermometer • Lifter, car maintenance work light, interior and exterior protection suite, vehicle fault diagnosis tester, circuit tester lamps • Multimeter, circuit test probes • Wire harness repair tools, soldering iron, hot air gun • Refrigerant filling machine, simple pressure gauge set for air conditioning repair, vacuum machine, refrigerant cylinder

DUTIES	TASKS	ENABLERS
		opener, brush **Materials** Refrigerant gas, Compressor oil, soapy water, air conditioning pipe seal, air conditioning filter drier, wire harness tie, water pipe sealant, air conditioning pollen filter insulating tape, shrinkable tubing, cleaning cloth **Worker Behaviours** Team spirit, trustworthy, time management and commitment

DUTIES	TASKS	ENABLERS
6.0. Repair Vehicle Body.	6. 1 Inspect body damages. 6.2. Perform vehicle body parts disassembly and assembly. 6.3. Perform vehicle body shaping repair. 6.4. Perform body spray painting. 6.5. Perform paintwork maintenance.	**Generic skills and knowledge** • Using communication skills to work with others, reporting to superiors • Use of manufacturer's manual • skills and knowledge on Vehicle Body. • Knowledge and skills on Gas and Arc Welding • Interpretation of technical drawing • Basic Material science **Tools and Equipment** • PPE such as Safety Shoes, Goggles, Gloves, Hearing Protection, Hard Hats. • Arc Welding Machine, Gas Welding Equipments • Full Automotive Tool box. • Car maintenance work light, interior and exterior protection suite, rivet guns, sanding machines, Meson machine, ventilation and air exchange equipment • Sheet metal hammer, top iron, rubber hammer • Car wash machine, car wash cloth, brush • Paint spray booth, paint spray gun, paint lamp, polishing

DUTIES	TASKS	ENABLERS
		machine, waxing machine, grinder, glazing machine, spray gun **Materials** Thinner, hardener, paint, gas and electric welding rods, rivets, putty paste, car wash cleaner, cleaning solvent, spray paint protection paper, paper tape, polish, car wax, glaze, coating agent, crystallizing kit, car film, cleaning cloth **Worker Behaviours** Team spirit, trustworthy, time management and commitment

DUTIES	TASKS	ENABLERS
7.0. Repair Vehicle Auxiliary Appliances and Anti-theft Alarm Systems.	7.1. Repair vehicle auxiliary appliances system 7.2. Repair alarm systems. 7.3. Repair immobilizer systems.	**Generic skills and knowledge** • Using communication skills to work with others, reporting to superiors • Use of manufacturer's manual • skills and knowledge on Vehicle safety, security and Entertainment systems • Knowledge on digital and programming language • Basic Material science **Tools and Equipment** • PPE such as Safety Shoes, Goggles, Gloves, Hearing Protection, Hard Hats. • Vehicle fault diagnosis tester • Lifter, car maintenance work light, interior and exterior protection suite, battery charger • Multimeter, circuit test probes • Automotive oscilloscope, circuit tester lamps • Wire harness repair tools, soldering iron, hot air gun **Materials** Alarm, fuses, relays, insulating tape, heat shrinkable tubing, cleaning cloth **Worker Behaviours** Team spirit, trustworthy, time management and commitment