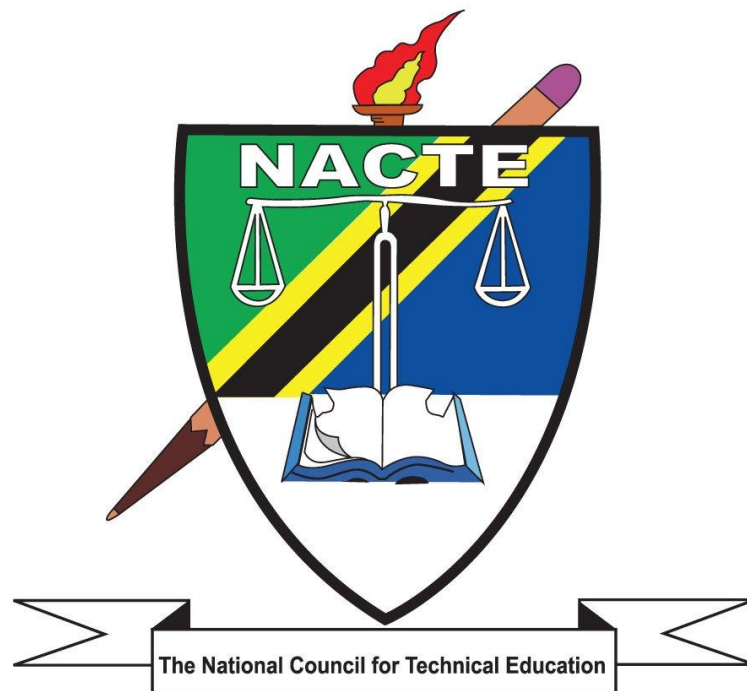


NATIONAL COUNCIL FOR TECHNICAL EDUCATION



NOVEMBER 2022

OCCUPATIONAL STANDARDS FOR AUTOMOTIVE ENGINEERS

LEVEL: NTA 7

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FOREWORD

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

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

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

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

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

To address the skills miss-match and shortage in the five (5) sectors in the country, the project funded, among others, a component of Development of Occupational Standards for Technical and Vocational Education and Training (TVET). In this regard, NACTE endeavoured to identify

qualified and highly experienced experts in the five sectors from both the industry and training institutions to carry out the development of Occupational Standards. The exercise was carried out at Morogoro Teachers College – Morogoro from 16th July to 10th August, 2021. The output of the exercise is Occupational Standards for 12 occupations. Occupational standards for Automotive engineers 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 Eng. Dr. Simon Bareguand Mrs Leah Lukindo for the tireless efforts and commitment in facilitating and guiding the standards development process, Ms. Eileen Tzamburakis and Ms. ChausikuYakweli Ibrahim for compiling and type setting the final document; and the NACTE Secretariat for coordinating the whole activity.

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

S/N	Name	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:

<u>S/N</u>	Institute	Name	Title/area of expertise
1	Zibo Vocational Institute	Gao Xiaochen	Professor/Automotive
2		Chen Chao	Associate Professor/Automotive
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8		Wang Xike	Lecturer/Automotive
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2		Cao Denghua	Professor
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5		Liu Jungang	Associate Professor
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8		Chang Tongzhen	Lecturer/Automotive
9		Bao Qiang	Lecturer/Automotive

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
Executive Secretary

Dar es Salaam
NOVEMBER 2022

ABBREVIATIONS

ABS	Anti-locking Braking System
CDI	Capacitor Diode Ignition
ECM	Electronic Control Module
OBD-II	Second Generation of On-board Diagnostics
EFI	Electronic Fuel Injection
ESA	Electronic Spark Advance
VVTi	Variable Valve Timing with intelligence
MOPP	Maintenance Operation and Procedure
NACTE	National Accreditation Council of Technical Education
NOS	National Occupational Standards
OS	Occupational Standards
TET	Technical Education and Training
TVET	Technical and Vocational Education and Training

GLOSSARY OF TERMS

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

1.0. INTRODUCTION

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

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

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

In TET delivery, Tanzania adopted the 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 Engineer Occupation has its own set of occupational standards. The document explains how the occupational standards were developed, as well as the scope, the occupational profile in the form of DACUM charts, and the Occupational Standards.

2.0. OCCUPATIONAL STANDARD DEVELOPMENT PROCESS

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

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

The occupational standards were then developed. Experts in Occupational Analysis and the Development of Occupational Standards facilitated the workshop. Interviews, online surveys, and a stakeholder forum were used to validate the occupational standards. Engineers, supervisory technicians on the job, and experienced Civil 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 Engineer. 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 engineer 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 engineers help with the design of new vehicles as well as the maintenance of vehicle components such as engines, transmissions, brake systems, and safety measures. Mechanical, electrical, and electronic components make up modern automobiles. As a result, an engineer in this sector is responsible for resolving mechanical, electrical and electronic issues in automobiles. These occupational standards are concerned with the vehicle's maintenance and upkeep, which include electrical and electronic diagnosis. The following are the primary responsibilities of an automotive engineer:

- a) Servicing Mechanical, electrical and electronics systems in vehicles
- b) Performing physical and virtual tests
- c) Building prototypes of components to carry out tests on
- d) Interpreting and analysing results and data
- e) Providing technical advice and answering queries from clients
- f) Sourcing vehicle components and selecting the best materials to use
- g) Using specialist computer modelling software to conduct diagnoses in vehicle components
- h) Agreeing and negotiating project budgets, timescales and specifications with clients and managers
- i) Making improvements to vehicles in response to customer feedback
- j) Investigating and solving problems, e.g. mechanical failures
- k) Writing reports and documentation
- l) Undertaking relevant research
- m) Supervising subordinates

The Occupational standards have been clustered into NTA qualification levels i.e. NTA level 7 and 8.

4.0. VALIDITY PERIOD

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

5.0. OCCUPATIONAL STANDARDS

5.1. OCCUPATIONAL STANDARDS FOR AUTOMOTIVE ENGINEERS - NTA 7

OCCUPATION	AUTOMOTIVE ENGINEER	OCCUPATION CODE	
DUTY TITLE	MANAGE HEALTH AND SAFETY AT WORK PLACE	DUTY NO.	701
TASKTITLE	MAINTAIN HEALTH AND SAFETY AT WORKPLACE	TASK NO.	7011
PERFORMANCE CRITERIA	A person performing this task must be able maintain safety at place of work as per technical requirements and Occupational safety and health regulations.;		
RANGE STATEMENT	<p>This task can be performed in the automotive workshop under the supervision of automotive/Mechanical Engineer. The following tools and equipment will be required:</p> <ol style="list-style-type: none"> 1. Organised store; 2. Changing rooms; 3. Wash rooms; 4. Fire alarm; 5. CCTV Camera; 6. Fire extinguishers; 7. P.P.E, such as Safety Shoes, Goggles, Gloves, Safety Helmets, Protective Gloves, Insulated Gloves; 8. Medical First Aid Kit. 		
EVIDENCE REQUIREMENTS			
Practical Performance	Underpinning knowledge		
<p>The person performing this task must be able do the following:</p> <ol style="list-style-type: none"> 1. Establish Occupational safety and health hazards register; 2. Develop procedures for handling hazardous substances and events; 3. Perform emergency response drills; 4. Demonstrate to subordinate the use P.P.E; 5. Compile the list of unsafe incidences and accidents on daily basis; 6. Develop mitigation measures; 7. Identify pollutants at work place; 8. Put in place mitigation measures for pollution; and 9. Monitor implementation of safety procedures in the work stations. 	<p>Detailed knowledge about:</p> <p>1.0. Methods:</p> <p>The person performing this task must be able to explain how to:</p> <ol style="list-style-type: none"> 1.1. Prepare the register of occupational hazards at work place; 1.2. Perform emergency drills; 1.3. Deal with different pollutants; 1.4. Monitor implementation of occupational health and safety regulations; 1.5. Workshop 7S management (seiri, seiton, seiso, seikeetsu, shitsuke, safety, saving). <p>2.0. Principles:</p> <p>The person must be able to explain the principles of:</p> <ol style="list-style-type: none"> 2.1. Extinguishing fire; 2.2. Handle people with various injuries due different types of hazards. <p>3.0. Theories:</p> <p>The person must be able to explain:</p>		

	<p>3.1. Type of health and safety hazards their causes at workplace;</p> <p>3.2. Mitigation measures on different types of hazards;</p> <p>3.3. Developing safety consciousness at work place;</p> <p>3.4. Safety symbols and signs;</p> <p>3.5. Different Pollutants and their mitigation measures;</p> <p>3.6. Preparation of good working environment.</p> <p>4.0. Essential Skills: The person performing the task must have the following skills:</p> <p>4.1. Communication skills;</p> <p>4.2. Management skills;</p> <p>4.3. Data storage skills;</p> <p>4.4. Customer care skills;</p> <p>4.5. Team work skills;</p> <p>4.6. Report writing skills;</p> <p>4.7. Computer operation skills.</p>
DESCRIPTION OF END PRODUCTS/SERVICE	Safety at place of work maintained as per technical specifications and Occupational safety and health regulations.
CIRCUMSTANTIAL KNOWLEDGE	<p>Detailed knowledge about:</p> <ol style="list-style-type: none"> 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	MANAGE HEALTH AND SAFETY AT WORK PLACE	DUTY NO.	701
TASKTITLE	PERFORM WORKSHOP RISK ASSESSMENT	TASK NO.	7012
PERFORMANCE CRITERIA	A person performing this task must be able to perform Workshop risk assessment as per technical requirements and guidelines approved by the Occupational Safety and Health Authority.		
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. OSHA regulations Manual; 2. Note book, Pen/pencil, Computer; 3. P.P.E, such as Safety Shoes, Goggles, Gloves, Safety Helmets, Protective Gloves, Insulated Gloves.		
EVIDENCE REQUIREMENTS			
Practical performance	Underpinning Knowledge		
This person performing this task must be able to explain how to: 1. Select right tools and P.P.E for the task; 2. Observe health and safety when performing the task; 3. Obtain resources required for the task; 4. Identify Risk of battery Acid; 5. Identify Risk of Electrical Shock; 6. Identify Risk of Exhaust gases; 7. Identify Risk of fire; 8. Identify Risk of Slippery Floor; 9. Identify Risk of Rising/lifting Vehicle; 10. Identify Risk of Short Circuit; 11. Identify risk of running Engine; 12. Identify the risk of moving Loads; 13. Establish a risk register; 14. Determine mitigation measures for the identified risks; 15. Clean tools, equipment and workplace; 16. Store tools and equipment; 17. Identify liquid splash risks.	Detailed knowledge about: 1.0. Methods: This person performing this task must be able to explain how to: 1.1. Perform the risk assessment; 1.2. Prepare the risk register. 2.0. Principles: The person must be able to explain the principles of Preparing checklist for workshop risk assessment. 3.0. Theories: The person must be able to explain: 3.1. Assessment Possible risks at work place; 3.2. Causes and mitigation measure of risks; 3.3. Effects of the risks; 3.4. Importance of conducting risk assessment. 4.0. Essential skills: 4.1. Communication skills; 4.2. Management skills; 4.3. Data storage skills; 4.4. Customer care skills; 4.5. Team work skills; 4.6. Report writing skills; 4.7. Computer operation skills;		

	<p>4.8. Circuit risk assessment skills;</p> <p>4.9. Fire risk assessment skills;</p> <p>4.10. Risk assessment skills for the use of tools and equipment.</p>
DESCRIPTION OF END PRODUCTS/SERVICE	Workshop risk assessment is performed as per technical specifications and guidelines issued by the Occupational Safety and Health Authority.
CIRCUMSTANTIAL KNOWLEDGE	<p>Detailed Knowledge about:</p> <ol style="list-style-type: none"> 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	MANAGE HEALTH AND SAFETY AT WORK PLACE	DUTY NO.	701
TASKTITLE	DESIGN WORK STATION	TASK NO.	7013
PERFORMANCE CRITERIA	A person performing this task must be able to design work stations per technical requirements and Occupational Safety and Health regulations.		
RANGE STATEMENT	This task can be performed in the automotive workshop under the supervision of Automotive/Mechanical Engineer. The OSHA regulations Manual will be required.		
EVIDENCE REQUIREMENTS			
Practical performance		Underpinning Knowledge	
<p>The person performing this task must be able do the following:</p> <ol style="list-style-type: none"> 1. Observe health and safety when performing the task; 2. Obtain required resources for the task; 3. Design workshop overall layout plan; 4. Install the equipment in accordance with the layout; 5. Design the marks on walkways; 6. Mark walkways; 7. Determine the place to fix symbols for safety precautions; 8. Place safety symbols in right places; 9. Design layout for storage of tools and equipment in stores; 10. Organise the store according to the layout; 11. Design Washrooms; 12. Design drinking water station; 13. Design Changing Room; 14. Design disposal stations for used parts, tools, liquids and other items; 15. Design the layout of sanitary and cleaning tool storage; 16. Clean tools, equipment and workplace; 17. Store tools and equipment. 		<p>Detailed knowledge about:</p> <p>1.0. Methods: This person performing this task must be able to explain how to:</p> <ol style="list-style-type: none"> 1.1. Design a work station for the Automotive workshop. <p>2.0. Principles: The person must be able to explain the principles of designing work Station.</p> <p>3.0. Theories: The person must be able to explain requirements for the work Station for the automotive workshop.</p> <p>4.0. Essential skills:</p> <ol style="list-style-type: none"> 4.1. Communication skills; 4.2. Management skills; 4.3. Data storage skills; 4.4. Customer care skills; 4.5. Team work skills; 4.6. Report writing skills; 4.7. Computer operation skills; 4.8. Workshop planning and design skills. 	

DESCRIPTION OF END PRODUCTS/SERVICE	Work Station is designed as per technical specifications and Occupational safety and health authority.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: <ol style="list-style-type: none"> 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	MANAGE SERVICE SCHEDULE FOR ENGINE ELECTRONICS CONTROL SYSTEMS	DUTY NO.	702
TASK TITLE	ORGANISE SERVICE SCHEDULE FOR ENGINE ELECTRONICS CONTROL SYSTEMS	TASK NO.	7021
PERFORMANCE CRITERIA	A person performing this task must be able to organise a service schedule for engine electronics control systems as per technical requirements and Manufacturer's manual specifications.		
RANGE STATEMENT	<p>This task can be performed in the automotive workshop under the supervision of Automotive /Mechanical Engineer. The following tools and equipment will be required:</p> <ol style="list-style-type: none"> 1. Full sets of Automotive tool boxes; 2. Vehicle diagnosis Machines; 3. Programming Machines; 4. Vehicle diagnosis Bay; 5. Diesel Injector Nozzle Testing Machine; 6. Petrol Injector Nozzle Testing Machine; 7. Injection pump Testing Machine; 8. Washing machine; 9. Power source; 10. P.P.E, such as Safety Shoes, Goggles, Gloves; 11. Air compressor; 12. Lifter; 13. Oscilloscope; 14. Digital multimeter; 15. Charger; 16. Vehicle protection supplies; 17. Sanitary and cleaning supplies; 18. Junction box; 19. Oil and coolant recovery device. 		
EVIDENCE REQUIREMENTS			
Practical performance	Underpinning knowledge		
<p>The person performing this task must be able do the following:</p> <ol style="list-style-type: none"> 1. Observe health and safety when performing the task when performing the task; 2. Select right tools, equipment and safety gears for the task; 3. Prepare service schedule for Electronic components in vehicle; 	<p>Detailed knowledge about:</p> <p>1.0. Methods: This person performing this task must be able to explain how to:</p> <ol style="list-style-type: none"> 1.1. Organize service schedule for engine electronics control systems. 1.2. Perform service of various components of the engine electronics control system <p>2.0. Principles:</p>		

<ol style="list-style-type: none"> 4. Prepare service schedule for Fuel Injection (EFI) Services; 5. Prepare service schedule for Electronic Spark Advance (ESA) services; 6. Prepare Schedule for Lubrication Systems services; 7. Prepare Schedule for cooling system services; 8. Clean tools, equipment and workplace; 9. Store tools and equipment. 	<p>The person must be able to explain the principles of:</p> <ol style="list-style-type: none"> 2.1. Organizing service schedule for engine electronics control systems; 2.2. Periodic engine maintenance. <p>3.0. Theories: The person must be able to explain:</p> <ol style="list-style-type: none"> 3.1. General knowledge on Electronic circuits; 3.2. Managing service schedule for engine electronics control systems; 3.3. Systems control. <p>4.0. Essential skills:</p> <ol style="list-style-type: none"> 4.1. Communication skills; 4.2. Management skills; 4.3. Data storage skills; 4.4. Entrepreneurship skills; 4.5. Customer care skills; 4.6. Team work skills; 4.7. Report writing skills; 4.8. Computer application skills; 4.9. Circuit testing skills; 4.10. Electronic component testing skills; 4.11. Programming skills.
<p>DESCRIPTION OF END PRODUCTS/SERVICE</p>	<p>Service schedule of Engine Electronics Control Systems is organized as per technical requirements and manufacturer's manual specifications.</p>
<p>CIRCUMSTANTIAL KNOWLEDGE</p>	<p>Detailed knowledge about:</p> <ol style="list-style-type: none"> 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	MANAGE SERVICE SCHEDULE FOR ENGINE ELECTRONICS CONTROL SYSTEMS	DUTY NO.	702
TASK TITLE	MAINTAIN ENGINE MANAGEMENT SYSTEMS	TASK NO.	7022
PERFORMANCE CRITERIA	A person performing this task must be able to maintain engine management systems as per technical requirements and Manufacturer's manual specifications.		
RANGE STATEMENT	<p>This task can be performed in the automotive workshop under the supervision of Automotive /Mechanical Engineer. The following tools and equipment will be required:</p> <ol style="list-style-type: none"> 1. Full sets of Automotive tool boxes; 2. Vehicle diagnosis Machines; 3. Programming Machines; 4. Vehicle diagnosis Bay; 5. Diesel Injector Nozzle Testing Machine; 6. Petrol Injector Nozzle Testing Machine; 7. Injection pump Testing Machine; 8. Washing machine; 9. Power source; 10. P.P.E, such as Safety Shoes, Goggles, Gloves; 11. Air compressor; 12. Lifter; 13. Oscilloscope; 14. Digital multimeter; 15. Charger; 16. Oil and coolant recovery device; 17. Vehicle protection supplies; 18. Sanitary and cleaning supplies; 19. Junction box. 		
EVIDENCE REQUIREMENTS			
Practical performance	Underpinning knowledge		
<p>The person performing this task must be able do the following:</p> <ol style="list-style-type: none"> 1. Observe health and safety when performing the task; 2. Select right tools, equipment and safety gears for the task; 3. Test functionality of fuel injection single nozzle and Multi-Injector; 4. Test functionality of Common rail petrol engine; 	<p>Detailed knowledge about:</p> <p>1.0. Methods: This person performing this task must be able to explain how to:</p> <ol style="list-style-type: none"> 1.1. Test different components of engine management system. 1.2. Interpret various codes <p>2.0. Principles: The person must be able to explain the principles of Engine systems control</p>		

<ol style="list-style-type: none"> 5. Test functionality of Common Rail Diesel engine; 6. Test functionality of air induction system; 7. Test functionality of Variable Valve Timing Intelligent (VVTi) system; 8. Test functionality of Emission control system; 9. Test functionality of Electronic Ignition system; 10. Test functionality of Engine Braking; 11. Repair defects in the engine management system; 12. Test engine conditions; 13. Clean tools, equipment and workplace; 14. Store tools and equipment. 	<p>3.0. Theories: The person must be able to explain</p> <ol style="list-style-type: none"> 3.1. Engine Management systems components and their functions; 3.2. Emissions control; 3.3. Electronic fuel injection system components and their functions; 3.4. Electronic ignition systems components and their functions. <p>4.0. Essential skills:</p> <ol style="list-style-type: none"> 4.1. Communication skills; 4.2. Management skills; 4.3. Data storage skills; 4.4. Entrepreneurship skills; 4.5. Engineering mathematics skills; 4.6. Computer application skills; 4.7. Customer care skills; 4.8. Team work skills; 4.9. Report writing skills; 4.10. Programming skills; 4.11. Circuit testing skills; 4.12. Electronic component testing skills.
<p>DESCRIPTION OF END PRODUCTS/SERVICE</p>	<p>Maintenance of engine management systems is performed as per technical requirements and manufacturer's manual specifications.</p>
<p>CIRCUMSTANTIAL KNOWLEDGE</p>	<p>Detailed knowledge about:</p> <ol style="list-style-type: none"> 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	MANAGE SERVICE SCHEDULE FOR ENGINE ELECTRONICS CONTROL SYSTEMS	DUTY NO.	702
TASK TITLE	PERFORM ENGINE DIAGNOSIS	TASK NO.	7023
PERFORMANCE CRITERIA	A person performing this task must be able to Manage Engine diagnosis as per technical requirements and Manufacturer's manual specifications.		
RANGE STATEMENT	<p>This task can be performed in the automotive workshop under the supervision of Automotive /Mechanical Engineer. The following tools and equipment will be required:</p> <ol style="list-style-type: none"> 1. Full sets of Automotive tool boxes; 2. Vehicle diagnosis Machines; 3. Programming Machines; 4. Vehicle diagnosis Bay; 5. Diesel Injector Nozzle Testing Machine; 6. Petrol Injector Nozzle Testing Machine; 7. Injection pump Testing Machine; 8. Washing machine; 9. Power source; 10. P.P.E, such as Safety Shoes, Goggles, Gloves; 11. Air compressor; 12. Lifter; 13. Oscilloscope; 14. Digital multimeter; 15. Charger; 16. Oil and coolant recovery device; 17. Vehicle protection supplies; 18. Sanitary and cleaning supplies; 19. Junction box. 		
EVIDENCE REQUIREMENTS			
Practical performance	Underpinning knowledge		
<p>The person performing this task must be able do the following:</p> <ol style="list-style-type: none"> 1. Observe health and safety when performing the task; 2. Select right tools, equipment and safety gears for the task; 3. Perform diagnosis of the Mechanical system of the engine; 4. Identify defective components; 5. Repair or replace defective components; 	<p>Detailed knowledge about:</p> <p>1.0. Methods:</p> <p>This person performing this task must be able to explain how to:</p> <ol style="list-style-type: none"> 1.1. Perform engine diagnosis; 1.2. Trouble shoot mechanical, electrical and electronic defects in a vehicle engine; 1.3. Interpret trouble codes; 1.4. Explain the meaning of data flow. <p>2.0. Principles:</p> <p>The person must be able to explain the principles of:</p>		

<p>6. Perform diagnosis of the electrical system of the engine;</p> <p>7. Detect electrical faults;</p> <p>8. Rectify electrical faults;</p> <p>9. Perform diagnosis of the electronic control system of the engine;</p> <p>10. Detect electronic faults;</p> <p>11. Rectify faults in the electronics circuits;</p> <p>12. Test their functionality;</p> <p>13. Clean tools, equipment and workplace;</p> <p>14. Store tools and equipment.</p>	<p>2.1. Engine diagnosis.</p> <p>3.0. Theories: The person must be able to explain</p> <p>3.1. Basic electrical and electronics circuits;</p> <p>3.2. Electrical and electronics component in the engines and their functions;</p> <p>3.3. Joints and terminations;</p> <p>3.4. Measuring electricity;</p> <p>3.5. Performing continuity, resistance and voltage tests in electrical and electronics circuits;</p> <p>3.6. Material science;</p> <p>3.7. Trouble codes, data flow;</p> <p>3.8. Mechanical components in a vehicle engine and their functions;</p> <p>3.9. Identifying categories of engine diagnosis.</p> <p>Essential skills:</p> <p>4.1. Communication skills;</p> <p>4.2. Management skills;</p> <p>4.3. Identify genuine and non-genuine parts skills;</p> <p>4.4. Data storage skills;</p> <p>4.5. Entrepreneurship skills;</p> <p>4.6. Engineering mathematics skills;</p> <p>4.7. Customer care skills;</p> <p>4.8. Team work skills;</p> <p>4.9. Report writing skills;</p> <p>4.10. Computer application skills;</p> <p>4.11. Programming skills;</p> <p>4.12. Data flow analysis skills;</p> <p>4.13. Circuit testing skills;</p> <p>4.14. Electronic component testing skills.</p>
<p>DESCRIPTION OF END PRODUCTS/SERVICE</p>	<p>Engine diagnosis is performed as per technical requirements and manufacturer's manual specifications.</p>
<p>CIRCUMSTANTIAL KNOWLEDGE</p>	<p>Detailed Knowledge about:</p> <p>1. Safe handling of working tools;</p> <p>2. Safe handling of measuring instruments;</p> <p>3. Occupational health and safety;</p> <p>4. Maintenance operating policy and procedure (MOPP);</p> <p>5. Waste disposal methods.</p>

OCCUPATION	AUTOMOTIVE ENGINEER	OCCUPATION CODE	
DUTY TITLE	MANAGE SERVICE SCHEDULE FOR ENGINE ELECTRONICS CONTROL SYSTEMS	DUTY NO.	702
TASK TITLE	PREPARE TECHNICAL REPORT	TASK NO.	7024
PERFORMANCE CRITERIA	A person performing this task must be able to prepare a technical report as per technical requirements and manufacturer's manual 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. Stationery Tools and equipment; 2. Computer and; 3. Printer.		
EVIDENCE REQUIREMENTS			
Practical performance		Underpinning knowledge	
<p>The person performing this task must be able do the following:</p> <ol style="list-style-type: none"> 1. Observe health and safety when performing the task; 2. Select right tools, equipment and safety gears for the task; 3. Collect Vehicle data; 4. Record Vehicle information; 5. Prepare Vehicle Job Sheet; 6. Prepare Vehicle Service Sheet; 7. Prepare Vehicle Service Card; 8. Organize and collect job sheets, service sheets and service cards. 		<p>Detailed knowledge about:</p> <p>1.0. Methods: The person performing this task must be able to explain how to:</p> <ol style="list-style-type: none"> 1.1. Prepare Technical report. <p>2.0. Principles: The person must be able to explain the principles of:</p> <ol style="list-style-type: none"> 2.1. Preparing Technical report. <p>3.0. Theories: The person must be able to explain</p> <ol style="list-style-type: none"> 3.1. How to prepare a technical report; 3.2. How to collect vehicle data. <p>4.0. Essential skills:</p> <ol style="list-style-type: none"> 4.1. Communication skills; 4.2. Management skills; 4.3. Data storage skills; 4.4. Genuine and non-genuine parts skills; 4.5. Entrepreneurship skills; 4.6. Engineering mathematics skills; 4.7. Customer care skills; 4.8. Team work skills; 4.9. Report writing skills; 4.10. Computer application skills; 	

	4.11. Statistical data analysis skills.
DESCRIPTION OF END PRODUCTS/SERVICE	Technical report is prepared as per technical requirements and manufacturer's manual specifications.
CIRCUMSTANTIAL KNOWLEDGE	<p>Detailed knowledge about:</p> <ol style="list-style-type: none"> 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	MANAGE VEHICLE DIAGNOSIS TECHNIQUES	DUTY NO.	703
TASK TITLE	HANDLE CUSTOMER'S REQUEST FOR MOTOR VEHICLE MAINTENANCE	TASK NO.	7031
PERFORMANCE CRITERIA:	A person performing this task must be able to handle customer's request for Motor Vehicle maintenance as per best practice.		
RANGE STATEMENT	<p>This task can be performed in the automotive workshop under the supervision of Automotive /Mechanical Engineer. The following tools and equipment will be required:</p> <ol style="list-style-type: none"> 1. Full sets of Automotive tool boxes; 2. Stationery Tools and equipment; 3. Vehicle diagnosis Machines; 4. Programming Machines; 5. Vehicle diagnosis Bay; 6. Diesel Injector Nozzle Testing Machine; 7. Petrol Injector Nozzle Testing Machine; 8. Injection pump Testing Machine; 9. Washing machine; 10. Power source; 11. P.P.E, such as Safety Shoes, Goggles, Gloves; 12. Air compressor; 13. Oscilloscope; 14. Digital multimeter; 15. Charger; 16. Lifter; 17. Vehicle protection supplies; 18. Sanitary and cleaning supplies; 19. Junction box; 20. Oil and coolant recovery device. 		
EVIDENCE REQUIREMENTS			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
<p>The person performing this task must be able do the following:</p> <ol style="list-style-type: none"> 1. Observe health and safety when performing the task; 2. Select right tools, equipment and safety gears for the task; 3. Review Customer's request; 4. Inspect the Vehicle; 5. Perform preliminary Test on customer's request; 		<p>Detailed knowledge about:</p> <p>1.0. Methods:</p> <p>The person performing this task must be able to explain how to;</p> <ol style="list-style-type: none"> 1.1. Handle customer's request on motor vehicle maintenance; 1.2. Evaluate vehicle condition. <p>2.0. Principles of;</p> <p>The person must be able to explain the principles of:</p>	

<ul style="list-style-type: none"> 6. Suggest the step ahead; 7. Provide the inspection report to the customer; 8. Respond to customer's decision; 9. Clean tools, equipment and workplace; 10. Store tools and equipment. 	<ul style="list-style-type: none"> 2.1. Dealing with customers; 2.2. Vehicle inspection. <p>3.0. Theories:</p> <p>The person must be able to explain</p> <ul style="list-style-type: none"> 3.1. Procedures for Vehicle diagnostics; 3.2. Customer care; 3.3. Handling of complains. <p>4.0. Essential skills:</p> <ul style="list-style-type: none"> 4.1. Communication skills; 4.2. Management skills; 4.3. Data storage skills; 4.4. Genuine and non-genuine parts skills; 4.5. Entrepreneurship skills; 4.6. Engineering mathematics skills; 4.7. Customer care skills; 4.8. Team work skills; 4.9. Report writing skills; 4.10. Objection handling skills; 4.11. skills in analyzing and judging the working condition of vehicles; 4.12. Computer application skills.
<p>DESCRIPTION OF END PRODUCTS/SERVICE</p>	<p>Customer's request is handled as per best practice.</p>
<p>CIRCUMSTANTIAL KNOWLEDGE</p>	<p>Detailed knowledge about:</p> <ul style="list-style-type: none"> 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	MANAGE VEHICLE DIAGNOSIS TECHNIQUES	DUTY NO.	703
TASK TITLE	PERFORM MECHANICAL DIAGNOSIS IN VEHICLE	TASK NO.	7032
PERFORMANCE CRITERIA:	A person performing this task must be able to perform mechanical diagnostics of a motor vehicle as per technical requirements and manufacturer's manual specifications.		
RANGE STATEMENT	<p>This task can be performed in the automotive workshop under the supervision of Automotive /Mechanical Engineer. The following tools and equipment will be required:</p> <ol style="list-style-type: none"> 1. Full sets of Automotive tool boxes; 2. Stethoscope; 3. Vehicle diagnosis Bay; 4. Diesel Injector Nozzle Testing Machine; 5. Petrol Injector Nozzle Testing Machine; 6. Injection pump Testing Machine; 7. Washing machine; 8. Power source; 9. P.P.E, such as Safety Shoes, Goggles, Gloves; 10. Air compressor; 11. Vehicle protection supplies; 12. Sanitary and cleaning supplies; 13. Lifter. 		
EVIDENCE REQUIREMENTS			
PRACTICAL PERFORMANCE	UNDERPINNING KNOWLEDGE		
<p>The person performing this task must be able do the following:</p> <ol style="list-style-type: none"> 1. Observe health and safety when performing the task; 2. Select right tools, equipment and safety gears for the task; 3. Inspect the vehicle for obvious Faults; 4. Test for Noise, Vibration and Harshness; 5. Identify abnormal condition; 6. Exclude anomalies; 7. Perform Road Test; 8. Clean tools, equipment and workplace; 9. Store tools and equipment. 	<p>Detailed knowledge about:</p> <p>1.0. Methods:</p> <p>The person performing this task must be able to explain how to perform Mechanical Diagnostics</p> <p>Principles:</p> <p>The person must be able to explain the principles of:</p> <p>2.1. Performing Mechanical Diagnostics.</p> <p>Theories:</p> <p>The person must be able to explain</p> <p>3.1. Perform Vehicle Diagnostics;</p> <p>3.2. Categorise Vehicle diagnostics.</p> <p>4.0. Essential skills:</p> <p>4.1. Communication skills;</p> <p>4.2. Management skills;</p>		

	<p>4.3. Data storage skills;</p> <p>4.4. Identify genuine and non-genuine parts skills;</p> <p>4.5. Entrepreneurship skills;</p> <p>4.6. Engineering mathematics skills;</p> <p>4.7. Customer care skills;</p> <p>4.8. Team work skills;</p> <p>4.9. Report writing skills;</p> <p>4.10. Noise, abnormal sound, vibration and other testing skills;</p> <p>4.11. Computer application skills.</p>
DESCRIPTION OF END PRODUCTS/SERVICE	Mechanical diagnosis is performed as per technical requirements and manufacturer's manual specifications
CIRCUMSTANTIAL KNOWLEDGE	<p>Detailed Knowledge about:</p> <ol style="list-style-type: none"> 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	MANAGE VEHICLE DIAGNOSIS TECHNIQUES	DUTY NO.	703
TASK TITLE	PERFORM ELECTRICAL AND ELECTRONICS DIAGNOSIS	TASK NO.	7033
PERFORMANCE CRITERIA:	A person performing this task must be able to perform electrical and electronics diagnosis of a motor vehicle as per technical requirements and Manufacturer's manual specifications.		
RANGE STATEMENT	<p>This task can be performed in the automotive workshop under the supervision of Automotive /Mechanical Engineer. The following tools and equipment will be required:</p> <ol style="list-style-type: none"> 1. Full sets of Automotive tool boxes; 2. Stethoscope; 3. Vehicle diagnosis Machines; 4. Programming Machines; 5. Vehicle diagnosis Bay; 6. Diesel Injector Nozzle Testing Machine; 7. Petrol Injector Nozzle Testing Machine; 8. Injection pump Testing Machine; 9. Washing machine; 10. Power source; 11. P.P.E, such as Safety Shoes, Goggles, Gloves; 12. Air compressor; 13. Oscilloscope; 14. Digital multimeter; 15. Charger; 16. Lifter; 17. Vehicle protection supplies; 18. Sanitary and cleaning supplies; 19. Junction box. 		
EVIDENCE REQUIREMENTS			
PRACTICAL PERFORMANCE	UNDERPINNING KNOWLEDGE		
<p>The person performing this task must be able do the following:</p> <ol style="list-style-type: none"> 1. Observe health and safety when performing the task; 2. Select right tools, equipment and safety gears for the task; 3. Inspect the vehicle electrical and electronics wiring systems through On- and Out-Board Diagnosis terminals; 4. Detect faults; 	<p>Detailed knowledge about:</p> <p>1.0. Methods: The person performing this task must be able to explain how to perform electrical and electronics diagnostic</p> <p>2.0. Principles: The person must be able to explain the principles of: 2.1. Managing electrical and electronics diagnostics</p> <p>3.0. Theories: The person must be able to explain</p>		

<p>5. Verify Electronics Control Module Pin in and Pin Out;</p> <p>6. Verify for Sensor Signals;</p> <p>7. Verify actuators operation;</p> <p>8. Test electrical and electronics components and circuits;</p> <p>9. Clean tools, equipment and workplace;</p> <p>10. Store tools and equipment.</p>	<p>3.1. Perform Vehicle Diagnostics;</p> <p>3.2. Categorise Vehicle diagnostics.</p> <p>4.0. Essential skills:</p> <p>4.1. Communication skills;</p> <p>4.2. Management skills;</p> <p>4.3. Computer applications skills;</p> <p>4.4. Data storage skills;</p> <p>4.5. Genuine and non-genuine parts skills;</p> <p>4.6. Entrepreneurship skills;</p> <p>4.7. Engineering mathematics skills;</p> <p>4.8. Customer care skills;</p> <p>4.9. Team work skills;</p> <p>4.10. Report writing skills;</p> <p>4.11. Computer application skills;</p> <p>4.12. Data flow analysis skills;</p> <p>4.13. Circuit testing skills;</p> <p>4.14. Electronic component testing skills.</p>
<p>DESCRIPTION OF END PRODUCTS/SERVICE</p>	<p>Electrical and electronics diagnosis is performed as per technical requirements and manufacturer's manual specifications.</p>
<p>CIRCUMSTANTIAL KNOWLEDGE</p>	<p>Detailed knowledge about:</p> <ol style="list-style-type: none"> 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	PERFORM ADVANCED ELECTRONICS TESTING	DUTY NO.	704
TASK TITLE	TEST PERFORMANCE AND CONDITION SENSORS	TASK NO.	7041
PERFORMANCE CRITERIA:	A person performing this task must be able to test performance and condition sensors as per technical requirements and Manufacturer's manual specifications.		
RANGE STATEMENT	<p>This task can be performed in the automotive workshop under the supervision of Automotive /Mechanical Engineer. The following tools and equipment will be required:</p> <ol style="list-style-type: none"> 1. Full sets of Automotive tool boxes; 2. Stethoscope; 3. Vehicle diagnosis Machines; 4. Programming Machines; 5. Oscilloscope Machines; 6. Vehicle diagnosis Bay; 7. Washing machine; 8. Power source; 9. P.P.E, such as Safety Shoes, Goggles, Gloves; 10. Air compressor; 11. Digital multimeter; 12. Charger; 13. Vehicle protection supplies; 14. Sanitary and cleaning supplies; 15. Junction box; 16. Lifter. 		
EVIDENCE REQUIREMENTS			
PRACTICAL PERFORMANCE	UNDERPINNING KNOWLEDGE		
<p>The person performing this task must be able do the following:</p> <ol style="list-style-type: none"> 1. Observe health and safety when performing the task; 2. Select right tools, equipment and safety gears for the task; 3. Set up testing process; 4. Use multimeter, oscilloscope, junction box to implement measurements; 5. Analyse Waveform measurement; 6. Analyse Analog values; 7. Analyse digital Values; 	<p>Detailed knowledge about:</p> <p>1.0. Methods: The person performing this task must be able to explain how to;</p> <ol style="list-style-type: none"> 1.1. Test sensor performance; 1.2. Connect sensors for testing. <p>2.0. Principles: The person must be able to explain the principles of sensor performance.</p> <p>3.0. Theories: The person must be able to explain</p> <ol style="list-style-type: none"> 3.1. Characteristics of sensors; 		

<p>8. Comprehensive analysis of measurement results; 9. Verify sensor condition; 10. Clean tools, equipment and workplace; 11. Store tools and equipment.</p>	<p>3.2. Analog and digital measurements; 3.3. Basics of instrumentation.</p> <p>4.0. Essential skills:</p> <p>4.1. Communication skills; 4.2. Management skills; 4.3. Data storage skills; 4.4. Genuine and non-genuine parts skills; 4.5. Entrepreneurship skills; 4.6. Engineering mathematics skills; 4.7. Customer care skills; 4.8. Team work skills; 4.9. Report writing skills; 4.10. Fault code analysis skills; 4.11. Computer application skills; 4.12. Data flow analysis skills; 4.13. Circuit testing skills; 4.14. Electronic component testing skills; 4.15. Programming skills.</p>
<p>DESCRIPTION OF END PRODUCTS/SERVICE</p>	<p>Performance and condition sensors behaviour are verified as per technical requirements and manufacturer’s manual specifications.</p>
<p>CIRCUMSTANTIAL KNOWLEDGE</p>	<p>Detailed knowledge about:</p> <ol style="list-style-type: none"> 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	PERFORM ADVANCED ELECTRONICS TESTING	DUTY NO.	704
TASK TITLE	PERFORM DIAGNOSTIC SCANNING OF A VEHICLE.	TASK NO.	7042
PERFORMANCE CRITERIA:	A person performing this task must be able to perform diagnostic scanning of a vehicle as per technical requirements and Manufacturer's manual specifications.		
RANGE STATEMENT	<p>This task can be performed in the automotive workshop under the supervision of Automotive /Mechanical Engineer. The following tools and equipment will be required:</p> <ol style="list-style-type: none"> 1. Full sets of Automotive tool boxes; 2. Stethoscope; 3. Vehicle diagnosis Machines; 4. Programming Machines; 5. Vehicle diagnostic scanner; 6. OBD-II fault code reader; 7. Vehicle diagnosis Bay; 8. Washing machine; 9. Power source; 10. P.P.E, such as Safety Shoes, Goggles, Gloves; 11. Air compressor; 12. Digital multimeter; 13. Charger; 14. Vehicle protection supplies; 15. Sanitary and cleaning supplies; 16. Junction box; 17. Lifter; 18. Oscilloscope. 		
EVIDENCE REQUIREMENTS			
PRACTICAL PERFORMANCE	UNDERPINNING KNOWLEDGE		
<p>The person must do the following:</p> <ol style="list-style-type: none"> 1. Observe health and safety when performing the task; 2. Select right tools, equipment and safety gears for the task; 3. Identify Serial Port Communication; 4. Identify OBD-II scanner connector; 5. Connect OBD-II scanner; 6. Interpret Fault Codes; 7. Fix faults; 	<p>Detailed knowledge about:</p> <p>1.0. Methods: This person performing this task must be able to explain how to perform vehicle scanning.</p> <p>2.0. Principles: The person must be able to explain the principles of vehicle diagnostic scanning.</p> <p>3.0. Theories: The person must be able to explain</p> <ol style="list-style-type: none"> 3.1. Application of diagnostic scanner; 3.2. Fault code reading and analysis; 3.3. Data flow reading and analysis. 		

<p>8. Erase stored fault codes; 9. Clean tools, equipment and workplace; 10. Store tools and equipment; 11. Interpret data flow; 12. Analyze data flow.</p>	<p>4.0. Essential skills: 4.1. Communication skills; 4.2. Management skills; 4.3. Data storage skills; 4.4. Computer application skills; 4.5. Genuine and non-genuine parts skills; 4.6. Entrepreneurship skills; 4.7. Engineering mathematics skills; 4.8. Customer care skills; 4.9. Team work skills; 4.10. Report writing skills; 4.11. Fault code analysis skills; 4.12. Data flow analysis skills; 4.13. Circuit testing skills; 4.14. Electronic component testing skills; 4.15. Computer application skills; 4.16. Programming skills.</p>
<p>DESCRIPTION OF END PRODUCTS/SERVICE</p>	<p>Diagnostic scanning of a vehicle is performed as per manufacturer's specification.</p>
<p>CIRCUMSTANTIAL KNOWLEDGE</p>	<p>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.</p>

OCCUPATION	AUTOMOTIVE ENGINEER	OCCUPATION CODE	
DUTY TITLE	PERFORM ADVANCED ELECTRONICS TESTING	DUTY NO.	704
TASK TITLE	PERFORM EXHAUST GAS ANALYSIS USING GAS ANALYZER	TASK NO.	7043
PERFORMANCE CRITERIA	A person performing this task must be able to perform exhaust gas analysis in motor vehicle engine using gas analyzer as per technical requirements and Manufacturer's manual specifications.		
RANGE STATEMENT	<p>This task can be performed in the automotive workshop under the supervision of Automotive /Mechanical Engineer. The following tools and equipment will be required:</p> <ol style="list-style-type: none"> 1. Full sets of Automotive tool boxes; 2. Exhaust gas analyzer; 3. Vehicle diagnosis Machines; 4. Programming Machines; 5. Oscilloscope Machines; 6. Vehicle diagnosis Bay; 7. Washing machine; 8. Power source; 9. P.P.E, such as Safety Shoes, Goggles, Gloves; 10. Air compressor; 11. Digital multimeter; 12. Charger; 13. Vehicle protection supplies; 14. Sanitary and cleaning supplies; 15. Lifter; 16. Tailpipe. 		
EVIDENCE REQUIREMENTS			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
<p>The person performing this task must be able do the following:</p> <ol style="list-style-type: none"> 1. Observe health and safety when performing the task; 2. Select right tools, equipment and safety gears for the task; 3. Install tailpipe; 4. Measure Carbon Monoxide Content; 5. Adjust level of Carbon Monoxide; 6. Measure Hydrocarbon; 7. Adjust level of Hydrocarbon on EGR valve; 8. Compare to the Standards; 9. Clean tools, equipment and 		<p>Detailed knowledge about:</p> <p>1.0. Methods:</p> <ol style="list-style-type: none"> 1.1. Operate a gas analyser; 1.2. Operate and adjust EGR valve. <p>2.0. Principles:</p> <p>The person must be able to explain the principles of:</p> <ol style="list-style-type: none"> 2.1. Exhaust gas analysis. <p>3.0. Theories:</p> <p>The person must be able to explain</p> <ol style="list-style-type: none"> 3.1. Types of emissions in motor vehicle; 3.2. Controlling emissions in motor vehicle; 3.3. Analog and digital measurements. 	

<p>workplace; 10. Store tools and equipment.</p>	<p>4.0. Essential skills: 4.1. Communication skills; 4.2. Management skills; 4.3. Data storage skills; 4.4. Genuine and non-genuine parts skills; 4.5. Entrepreneurship skills; 4.6. Engineering mathematics skills; 4.7. Customer care skills; 4.8. Team work skills; 4.9. Report writing skills; 4.10. Organizational production skills; 4.11. Computer application skills; 4.12. Programming skills.</p>
<p>DESCRIPTION OF END PRODUCTS/SERVICE</p>	<p>Exhaust gas is analyzed as per as per technical requirements and manufacturer's manual specifications.</p>
<p>CIRCUMSTANTIAL KNOWLEDGE</p>	<p>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.</p>

OCCUPATION	AUTOMOTIVE ENGINEER	OCCUPATION CODE	
DUTY TITLE	PERFORM ADVANCED ELECTRONICS TESTING	DUTY NO.	704
TASK TITLE	TEST FUNCTIONALITY OF VEHICLE BODY SENSORS	TASK NO.	7044
PERFORMANCE CRITERIA	A person performing this task must be able to test functionality of vehicle body sensors as per technical requirements and Manufacturer's manual specifications.		
RANGE STATEMENT	<p>This task can be performed in the automotive workshop under the supervision of Automotive /Mechanical Engineer. The following tools and equipment will be required:</p> <ol style="list-style-type: none"> 1. Full sets of Automotive tool boxes; 2. Exhaust gas analyzer Machine; 3. Vehicle diagnosis Machines; 4. Multimeter; 5. Programming Machines; 6. Auto Tester Lamp; 7. Oscilloscope Machines; 8. Vehicle diagnosis Bay; 9. Washing machine; 10. Power source; 11. P.P.E, such as Safety Shoes, Goggles, Gloves; 12. Air compressor; 13. Charger; 14. Vehicle protection supplies; 15. Sanitary and cleaning supplies; 16. Junction box; 17. Lifter. 		
EVIDENCE REQUIREMENTS			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
<p>The person performing this task must be able do the following:</p> <ol style="list-style-type: none"> 1. Observe health and safety when performing the task; 2. Select right tools, equipment and safety gears for the task; 3. Test Air Flow Sensors; 4. test Pressure sensors; 5. Test speed Sensors; 6. Test Inductive Sensors; 7. Test coolant Temperature sensors; 8. Test Oxygen Sensors; 9. Test Knock Sensor; 10. Record test results; 		<p>Detailed knowledge about:</p> <p>1.0. Methods: This person performing this task must be able to explain how to:</p> <ol style="list-style-type: none"> 1.1. Perform Vehicle Sensors Testing; 1.2. Troubleshooting. <p>2.0. Principles: The person must be able to explain the principles of performing Vehicle Sensors Testing.</p> <p>3.0. Theories: The person must be able to explain</p>	

<p>11. Compare with standards values; 12. Identify faults; 13. Clear faults;</p> <p>14. Clean tools, equipment and workplace; 15. Store tools and equipment.</p>	<p>3.1. Vehicle Sensors Testing; 3.2. Analog and digital measurements; 3.3. Genuine and non-genuine parts skills.</p> <p>4.0. Essential skills: 4.1. Communication skills; 4.2. Management skills; 4.3. Data storage skills; 4.4. Entrepreneurship skills; 4.5. Engineering mathematics skills; 4.6. Customer care skills; 4.7. Team work skills; 4.8. Report writing skills; 4.9. Computer application skills; 4.10 skills to identify genuine and non-genuine parts; 4.11. Circuit testing skills; 4.12. Electronic component testing skills; 4.13. Computer application skills; 4.14. Programming skills.</p>
<p>DESCRIPTION OF END PRODUCTS/SERVICE</p>	<p>Testing of vehicle sensors is performed as per technical requirements and manufacturer's manual specifications.</p>
<p>CIRCUMSTANTIAL KNOWLEDGE</p>	<p>Detailed Knowledge about:</p> <ol style="list-style-type: none"> 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	DESIGN DUAL FUEL /GAS SYSTEM CHANGEOVER MECHANISM	DUTY NO.	705
TASK TITLE	DESIGN DUAL PETROL /GAS SYSTEMS CHANGEOVER MECHANISM	TASK NO.	7051
PERFORMANCE CRITERIA	A person performing this task must be able design a Dual Petrol /Gas systems changeover mechanism as per technical requirements and Manufacturer's manual specifications.		
RANGE STATEMENT	<p>This task can be performed in the automotive workshop under the supervision of Automotive /Mechanical Engineer. The following tools and equipment will be required:</p> <ol style="list-style-type: none"> 1. Full sets of Automotive tool boxes; 2. Gas piping; 3. A fuel gas shut off valve; 4. A fuel gas pressure regulator; 5. A gas filter; 6. Vehicle diagnosis Machines; 7. Multimeter; 8. Auto Tester Lamp; 9. Vehicle diagnosis Bay; 10. Washing machine; 11. Power source; 12. P.P.E, such as Safety Shoes, Goggles, Gloves; 13. Air compressor; 14. Charger; 15. Vehicle protection supplies; 16. Sanitary and cleaning supplies; 17. Junction box; 18. Lifter. 		
EVIDENCE REQUIREMENTS			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
<p>The person performing this task must be able do the following:</p> <ol style="list-style-type: none"> 1. Observe health and safety when performing the task; 2. Select right tools, equipment and safety gears for the task; 3. Design changeover mechanism; 4. Install new mechanism; 5. Connect Gas system; 6. Connect electronic control system; 7. Test functionality of combined fuels; 		<p>Detailed knowledge about:</p> <p>1.0. Methods: This person performing this task must be able to explain how to:</p> <ol style="list-style-type: none"> 1.1. Install dual fuel gas changeover mechanism; 1.2. Connect required electronic control circuit. <p>2.0. Principles: The person must be able to explain the principles of designing Dual Petrol /Gas changeover mechanism.</p> <p>3.0. Theories: The person must be able to explain</p>	

<p>8. Clean tools, equipment and workplace; 9. Store tools and equipment.</p>	<p>3.1. Dual Fuel engine Gas conversion; 3.2. Maintenance procedures on Dual fuel.</p> <p>4.0. Essential skills: 4.1. Communication skills; 4.2. Management skills; 4.3. Data storage skills; 4.4. Entrepreneurship skills; 4.5. Customer care skills; 4.6. Team work skills; 4.7. Report writing skills; 4.8. skills to identify genuine and non-genuine parts; 4.9. Computer application skills.</p>
<p>DESCRIPTION OF END PRODUCTS/SERVICE</p>	<p>Dual Petrol engine Gas conversion is performed as per technical requirements and manufacturer’s manual specifications.</p>
<p>CIRCUMSTANTIAL KNOWLEDGE</p>	<p>Detailed knowledge about:</p> <ol style="list-style-type: none"> 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	DESIGN DUAL FUEL /GAS SYSTEM CHANGEOVER MECHANISM	DUTY NO.	705
TASK TITLE	DESIGN DUAL DIESEL/ GAS SYSTEMS CHANGEOVER MECHANISM	TASK NO.	7052
PERFORMANCE CRITERIA	A person performing this task must be able design a Dual Diesel/Gas systems changeover mechanism as per technical requirements and Manufacturer's manual specifications.		
RANGE STATEMENT	<p>This task can be performed in the automotive workshop under the supervision of Automotive /Mechanical Engineer. The following tools and equipment will be required:</p> <ol style="list-style-type: none"> 1. Full sets of Automotive tool boxes; 2. Gas piping; 3. A fuel gas shut off valve; 4. A fuel gas pressure regulator; 5. A gas filter; 6. Vehicle diagnosis Machines; 7. Multimeter; 8. Auto Tester Lamp; 9. Vehicle diagnosis Bay; 10. Washing machine; 11. Power source; 12. P.P.E, such as Safety Shoes, Goggles, Gloves; 13. Air compressor; 14. Vehicle protection supplies; 15. Sanitary and cleaning supplies; 16. Junction box; 17. Charger; 18. Lifter. 		
EVIDENCE REQUIREMENTS			
PRACTICAL PERFORMANCE	UNDERPINNING KNOWLEDGE		
<p>The person performing this task must be able do the following:</p> <ol style="list-style-type: none"> 1. Observe health and safety when performing the task; 2. Select right tools, equipment and safety gears for the task; 3. Design changeover mechanism; 4. Install new mechanism; 5. Connect Gas system; 6. Connect electronic control system; 	<p>Detailed knowledge about:</p> <p>1.0. Methods: This person performing this task must be able to explain how to:</p> <ol style="list-style-type: none"> 1.1. Install dual fuel gas changeover mechanism; 1.2. Connect required electronic control circuit. <p>2.0. Principles: The person must be able to explain the principles of:</p> <ol style="list-style-type: none"> 2.1. Diesel/ Gas changeover mechanism. 		

<p>7. Test functionality of combined fuels;</p> <p>8. Clean tools, equipment and workplace;</p> <p>9. Store tools and equipment.</p>	<p>3.0. Theories: The person must be able to explain</p> <p>3.1. Dual Fuel Engine Gas conversion;</p> <p>3.2. Maintenance procedures on Dual fuel.</p> <p>4.0. Essential skills:</p> <p>4.1. Communication skills;</p> <p>4.2. Management skills;</p> <p>4.3. Data storage skills;</p> <p>4.4. Entrepreneurship skills;</p> <p>4.5. Customer care skills;</p> <p>4.6. Team work skills;</p> <p>4.7. Report writing skills;</p> <p>4.8. skills to identify genuine and non-genuine parts;</p> <p>4.9. Computer application skills.</p>
<p>DESCRIPTION OF END PRODUCTS/SERVICE</p>	<p>Dual Diesel engine Gas conversion is performed as per technical requirements and manufacturer's manual specifications.</p>
<p>CIRCUMSTANTIAL KNOWLEDGE</p>	<p>Detailed knowledge about:</p> <p>1. Safe handling of working tools;</p> <p>2. Safe handling of measuring instruments;</p> <p>3. Occupational health and safety;</p> <p>4. Maintenance Operating Policy and Procedure (MOPP);</p> <p>5. Waste disposal methods.</p>

OCCUPATION	AUTOMOTIVE ENGINEER	OCCUPATION CODE	
DUTY TITLE	DESIGN DUAL FUEL /GAS SYSTEM CHANGEOVER MECHANISM.	DUTY NO.	705
TASK TITLE	REPAIR HYBRID ELECTRICAL VEHICLE	TASK NO.	7053
PERFORMANCE CRITERIA	A person performing this task must be able repair a Hybrid electrical Vehicle as per technical requirements and Manufacturer's manual specifications.		
RANGE STATEMENT	<p>This task can be performed in the automotive workshop under the supervision of Automotive /Mechanical Engineer. The following tools and equipment will be required:</p> <ol style="list-style-type: none"> 1. Full sets of Automotive tool boxes; 2. Vehicle diagnosis Machines; 3. Multimeter; 4. Auto Tester Lamp; 5. Vehicle diagnosis Bay; 6. Washing machine; 7. Power source; 8. P.P.E, such as Safety Shoes, Goggles, Gloves, Insulated Gloves, Insulated Mats; 9. Air compressor; 10. Vehicle protection supplies; 11. Sanitary and cleaning supplies; 12. Junction box; 13. Lifter. 		
EVIDENCE REQUIREMENTS			
PRACTICAL PERFORMANCE	UNDERPINNING KNOWLEDGE		
<p>The person performing this task must be able do the following:</p> <ol style="list-style-type: none"> 1. Observe health and safety when performing the task; 2. Service hybrid engine parts; 3. Service Hybrid Electric Motor parts; 4. Service Hybrid Batteries; 5. Service hybrid generator parts; 6. Service Power Split Device; 7. Service vehicle charging units; 8. Select right tools, equipment and safety gears for the task; 9. Clean tools, equipment and workplace; 10. Store tools and equipment. 	<p>Detailed knowledge about:</p> <p>1.0. Methods: This person performing this task must be able to explain how to:</p> <ol style="list-style-type: none"> 1.1. Hybrid electrical vehicles works; 1.2. Maintain hybrid electrical Vehicles. <p>2.0. Principles: The person must be able to explain the principles of:</p> <ol style="list-style-type: none"> 2.1. Repairing Hybrid electrical Vehicles. <p>3.0. Theories: The person must be able to explain</p> <ol style="list-style-type: none"> 3.1. Hybrid Electrical Vehicles components and operations; 3.2. Maintenance procedures on hybrid electrical Vehicles. 		

	<p>4.0. Essential skills:</p> <p>4.1. Communication skills;</p> <p>4.2. Management skills;</p> <p>4.3. Data storage skills;</p> <p>4.4. Entrepreneurship skills;</p> <p>4.5. Customer care skills;</p> <p>4.6. Team work skills;</p> <p>4.7. Report writing skills;</p> <p>4.8. High voltage operation skills;</p> <p>4.9. Computer application skills.</p>
DESCRIPTION OF END PRODUCTS/SERVICE	Hybrid electrical Vehicle is repaired and functioning as per technical requirements and manufacturer's manual specifications.
CIRCUMSTANTIAL KNOWLEDGE	<p>Detailed knowledge about:</p> <ol style="list-style-type: none"> 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; 6. Decontamination of ambulance vehicles.

TABLE 1: DACUM CHARTS FOR AUTOMOTIVE ENGINEERS LEVEL - 7

DUTIES	TASKS	ENABLERS
1.0.Manage Health and Safety at Work Place.	1.1.Maintain health and safety at workplace. 1.2.Perform Workshop Risk Assessment. 1.3.Design work station.	<p>Generic skills and knowledge</p> <ul style="list-style-type: none"> • Using communication skills to work with others, reporting to superiors • Use of manufacturer’s manual
2.0.Manage service schedule for Engine Electronics Control Systems.	2.1.Organise service schedule for engine electronics control systems. 2.2.Maintain engine management systems. 2.3.Perform engine diagnosis. 2.4.Prepare technical report.	<ul style="list-style-type: none"> • skills and knowledge on Workshop safety rules • Machine elements • Interpretation of technical drawing • Occupational Health and safety <p>Tools and Equipment</p> <ul style="list-style-type: none"> • PPE such as Safety Shoes, Goggles, Gloves, • Fire safety equipment • Fire alarm • Equipped tool set of tool box <p>Materials Drinking water, Cotton wools, foam water</p> <p>worker behaviours Team spirit, trustworthy, time management and commitment</p> <p>Generic skills and knowledge</p> <ul style="list-style-type: none"> • Using communication skills to work with others, reporting to superiors • Use of manufacturer’s manual • skills and knowledge on Engine Electronic systems • Machine elements • Interpretation of technical

DUTIES	TASKS	ENABLERS
		<p>drawing</p> <ul style="list-style-type: none"> • Basic Material science <p>Tools and Equipment</p> <ul style="list-style-type: none"> • PPE such as Safety Shoes, Goggles, Gloves, • Automotive Full tool box. • Engine Special Tools as per Technical Specifications • Special Measuring Tools • Diagnostics Machines <p>Materials Sensors, actuators, ECU</p> <p>Worker behaviours Team spirit, trustworthy, time management and commitment</p>
3.0.Manage Vehicle diagnosis Technics.	<p>3.1. Handle customer’s request for motor vehicle maintenance.</p> <p>3.2.Perform mechanical diagnosis in Vehicle.</p> <p>3.3.Perform electrical and electronics diagnosis.</p>	<p>Generic skills and knowledge</p> <ul style="list-style-type: none"> • Using communication skills to work with others, reporting to superiors • Use of manufacturer’s manual • skills and knowledge on Vehicle diagnostics • Machine elements • Interpretation of technical drawing • Basic Material science <p>Tools and Equipment</p> <ul style="list-style-type: none"> • PPE such as Safety Shoes, Goggles, Gloves, Hearing Protection, Hard Hats. • Full automotive Tool box • Special Measuring tools <p>Materials ECUS, Sensors and Actuators</p> <p>worker behaviours Team spirit, trustworthy, time management</p>

DUTIES	TASKS	ENABLERS
4.0.Perform Advanced Electronics Testing.	4.1. Test performance and condition sensors. 4.2. Perform diagnostic scanning of a vehicle. 4.3. Perform exhaust gas analysis using gas analyzer. 4.4. Test functionality of vehicle body sensors.	<p>Generic skills and knowledge</p> <ul style="list-style-type: none"> • Using communication skills to work with others, reporting to superiors • Use of manufacturer’s manual • skills and knowledge on Advanced Electronics Measurements • Machine elements • Interpretation of technical drawing • Basic Material science <p>Tools and Equipment</p> <ul style="list-style-type: none"> • PPE such as Safety Shoes, Goggles, Gloves, • Full Automotive Tool box • Special Electronics measuring tools <p>Material Power train Sensors, Chases Sensors, Body sensors etc</p> <p>worker behaviours Team spirit, trustworthy, time management and commitment</p>

DUTIES	TASKS	ENABLERS
5.0.Design Dual Fuel/Gas System Changeover Mechanism.	5.1.Design dual petrol/gas systems changeover mechanism. 5.2.Design dual diesel/gas systems changeover mechanism. 5.3.Repair hybrid electrical vehicle.	<p>Generic skills and knowledge</p> <ul style="list-style-type: none"> • Using communication skills to work with others, reporting to superiors • Use of manufacturer’s manual • skills and knowledge on Dual Fuel Engine Gas Fuel Conversion • Machine elements • Interpretation of technical drawing • Basic Material science <p>Tools and Equipment:</p> <ul style="list-style-type: none"> • PPE such as Safety Shoes, Goggles, Gloves, Hearing Protection, Hard Hats. • Gas cylinders LPG • Full Automotive Tool Box • Special tools LPG Installation <p>Materials</p> <ul style="list-style-type: none"> • Gas piping • A fuel gas shut off valve • A fuel gas pressure regulator • A gas filter, etc. <p>worker behaviours Team spirit, trustworthy, time management and commitment</p>