

**REPUBLIC OF KENYA**

**NATIONAL OCCUPATIONAL STANDARDS**

**FOR**

**MOTOR VEHICLE ELECTRICIAN**

**KNQF LEVEL 4**

**ISCED CODE: 0716 354A**

# FOREWORD

The provision of quality education and training is fundamental to the government’s overall strategy for social economic development. Quality education and training will contribute to achievement of Kenya’s development blueprint, Vision 2030 and sustainable development goals.

Reforms in the education sector are necessary for the achievement of Kenya Vision 2030 and meeting the provisions of the Constitution of Kenya 2010. The education sector had to be aligned to the Constitution of Kenya 2010 and this resulted in the formulation of the Policy Framework for Reforming Education and Training (Sessional Paper No. 4 of 2016). A key feature of this policy is the radical change in the design and delivery of the TVET training.

This policy document requires that training in TVET institutions be competency based, curriculum development be industry led, certification be based on demonstration of competence and mode of delivery to allow for multiple entry and exit in TVET programmes. These reforms demand that industry takes a leading role in occupational standards development to ensure it addresses competence needs.

It is against this background that these Occupational Standards have been developed for a competency-based Automotive Engineering standard. These Occupational Standards will also be the basis for assessment of an individual for competence certification.

It is my conviction that these Occupational Standards will play a key role towards development of competent human resource for the engineering sector’s growth and development.

# PREFACE

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

The Technical and Vocational Education and Training (TVET) ACT CAP.210A and Sessional Paper No. 4 of 2016 on Reforming Education and Training in Kenya, emphasized the need to reform curriculum development, assessment and certification. This called for a shift to CBET in order to address the mismatch between skills acquired through training and skills needed by industry as well as increase the global competitiveness of Kenyan labour force.

Incumbent Automotive engineering industry experts in conjunction with expert subject trainers and other related stakeholders have developed these Occupational Standards for Motor Vehicle Electric Level 4. These standards will be the basis for development of competency-based curriculum for Motor Vehicle Electric Level 4.

The Occupational Standards are designed and organized with clear performance criteria for each element of a unit of competency. These standards also outline the required knowledge and skills as well as evidence guide.

I am grateful to everyone who participated in the development of these Occupational Standards.

# KEY TO UNIT CODE



# ACRONYMS

ICT Information and Communication Technology

CPU Central Processing Unit

RAM Random Access Memory

CD Compact Disk

DVD Digital Versatile Disk

HDMI High-Definition Multimedia Interface

DVI Digital Visual Interface

VGA Video Graphics Array

USB Universal Serial Bus

OS Operating Systems

TVET Technical and Vocational Education and Training

AC Alternating Current

DC Direct Current

IEE Institution of Electrical Engineers

PCV Pressure Control Valve

EGR Exhaust Gas Recirculation

OBD On-Board Diagnostics

# OVERVIEW

The Motor Vehicle Electrician Level 4 qualification consists of competencies that a person must achieve to enable him/her to service and maintain motor vehicles. It includes maintaining vehicle engine, servicing automotive electrical systems and diagnosing car on board systems.

The units of competency comprising Motor Vehicle Electrician certificate Level 4 qualification include the following competencies:

**SUMMARY OF UNITS OF COMPETENCY**

|  |  |
| --- | --- |
| 0716 251 01A | Service vehicle starting systems |
| 0716 251 02A | Maintain vehicle charging system |
| 0716 251 03A | Maintain vehicle lighting system |
| 0716 351 04A | Maintain Vehicle Engine |
| 0716 351 05A | Maintain Ignition System |
| 0716 351 06A | Diagnose Car on Board System |

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# CORE UNITS OF COMPETENCY

# SERVICE VEHICLE STARTING SYSTEMS

**UNIT CODE: 0716 251 01A**

**UNIT DESCRIPTION**

This unit specifies competencies required to service vehicle starting system. It involves repairing starting system, servicing ignition system, testing ignition system and performing housekeeping.

**ELEMENTS AND PERFORMANCE CRITERIA**

|  |  |
| --- | --- |
| **ELEMENT**  These describe the key outcomes which make up workplace functions | **PERFORMANCE CRITERIA**  These are assessable statements which specify the required level of performance for each of the elements  ***(Bold and italicized terms are elaborated in the range)*** |
| 1. Apply basic concepts of electrical quantities | * 1. ***SI unit***s in Electrical are identified in accordance with IEE regulations.   2. ***Quantitie***s of Charge, force, work and power are defined as per engineering principles   3. Perform calculations involving Ohm’s law i.e. Current, Resistance and voltage   4. measuring instruments for electrical quantities are identified in accordance with engineering principles |
| 1. Motor vehicle Battery Service | 1. Understanding of electrolysis and its applications is demonstrated 2. Simple cells are constructed 3. Primary and secondary cells are differentiated 4. Types of cells and batteries are identified 5. ***Maintenance*** of batteries is carried out 6. Applications of batteries are identified |
| 1. Starting System repair | 1. Work area is organized and safety measures undertaken as per workplace procedure. 2. Tools, equipment and materials are assembled as per work requirements. 3. Physical checks and tests are performed as per service manual 4. Starting system components are serviced according to manufacturer’s manual 5. Starting system is assembled according to manufacturer’s specification 6. Starting system is tested according to manufacturer’s specification |
| 1. Perform house keeping | 1. Waste is segregated and disposed as per workshop procedure 2. Tools and equipment are cleaned as per workshop procedure 3. Tools and equipment are stored as per workshop procedure 4. Work area is cleaned according to workplace requirements |

**RANGE**

This section provides work environment and conditions to which the performance criteria apply. It allows for different work environment and situations that will affect performance.

|  |  |
| --- | --- |
| **Variable** | **Range** |
| 1. Tools and equipment may include but not limited to: | * 1. General workshop equipped for servicing vehicle electrical systems; * Screw driver * Ratchet and socket set * Wrench   1.2 Electronic diagnostic equipment;   * Multi-meters * Ignition test equipment. * Hydrometer * High-rate discharge tester * Feeler gauge * Battery charger * Glower * Test lamp |
| 1. Physical checks and tests may include but not limited to: | * Battery Terminals * Battery Cables * Starter Motor * Ignition switch * Wiring connections |
| 1. Starting system components may include but not limited to: | * Starter motor * Solenoid * Ignition switch * Battery |
| 1. Ignition system components may include but not limited to: | * Battery * Spark plug * Distributors * Ignition coil * High tension cables |

**REQUIRED KNOWLEDGE AND SKILLS**

This section describes the knowledge and skills required for this unit of competency.

**Required knowledge**

The individual needs to demonstrate knowledge of:

* Using sources of technical information for electrical systems
* Circuit protection
* Electrical safety procedures
* Electrical and electronic control system
* Selecting and using sealants, seals, fittings and fasteners
* Using of appropriate test methods
* Electrical principles
* Vehicle wiring principles
* Operation and construction of vehicle electrical systems
* Electrical safety procedures.

**Required skills**

The individual needs to demonstrate the following skills: ;

* Time management
* Problem solving
* Communications
* Planning
* Decision making
* First aid
* Analytical
* Starting system repair
* Ignition system service
* Ignition system test

**EVIDENCE GUIDE**

This provides advice on assessment and must be read in conjunction with the performance criteria, required knowledge and skills range.

|  |  |
| --- | --- |
| 1. Critical aspects of competency | ***Assessment requires evidence that the candidate:***   1. Undertook safety measures as per workplace procedure. 2. Selected tools, equipment and materials as per work requirements 3. Performedphysical checks and tests as per service manual 4. Serviced starting system components according manufacturers guidelines 5. Repaired ignition system components according manufacturers guidelines 6. Tested ignition system according to the manufacturers specification 7. Performed housekeeping as per workplace procedure |
| 1. Resource implications | The following resources should be provided:   1. Access to relevant workplace where assessment can take place 2. Appropriately simulated environment where assessment can take place 3. Resources relevant to the proposed assessment activity or tasks. |
| 1. Methods of assessment | Competency in this unit may be assessed through:   * 1. Practical   2. Portfolio of evidence   3. Third party report   4. Written tests |
| 1. Context of assessment | Competency may be assessed in a workplace or in a simulated workplace |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended |

# MAINTAIN VEHICLE CHARGING SYSTEM

**UNIT CODE: 0716 251 02A**

**UNIT DESCRIPTION**

This unit specifies competences required to maintain vehicle charging system. It involves inspecting charging system, servicing charging system, testing vehicle charging system and performing workshop housekeeping.

**ELEMENTS AND PERFORMANCE CRITERIA**

|  |  |
| --- | --- |
| **ELEMENT**  These describe the key outcomes which make up workplace functions | **PERFORMANCE CRITERIA**  These are assessable statements which specify the required level of performance for each of the elements  ***(Bold and italicized terms are elaborated in the range)*** |
| 1. Apply Workshop Safety | 1. Safe work environment is maintained as per workplace requirements 2. ***Workplace hazards*** and risks are controlled as per workplace requirements    1. ***Workplace accidents*** and incidents are managed as per workplace requirements |
| 1. Inspect charging system | * 1. PPE’s are adorned as per workshop procedure.   2. Work area is organized and safety measures undertaken as per workplace procedure.   3. ***Tools, equipment and materials*** are assembled as per work requirements.   4. ***Vehicle charging system*** is assessed as per manufacturer’s manual. |
| 1. Service vehicle charging system | * 1. Safety precautions are taken as per work requirements   2. Tools and equipment are selected as per job requirement   3. Physical checks and tests are performed as per service manual   4. Charging system is dismantled according manufacturers manual   5. Charging system is repaired according to manufacturer’s manual   6. Charging system is assembled according to manufacturer’s specification |
| 1. Test vehicle charging system | * 1. Work area is organized and safety measures undertaken as per workplace procedure.   2. Tools, equipment and materials are assembled as per work requirements.   3. Charging system is assessed according to the manufacturer’s specification |
| 1. Perform house keeping | * 1. Waste is segregated and disposed as per workshop procedure   2. Tools and equipment are cleaned as per workshop procedure   3. Tools and equipment are stored as per workshop procedure   4. Work area is cleaned according to workplace requirements |

**RANGE**

This section provides work environment and conditions to which the performance criteria apply. It allows for different work environment and situations that will affect performance.

|  |  |
| --- | --- |
| **Variable** | **Range** |
| 1. Tools, equipment and materials may include but not limited to: | * Multimeter * Battery charger * Spanners * Hydrometer * Screw driver * High-Rate discharge tester |
| 1. Vehicle charging system inspection may include but not limited to: | * Battery Condition * Terminal * Drive Belt * Alternator * Wiring |
| 1. Charging system may include but not limited to: | * Alternator * Battery * Battery cables * Fuses |

**REQUIRED KNOWLEDGE AND SKILLS**

This section describes the knowledge and skills required for this unit of competency.

**Required knowledge**

The individual needs to demonstrate knowledge of:

* Use sources of technical information for electrical systems
* Circuit protection
* Electrical safety procedures
* Selecting and using sealants, seals, fittings and fasteners
* Using appropriate test methods
* Basic electrical principles
* Vehicle wiring principles
* Operation and construction of vehicle electrical systems
* Electrical safety procedures

**Required skills**

The individual needs to demonstrate the following skills:

* Time management
* Problem solving
* Communications
* Planning
* Decision making
* First aid
* Charging system inspection
* Vehicle charging system service
* Vehicle charging system test

**EVIDENCE GUIDE**

This provides advice on assessment and must be read in conjunction with the performance criteria, required knowledge and skills range.

|  |  |
| --- | --- |
| 1. Critical aspects of competency | ***Assessment requires evidence that the candidate:***   1. Adorned PPE’s as per workshop procedures. 2. Assembled tools, equipment and materials as per work requirements. 3. Carried out vehicle charging system inspection as per manufacturer’s manual. 4. Performed physical checks and tests as per service manual 5. Repaired charging system according to manufacturer’s manual 6. Assessed charging system according to the manufacturer’s specification 7. Cleaned work area according to workplace requirements |
| 1. Resource implications | The following resources should be provided:   1. Access to relevant workplace where assessment can take place 2. Appropriately simulated environment where assessment can take place 3. Resources relevant to the proposed assessment activity or tasks. |
| 1. Methods of assessment | Competency in this unit may be assessed through:   * 1. Practical   2. Project   3. Portfolio of evidence   4. Third party report   5. Written tests |
| 1. Context of assessment | Competency may be assessed in a workplace or in a simulated workplace |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended |

# MAINTAIN VEHICLE LIGHTING SYSTEM

**UNIT CODE: 0716 251 03A**

**UNIT DESCRIPTION**

This unit specifies competences required to maintain vehicle charging system. It involves inspecting lighting system, servicing lighting system, testing vehicle lighting system and performing workshop housekeeping.

**ELEMENTS AND PERFORMANCE CRITERIA**

|  |  |
| --- | --- |
| **ELEMENT**  These describe the key outcomes which make up workplace functions | **PERFORMANCE CRITERIA**  These are assessable statements which specify the required level of performance for each of the elements  ***(Bold and italicized terms are elaborated in the range)*** |
| 1. Inspect lighting system | 1. PPE’s are adorned as per workshop procedure. 2. Work area is organized and safety measures undertaken as per workplace procedure. 3. ***Tools, equipment and materials*** are selected as per work requirements. 4. ***Physical checks and tests*** are performed as per manufacturer’s manual |
| 1. Service vehicle lighting system | * 1. Safety precautions are observed as per manufacturer’s manual   2. Tools and equipment are selected as per job requirement   3. ***Lighting system* components** are identified as per manufacturer’s manual   4. Lighting system is diagnosed according to manufacturer’s manual   5. Circuits are repaired according to manufacturer’s specification |
| 1. Test vehicle lighting system | 1. Work area is organized and safety measures undertaken as per workplace procedure. 2. Tools, equipment and materials are assembled as per work requirements. 3. Lighting system is assessed according to manufacturer’s specification |
| 1. Perform house keeping | 1. Waste is segregated and disposed as per workshop procedures 2. Tools and equipment are cleaned as per workshop procedures 3. Tools and equipment are stored as per workshop procedures 4. Work area is cleaned according to workplace requirements |

**RANGE**

This section provides work environment and conditions to which the performance criteria apply. It allows for different work environment and situations that will affect performance.

|  |  |
| --- | --- |
| **Variable** | **Range** |
| 1. Tools, equipment and materials may include but not limited to: | * Multimeter * Circuit tester * Screw drivers and wrenches * Socket set * Clipping tools * Electrical Tapes * Wire Brush |
| 1. Physical checks and tests may include but not limited to: | * Cracks, damage or moisture * Bulbs * Wiring |
| 1. lighting system components may include but not limited to: | * Lamps * Light fixtures * Sensors * Switches * Flasher unit * Relays |

**REQUIRED KNOWLEDGE AND SKILLS**

This section describes the knowledge and skills required for this unit of competency.

**Required knowledge**

The individual needs to demonstrate knowledge of:

* Technical information for electrical systems
* Circuit protection
* Electrical safety procedures
* Selecting and using sealants, seals, fittings and fasteners
* Using appropriate test methods
* Electrical principles
* Vehicle wiring principles
* Operation and construction of vehicle electrical systems
* Electrical safety procedures

**Required skills**

The individual needs to demonstrate the following skills:

* Time management
* Problem solving
* Communication
* Planning
* Decision making
* First aid

(Include technical skills)

**EVIDENCE GUIDE**

This provides advice on assessment and must be read in conjunction with the performance criteria, required knowledge and skills range.

|  |  |
| --- | --- |
| Critical aspects of competency | ***Assessment requires evidence that the candidate:***   1. Organized work area and undertook safety measures as per workplace procedure. 2. Selectedtools, equipment and materials as per work requirements. 3. Performedphysical checks and tests as per manufacturer’s manual 4. Repaired circuits according to manufacturer’s specification 5. Assessed lighting system according to manufacturer’s specification |
| Resource implications | The following resources should be provided:   1. Access to relevant workplace where assessment can take place 2. Appropriately simulated environment where assessment can take place 3. Resources relevant to the proposed assessment activity or tasks. |
| Methods of Assessment | Competency in this unit may be assessed through:   * 1. Practical   2. Project   3. Portfolio of evidence   4. Third party report   5. Written tests |
| Context of Assessment | Competency may be assessed in a workplace or in a simulated workplace |
| Guidance information for assessment | Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended |

# MAINTAIN VEHICLE ENGINE

**UNIT CODE: 0716 351 04A**

**UNIT DESCRIPTION**

This unit specifies competencies required to service and repair vehicle engine. It involves performing vehicle engine overhaul, servicing vehicle engine cooling system, service vehicle lubricating system, and service vehicle fuel system.

**ELEMENTS AND PERFORMANCE CRITERIA**

|  |  |
| --- | --- |
| **ELEMENT**  These describe the key outcomes which make up workplace functions | **PERFORMANCE CRITERIA**  These are assessable statements which specify the required level of performance for each of the elements  ***(Bold and italicized terms are elaborated in the range)*** |
| 1. Perform engine overhaul | * 1. Work area is organized and safety measures undertaken before use as per workplace procedure.   2. Engine diagnosis is carried out as per Manufacturer’s specification   3. ***Engine overhaul Tools, equipment and materials*** are assembled as per work requirements.   4. ***Engine components*** are dismantled according to manufacturer’s manual   5. Engine componentsare cleaned as perstandard operating procedure.   6. Engine parts are inspected according to manufacturer’s specification   7. Engine parts are serviced/Replaced according to manufacturer’s specification   8. Vehicle engine parts are reassembled according to manufacturer’s manual   9. Engine tune up is carried out according to manufacturer’s specification   10. Engine is fitted back to vehicle according to manufacturer’s manual   11. ***Re-installation******checks*** are performed according to manufacturer’s specification |
| 1. Service vehicle engine cooling system | 1. Work area is organized and safety measures undertaken as per workplace procedure. 2. Engine cooling system is diagnosed as per manufacturer’s specification 3. Cooling system tools, equipment and materials are assembled as per work requirements 4. Engine coolingcomponent***s*** are inspected according to manufacturer’s manual 5. ***Engine Cooling Components*** are servicedaccording tomanufacturer’s specifications***.*** 6. Engine Cooling Componentsare fitted back according tomanufacturer’s specifications 7. Engine Cooling systemis testedaccordingtomanufacturer’s specifications |
| 1. Service vehicle engine lubrication system | 1. Work area is organized and safety measures undertaken before use as per workplace procedure. 2. Engine lubrication system is diagnosed as per Manufacturer’s specification 3. ***Engine lubrication tools, equipment and materials*** are assembled as per work requirements. 4. ***Engine lubrication components*** are inspected according to manufacturer’s manual 5. Engine lubrication Components are serviced according to manufacturer’s specifications. 6. Engine lubrication Components are fitted back according to manufacturer’s specifications 7. Engine lubrication system is tested according to manufacturer’s specifications |
| 1. Service Vehicle Fuel system | 1. Work area is organized and safety measures undertaken before use as per workplace procedure 2. Tools, equipment and materials are assembled as per work requirements 3. ***Vehicle Fuel*** ***system*** diagnosis is carried out as per Manufacturer’s specification 4. Vehicle Fuel system components are inspected according to manufacturer’s manual 5. Vehicle Fuel system components areserviced/Replaced according tomanufacturer’s specifications***.*** 6. Vehicle Fuel system istested according tomanufacturer’s specifications |

**RANGE**

This section provides work environment and conditions to which the performance criteria apply. It allows for different work environment and situations that will affect performance.

|  |  |
| --- | --- |
| **Variable** | **Range** |
| 1. Engine overhaul Tools, equipment and materials may include but not limited to; | * Spanners * Torque wrench * Straight edge * Valve compressor * Pliers * Telescopic dial gauge * Filler gauge * Vernier calipers * Micrometer screw gauge * Ratchet * Diagnostic scope * Dial indicator * Compression tester * Ring squeezer * Timing light * Oil * Radiator pressure gauge * Funnels and draining pans * Cleaning materials * Plastigauge * Coolant |
| 1. Engine components may include but not limited to; | * Oil seals and oil filters * Piston and piston rings * Top covers * Valves, push rods and valve lifters * Camshaft * Gasket * Crankshaft * Drive pulleys * Oil sump and oil pump * Timing gears * Timing belt * Cylinder head * Cylinder block |
| 1. Re-installation checks may include but not limited to; | * Engine ignition timing * Camshaft timing * Injector pump timing * Tappet clearance |
| 1. Engine Cooling Components may include but not limited to; | * Radiator cap * radiator * hoses * Thermostat * Thermistor * switches * sensors * Water pump * Fan belt * fan relay * fan |
| 1. Engine lubrication tools, equipment and materials may include but not limited to; | * Drain pan * Feeler gauge * Oil funnels * Grease gun * Oil pump * Silicon * Oil * Grease * Rags |
| 1. Engine lubrication components may include but not limited to; | * Oil sump * Oil filters * Oil pump * Lubrication sensors * Oil galleries |
| 1. Engine Fuel system may include but not limited to; | * Air cleaners * Mufflers * Sensors * Catalytic converters * EGR valves * Manifolds * Throttle valves |

**REQUIRED KNOWLEDGE AND SKILLS**

***The individual needs to demonstrate knowledge of:***

* Kenyan legislation and workplace procedures relevant to:
* Health and safety
* Environment
* Personal protective equipment
* Waste management
* Legal requirements relating to the vehicles warranty
* Workplace procedures for vehicle engine overhaul.
* Documenting assessment and rectification information
* Working to agreed time frame and keeping others informed of progress
* The relationship between time, costs and profitability
* Interpretation and use of technical information for engine service activities
* The purpose of and how to use identification codes

**Required Skills**

*The individual needs to demonstrate the following skills*:

* Communication
* ICT
* Time management
* Problem solving
* Decision making
* Planning
* First aid
* Report writing
* Vehicle engine overhaul
* Vehicle engine cooling system service
* Vehicle engine electrical system service
* Interpreting technical information

**EVIDENCE GUIDE**

This provides advice on assessment and must be read in conjunction with the performance criteria, required knowledge and skills range

|  |  |
| --- | --- |
| 1. Critical Aspects of Competency | Assessment requires evidence that the candidate:   1. Undertook safety measures as per workplace procedures 2. Diagnosed Engine as per Manufacturer’s specification 3. DismantledEngine components according to manufacturer’s manual 4. Serviced/replaced engine parts according to manufacturer’s specification 5. Reassembled engine parts according to manufacturer’s manual 6. Tuned up engine according to manufacturer’s specification 7. Diagnosed Engine cooling system as per manufacturer’s specification 8. Serviced engine-cooling system components according to manufacturer’s specifications. 9. Tested engine cooling system according to manufacturer’s specifications 10. Serviced engine lubrication components according to manufacturer’s specifications. 11. Serviced/replaced Vehicle engine fuel system according to manufacturer’s specifications. |
| 1. Resource implications | The following resources should be provided:   * 1. Appropriately simulated environment where assessment can take place.   2. Access to relevant work environments.   3. Resources relevant to the proposed activities or task. |
| 1. Methods of Assessment | Competency in this unit may be assessed through:   * 1. Oral assessment   2. Practical   3. Portfolio of evidence   4. Third party report   5. Written assessment   6. Project |
| 1. Context of Assessment | Competency may be assessed individually in an actual workplace or in work-simulated conditions within accredited institutions |
| 1. Guidance information for assessment | This unit may be assessed on an integrated basis with others within this occupational sector. |

# SERVICE VEHICLE IGNITION SYSTEMS

**UNIT CODE: 0716 351 05A**

**UNIT DESCRIPTION**

This unit specifies competencies required to service vehicle electrical system. It involves; repair basic ignition system.

**ELEMENTS AND PERFORMANCE CRITERIA**

|  |  |
| --- | --- |
| **ELEMENT**  These describe the key outcomes which make up workplace functions | **PERFORMANCE CRITERIA**  These are assessable statements which specify the required level of performance for each of the elements  ***(Bold and italicized terms are elaborated in the range)*** |
| 1. Assess Vehicle Ignition System. | 1. Safety precautions are observed as per the manufacturer’s guidelines 2. ***Tools and equipment*** are selected as per the job requirement 3. Ignition system components are inspected according to manufacturer’s manual |
| 1. Repair ignition system | 1. Ignition components are identified according to manufacturer’s manual 2. Ignition system is located and removed as per the manufacturers specification 3. Physical checks and tests are performed as per the manual 4. Ignition system components are dismantled according manufacturers guidelines 5. Ignition system components are repaired according to manufacturer’s manual 6. Ignition system service documentation |
| 1. Perform Housekeeping | * 1. Waste is segregated and disposed as per workshop procedure   2. Tools and equipment are cleaned as per workshop procedure   3. Tools and equipment are stored as per workshop procedure   4. Work area is cleaned according to workplace requirements |

**RANGE**

This section provides work environment and conditions to which the performance criteria apply. It allows for different work environment and situations that will affect performance.

|  |  |
| --- | --- |
| **Variable** | **Range** |
| Tools and equipment | 1.1 General workshop equipped for servicing vehicle electrical systems;  1.2 Electronic diagnostic equipment;   * Multi-meters * Ignition test equipment. * Hydrometer * High rate discharge tester * Feeler gauge * Battery charger * Glower * Test lamp |
| Starting system | * Battery * Starter motor * Solenoid * Ignition switch |
| Lighting system | * Lamps * Lights * Light fixtures * Sensors |

**REQUIRED KNOWLEDGE AND SKILLS**

This section describes the knowledge and skills required for this unit of competency.

**Required knowledge**

The individual needs to demonstrate knowledge of:

* Interpret and use sources of technical information for electrical systems
* Electrical and electronic principles of vehicle electrical systems.
* Circuit protection
* Electrical safety procedures
* Electrical and electronic control system principles
* How to select and use sealants, seals, fittings and fasteners
* The use of appropriate test methods
* Electrical principles
* Vehicle wiring principles
* Operation and construction of vehicle electrical systems
* Electrical safety procedures.

**Required skills**

The individual needs to demonstrate the following skills:

* Proficient in ICT;
* Time management;
* Problem solving;
* Communications (verbal and written);
* Planning;
* Decision making;
* First aid;
* Diagnosis
* Analytical
* Report writing;
* Driving

**EVIDENCE GUIDE**

This provides advice on assessment and must be read in conjunction with the performance criteria, required knowledge and skills range.

|  |  |
| --- | --- |
| 1. Critical Aspects of Competency | ***Assessment requires evidence that the candidate:***   1. Serviced vehicle ignition system as per task requirements 2. Serviced vehicle charging systems as per task requirements 3. Serviced vehicle starting systems as per task requirements 4. Serviced vehicle lighting system as per task requirements |
| 1. Resource implications | The following resources should be provided:   * 1. Appropriately simulated environment where assessment can take place.   2. Access to relevant work environments.   3. Resources relevant to the proposed activities or task. |
| 1. Methods of Assessment | Competency in this unit may be assessed through:   * 1. Oral assessment   2. Practical   3. Portfolio of evidence   4. Third party report   5. Written assessment   6. Project |
| 1. Context of Assessment | Competency may be assessed individually in an actual workplace or in work-simulated conditions within accredited institutions |
| 1. Guidance information for assessment | This unit may be assessed on an integrated basis with others within this occupational sector. |

# DIAGNOSE CAR ON BOARD SYSTEM

**UNIT CODE:** **0716 351 06A**

**UNIT DESCRIPTION**

This unit specifies competencies required to diagnose car on board system. It involves launching OBD-II Scanners, diagnosing using OBD-II scanners, reading and interpreting fault codes, fixing faults using OBD-II scanners

**ELEMENTS AND PERFORMANCE CRITERIA**

|  |  |
| --- | --- |
| **ELEMENT**  These describe the key outcomes which make up workplace functions | **PERFORMANCE CRITERIA**  These are assessable statements which specify the required level of performance for each of the elements  ***(Bold and italicized terms are elaborated in the range)*** |
| 1. Launch OBD-II scanners | 1. Launcher is connected to the power source according to manufacturer’s manual 2. ***Scanners*** are powered on according to manufacturer’s manual 3. Module is connected to the OBD-II port according to manufacturer’s manual 4. Car engine is powered on according to manufacturer’s manual 5. Module and monitor are paired according to manufacturer’s manual |
| 1. Diagnose using OBD-II scanners | 1. Vehicle origin is scanned as per the manufacturers 2. Vehicle model is scanned as per the manufacturers 3. Vehicle ***engine type*** is scanned as per the manufacturers 4. Vehicle health report is scanned as per the job requirement 5. Scanning is carried out according to job requirement |
| 1. Read and interpret fault codes | 1. Codes are read and recorded according to manufacturer’s manual 2. ***Codes*** are interpreted according to manufacturer’s manual 3. Car engine is disconnected according to manufacturer’s manual |
| 1. Fix faults using OBD-II scanners | 1. Faults detected are repaired according to manufacturer’s manual 2. Recorded data is cleared according to manufacturer’s manual 3. Car engine is connected according to manufacturer’s manual |

**RANGE**

This section provides work environment and conditions to which the performance criteria apply. It allows for different work environment and situations that will affect performance.

|  |  |
| --- | --- |
| **Variable** | **Range**  ***May include but not limited to:*** |
| Scanners | * Handheld held OBD II * Wireless OBD II Scanner |
| Codes | * P Series * B Series * N series * C series |
| engine type | * 1F-E * V8 * 5A * 5E * 2E * 1F-Z * 1NZ-FXE * 2KD * 1KD * 2ZR-FE * MR |

**REQUIRED KNOWLEDGE AND SKILLS**

This section describes the knowledge and skills required for this unit of competency.

**Required knowledge**

The individual needs to demonstrate knowledge of:

* Engine operations and constructions
* Kenyan legislation and workplace procedures relevant to:
* health safety environmental and quality

(Environment include waste disposal)

* personal and vehicle protective equipment
* Workplace procedures for:
* recording fault location and correction activities;
* reporting the results of tests;
* the referral of problems
* The layout and operation of different types of engines

**Required skills**

The individual needs to demonstrate the following skills:

* Proficient in ICT;
* Time management;
* Problem solving;
* Communications (verbal and written);
* Planning;
* Decision making;
* First aid;
* Diagnosis
* Analytical
* Report writing;
* Driving

**EVIDENCE GUIDE**

This provides advice on assessment and must be read in conjunction with the performance criteria, required knowledge and skills range.

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| 1. Critical Aspects of Competency | ***Assessment requires evidence that the candidate:***   1. Launched OBD-II scanners 2. Diagnosed using OBD-II scanners 3. Read and interpreted fault codes 4. Fixed faults using OBD-II scanners |
| 1. Resource implications | The following resources should be provided:   * 1. Appropriately simulated environment where assessment can take place.   2. Access to relevant work environments.   3. Resources relevant to the proposed activities or task. |
| 1. Methods of Assessment | Competency in this unit may be assessed through:   * 1. Oral assessment   2. Practical   3. Portfolio of evidence   4. Third party report   5. Written assessment   6. Project |
| 1. Context of Assessment | Competency may be assessed individually in an actual workplace or in work-simulated conditions within accredited institutions |
| 1. Guidance information for assessment | This unit may be assessed on an integrated basis with others within this occupational sector. |