

**REPUBLIC OF KENYA**

**COMPETENCY BASED MODULAR CURRICULUM**

**FOR**

**MOTORCYCLE MECHANICS**

**KNQF LEVEL 4**

**PROGRAMME CODE: 0716354A**

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# FOREWORD

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

Reforms in the education sector are necessary to achieve Kenya Vision 2030 and meet the provisions of the Constitution of Kenya 2010. The education sector had to be aligned to the Constitution, and this resulted in the formulation of the Policy Framework for Reforming Education and Training in Kenya (Sessional Paper No. 14 of 2012). A key feature of this policy is the radical change in the design and delivery of TVET training. This policy document requires that training in TVET be competency-based, curriculum development be industry-led, certification be based on demonstration of competence, and the mode of delivery allow for multiple entry and exit in TVET programmes.

These reforms demand that Industry takes a leading role in curriculum development to ensure the curriculum addresses its competence needs. It is against this background that this curriculum has been developed. For trainees to build their skills on foundational hands-on activities of the occupation, units of learning are grouped in modules. This has eliminated duplication of content and streamlined exemptions based on skills acquired as a trainee progresses in the up-skilling process, while at the same time allowing trainees to be employable in the shortest time possible through the acquisition of part qualifications.

It is my conviction that this curriculum will play a great role in developing competent human resources for the motorcycle Sector’s growth and development.

**PRINCIPAL SECRETARY**

**STATE DEPARTMENT FOR TVET**

**MINISTRY OF EDUCATION**

# PREFACE

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

TVET Act, CAP 210A and Sessional Paper No. 1 of 2019 on Reforming Education and Training in Kenya for Sustainable Development emphasized the need to reform curriculum development, assessment, and certification. This called for a shift to CBET to address the mismatch between skills acquired through training and skills needed by industry, as well as increase the global competitiveness of the Kenyan labour force.

This curriculum has been developed in adherence to the Kenya National Qualifications Framework and CBETA standards and guidelines. The curriculum is designed and organized into Units of Learning with Learning Outcomes, suggested delivery methods, learning resources, and methods of assessing the trainee’s achievement. In addition, the units of learning have been grouped in modules to concretize the skills acquisition process and streamline upskilling.

I am grateful to all expert trainers and everyone who played a role in translating the Occupational Standards into this competency-based modular curriculum.

# ACKNOWLEDGEMENT

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

I recognize with appreciation the role of the Engineering and Manufacturing National Sector Skills Committee (NSSC) in ensuring that competencies required by the industry are addressed in the curriculum. I also thank all stakeholders in the Automotive sector for their valuable input and everyone who participated in developing this curriculum.

I am convinced that this curriculum will go a long way in ensuring that individuals aspiring to work in the Automotive Sector acquire competencies to perform their work more efficiently and effectively.

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# ABBREVIATIONS AND ACRONYMS

**KCSE** Kenya Certificate of Secondary Education

**KNQA** Kenya National Qualifications Authority

**TVETA** Technical, Vocational Education and Training Authority

**ISCED**  International Standard Classification of Education

**RPL** Recognition of Prior Learning

**PPE** Personal protective Equipment

# KEY TO ISCED UNIT CODE



# COURSE OVERVIEW

Motorcycle Mechanics Level 4 qualification consists of competencies that an individual must achieve to perform Motorcycle mechanic maintenance. It involves motorcycle maintenance, motorcycle frame maintenance, motorcycle electrical systems maintenance, electric motorcycle power train maintenance and motorcycle body maintenance.

# SUMMARY OF UNITS OF LEARNING

|  |  |  |  |
| --- | --- | --- | --- |
| CORE UNITS OF LEARNING | | | |
| **Unit Code** | **Units Title** | **Unit Duration (Hours)** | **Credit Factor** |
| **MODULE I** | | | |
| 0716 251 01A | Motorcycle Engine Maintenance | 150 | 15.0 |
| 0716 251 02A | Motorcycle Frame Maintenance | 150 | 15.0 |
| **MODULE II** | | | |
| 0716 351 03A | Motorcycle Electrical Systems maintenance | 140 | 14.0 |
| 0716 351 04A | Electric Motorcycle Power Train maintenance | 120 | 12.0 |
| 0716 351 05A | Motorcycle Body maintenance | 140 | 14.0 |
| **Industrial Attachment** | | **320** | **32.0** |
| **TOTAL** | | **1020** | **102.0** |

**Entry Requirements**

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

1. Kenya Certificate of Secondary Education (KCSE)

Or

1. Motorcycle mechanic KNQF level 3 certificate
2. Equivalent qualifications as determined by TVETA

**Trainer Qualifications**

A trainer for any of the units of competency in this course must:

1. Possession of at least Motorcycle mechanic level 5 qualification or in related trade area; and
2. Licensed by TVETA.
3. Registered by Engineer Board of Kenya (E.B.K) or Kenya Engineering Technology Registration Board (KETRB).

**Industry Training**

An individual enrolled in this course will be required to undergo Industry training for a minimum period of 320 hours in Motorcycle mechanic sector. The industrial training may be taken after completion of all units for those pursuing the full qualification or be distributed equally in each unit for those pursuing part qualification. In the case of dual training model, industrial training shall be as guided by the dual training policy.

**Assessment**

The course shall be assessed formatively and summatively:

1. During formative assessment all performance criteria shall be assessed based on performance criteria weighting.
2. Number of formative assessments shall minimally be equal to the number of elements in a unit of competency
3. Assessment of basic and common competencies shall be integrated in the core units
4. Theoretical assessment shall be integrated in practical assessment and conducted orally in both formative and summative assessments.
5. Theoretical and practical weight shall be as follows
6. 10:90 for the units in modules I and Module II.
7. Formative and summative assessments shall be weighted at 60% and 40% respectively in the overall unit of learning score
8. Assessment performance rating for each unit of competency shall be as follows:

|  |  |
| --- | --- |
| **MARKS** | **COMPETENCE RATING** |
| 80 -100 | Attained Mastery |
| 65 - 79 | Proficient |
| 50 - 64 | Competent |
| 49 and below | Not Yet Competent |
| Y | Assessment Malpractice/irregularities |

1. Assessment for Recognition of Prior Learning (RPL) may lead to award of part and/or full qualification.

**Certification**

A candidate will be issued with a Certificate of Competency upon demonstration of competence in a core Unit of Competency. To be issued with Kenya National TVET Certificate in Motorcycle Mechanics Level 4 the candidate must demonstrate competence in all the Units of Competency as given in the qualification pack. A Statement of Attainment certificate may be issued upon demonstration of competence in a certifiable element within a unit.

The certificates will be issued by the Qualification Awarding Institution

# MODULE I

# MOTORCYCLE ENGINE MAINTENANCE

**UNIT CODE: 0716 251 01A**

**Relationship to Occupational Standards**

**This unit addresses the Unit of Competency:** Maintain Motorcycle Engine

**Duration of Unit:** 150 Hours

**Unit Description**

This unit of learning covers the learning outcomes, content, assessment methods, methods of delivery and resources required to train motorcycle engine. It involves performing motorcycle engine overhaul, servicing motorcycle transmission system, servicing motorcycle fuel system and Perform motorcycle engine periodic maintenance.

**Summary of learning outcomes**

|  |  |  |
| --- | --- | --- |
| **S/No** | **Learning Outcomes** | **Duration (Hours)** |
|  | Perform Motorcycle Engine Overhaul | 60 |
|  | Service Motorcycle Fuel System | 30 |
|  | Service Motorcycle Transmission System | 30 |
|  | Perform Motorcycle Engine Periodic Maintenance | 30 |
| **Total** | | **150** |

**Learning outcomes, content, suggested assessment methods.**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Perform Motorcycle Engine Overhaul | * 1. Work Area Organization      1. Workplace cleaning      2. Tools, equipment, and parts organization      3. Hazardous zones in the workshop      4. Safety Measures in the Work Area      5. Ventilation and use of fire extinguishers      6. General safety protocols   2. Types of motorcycle engine.      1. Four stroke petrol engines      2. Two stroke petrol engines   3. Motorcycle engine components.      1. Oil seals and oil filters      2. Piston and piston rings      3. Top covers      4. Valves, push rods and valve lifters      5. Camshaft      6. Gasket      7. Crankshaft      8. Oil sump and oil pump      9. Timing gears      10. Timing chain      11. Cylinder head      12. Cylinder block      13. Air cleaners      14. Manifolds      15. Throttle valves      16. Cooling fins   4. Motor cycle Engine Diagnosis      1. Common engine issues         1. Compression loss         2. Overheating         3. Fuel system issues         4. Battery and electrical issues         5. Exhaust smoke analysis      2. Diagnostic Tools and Techniques         1. compression testers         2. spark testers   5. Engine Overhaul Tools, Equipment and materials used and maintenance      1. Wrenches      2. Screwdrivers      3. Spanners      4. Torque wrench      5. Valve spring compressors      6. Compression tester      7. Piston ring compressors      8. Timing light      9. Micrometers      10. Vernier caliper      11. Cylinder bore gauge      12. Gaskets      13. Valve seals      14. Crankshaft bearing      15. Engine oil      16. Cleaning solvents   6. Engine components dismantling      1. Work Preparation and Tool Selection      2. Dismantling procedure   7. Servicing and replacing motorcycle engine parts.      1. Timing chain/belt replacement      2. Cylinder head inspection and service      3. Piston and ring replacement      4. Valve cleaning      5. Oil change and filter replacement   8. Techniques for servicing parts.      1. Cleaning      2. Lubricating      3. inspecting, and repairing components         1. Cylinders         2. Valves         3. Pistons         4. Checking tolerances and wear levels      4. Worn or Damaged Parts replacement         1. Understanding manufacturer’s specifications for each engine part   9. Motorcycle engine tune-up.      1. Timing adjustment      2. Valve clearance      3. Spark plug gap   10. Re-installation checks       1. Oil level       2. Exhaust system checks       3. Fuel tap and lines       4. Oil Leaks          1. Gasket          2. Seals   Running the engine | Perform motorcycle engine overhaul |
| 1. Service Motorcycle Fuel System | * 1. Work Area Organization      1. Workplace cleaning      2. Tools, equipment, and parts organization      3. Hazardous zones in the workshop      4. Safety Measures in the Work Area      5. Ventilation and use of fire extinguishers      6. Safety protocol when handling fuel   2. Personal Protective Equipment (PPE) for fuel system maintenance      1. Gloves      2. Safety shoes      3. safety goggles      4. Anti-static clothing   3. Fuel system construction and operation.      1. Key Fuel system components.         1. Fuel pipes         2. Throttle Cables         3. Throttle valve         4. Fuel pump         5. Carburetor         6. Carburetor joints         7. Fuel tank   4. Fuel System Inspection and diagnosis      1. Diagnosing common problems         1. Wear         2. Corrosion         3. Blockages         4. Fuel filter clogging         5. Fuel pump malfunction         6. Fuel leaks      2. Manufacturers inspection guidelines   5. Fuel system service      1. Tools and Equipment for Fuel System Servicing         1. Wrenches         2. Pliers         3. Screwdrivers         4. Fuel pipe clips         5. Carburetor cleaning kits         6. Fuel filters         7. Carburetor service kit      2. Fuel system components service         1. Fuel pump service         2. Fuel filter replacement         3. Carburetor service            1. Carburetor Jets cleaning and replacement            2. Carburetor Float replacement            3. Needle valve cleaning         4. Fuel pipes         5. Adjusting carburetor settings   6. Fuel system tests.      + 1. Test running        2. Fuel leakages        3. Carburetor performance        4. Fuel pump functionality test   7. Idling test | * Practical * Project * Portfolio of evidence * Third party report   Written tests |
| 1. Service Motorcycle Transmission System | * 1. Work Area Organization      1. Workplace cleaning      2. Tools, equipment, and parts organization      3. Hazardous zones in the workshop      4. Safety Measures in the Work Area      5. Ventilation and use of fire extinguishers      6. General safety protocols   2. Personal Protective Equipment (PPE) for Transmission system maintenance      1. Gloves      2. Eye Protection      3. Safety shoes   3. Essential Tools, equipment and material for Transmission Work      1. Wrenches      2. Screwdrivers      3. Snap ring pliers      4. Torque wrenches      5. Clutch holding tools      6. Gear pullers      7. Transmission jack      8. cleaning tank      9. Engine oil      10. grease      11. Gaskets   4. Transmission system construction and operation.      1. Gearbox unit      2. Clutch unit      3. Chain and sprocket   5. Assessment of Common issues in motorcycle transmission.      + 1. Gear slipping        2. Hard shifting        3. Clutch slip   6. Transmission system overhaul      1. Reasons for overhaul         1. Wear         2. Tear         3. Malfunction      2. Key steps in transmission system overhaul         1. Disassembly         2. Inspection         3. Cleaning         4. Replacement      3. Dismantling Transmission Components         1. Dismantling sequence   7. Transmission system components service.      1. Key serviceable components.         1. Gears         2. Bearings         3. clutch plates replacement      2. Clutch cable adjustment and replacement      3. Oil change      4. Cleaning      5. Chain lubrication and adjustment      6. Adjustment according to manufacturer guidelines      7. Replacing Worn or Damaged Parts         1. manufacturer specifications for compatibility and performance   8. Transmission system tests.      1. Oil level and condition check      2. Clutch functionality test      3. Shifting test      4. Noise Level      5. Gear engagement      6. Shifting quality   9. Vibration limits | * Service motorcycle transmission system |
| 1. Perform Motorcycle Engine Periodic Maintenance | * 1. Work area organization and safety measures      1. Importance of a well-organized work area      2. Work area arrangement and organization      3. Hazardous zones      4. Safety measures      5. Emergency procedures   2. Personal Protective Equipment (PPE) for motorcycle maintenance      1. gloves      2. Goggles      3. safety shoes   3. Tools, equipment, and materials      1. Spanners      2. Screw drivers      3. Torque wrench      4. Pliers      5. hammers      6. Oil   4. Equipment for motorcycle maintenance      1. Work stands      2. Compression tester      3. Oil change equipment      4. Oil drain pans, funnels, and filter wrenches.   5. Materials for motorcycle maintenance      1. Engine oil      2. Cleaning materials      3. grease      4. Fuel      5. Replacement parts      6. Safety materials   6. Periodic motorcycle maintenance.      1. Oil change      2. Oil level check      3. Fuel level check      4. Air and fuel filter change      5. Components cleaning      6. Greasing & lubrication      7. Components inspection   7. Waste material disposal.      1. Sorting waste      2. Recycling      3. Disposal      4. Hazardous material handling      5. Used Oil disposal      6. Fluids and chemicals disposal | * Practical * Project * Portfolio of evidence * Third party report * Written tests |

**Suggested Methods of Delivery**

* Practical
* Projects
* Demonstrations
* Group discussion
* Direct Instructions

**Recommended Resources for 25 Trainees**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/No.** | **Category/Item** | **Description/Specifications** | **Quantity** | **Recommended Ratio (Item: Trainee)** |
| **A** | **Learning Materials** | | | |
|  | Textbooks | Comprehensive textbooks on Motorcycle Mechanics | 25 | 1:1 |
|  | Projector | Functional projector for displaying content during presentations | 1 | 1:25 |
|  | Computer | Functional desktop computer with online instructional content | 1 | 1:25 |
|  | White board | Quality whiteboard of approximately 6 ft by 3 ft for writing during theory instruction | 1 | 1:25 |
|  | Printer | An ink-jet, laser-jet or toner-cartridge printer for printing notes, instructions and working drawings | 1 | 1:25 |
| **B** | **Learning Facilities & Infrastructure** | | | |
|  | Lecture/Theory Room | Spacious room with seats for 25 trainees, approximately 60 sqm | 1 | 1:25 |
|  | Workshop | Standard workshop with bench/fitting area and welding booths approximately 180 sqm | 1 | 1:25 |
| **C** | **Materials and Supplies** | | | |
|  | Dust coat/ overall | Shields skin and regular clothes from sparks | 25 | 1:25 |
|  | Gloves | Shields hands from sharp edges, heat, and chemical exposure | 25 | 1:1 |
|  | Safety boots | Protects feet from heavy objects, sharp materials, and impact. | 25 | 1:1 |
|  | Ear muffs/ ear plugs | Shields against prolonged exposure to high noise levels from machinery | 25 | 1:1 |
|  | Safety goggles | Protects eyes from flying metal particles, sparks, and dust | 25 | 1:1 |
|  | Spark Plugs | For Replacement | 5 | 1:5 |
|  | spark testers | For spark test | 5 | 1:5 |
|  | Batteries | For Replacement | 5 | 1:5 |
|  | First Aid kit | Fully equipped First Aid kit for use in case of accidents | 1 | 1:25 |
|  | Engine oil-20W50 |  | 5 | 1:5 |
|  | Petrol |  | 10 litres | 1:3 |
|  | Grease |  | 10 kgs | 1:3 |
|  | Gaskets and seals |  | 10 sets | 1:3 |
|  | Engineers blue | For marking out | 5 | 1.5 |
|  | anti-rust fluid (WD 40) | For cleaning and lubricating | 1 litre | 1:25 |
|  | Brooms and cleaning stuff | Hand brooms and mops for cleaning | 10 | 2:5 |
|  | Cotton waste | Absorbent cotton waste for cleaning of oils and other dirt on machines, tools and equipment | Enough |  |
|  | Cleaning detergents | General degreasers | 10 liters |  |
| Floor detergents | 10 liters |
| Hand detergents | 10 liters |
| **D** | **Tools and Equipment** | | | |
| **Measuring tools** | | | | |
|  | Multimeters | For electric checks (Voltage, resistivity, amperage) | 5 | 1:5 |
|  | testing lamp | For circuit continuity tests | 10 | 1:3 |
|  | Cylinder bore gauge | For measuring engine bore | 5 | 1:5 |
| **Fastening tools** | | | | |
|  | Full Spanner Sets | For fastening bolts and nuts | 5 | 1:5 |
|  | 6-piece Screwdriver Sets | For fastening screws | 5 | 1:5 |
|  | Torque Wrenches | For fastening bolts and nuts at specific torque | 5 | 1:5 |
| **Striking Tools** | | | | |
|  | Hammers | For striking | 10 | 1:3 |
|  | Soft hammers | For striking soft parts without damaging | 10 | 1:3 |
| **Cutting tools** | | | | |
|  | Chisel | For cutting | 5 | 1:5 |
|  | Combination Pliers | For various functions including cutting and holding. | 5 | 1:5 |
|  | Tinsnips | For cutting sheet metals | 5 | 1:5 |
|  | Hacksaw | For cutting metal parts | 5 | 1:5 |
| **E** | **Machines and Equipment** | | | |
|  | Motorcycle engine Models | For disassembly and assembly | 5 | 1:5 |
|  | Firefighting equipment | for ensuring safety in fabrication workshops where fire hazards are present, such as sparks | 3 |  |
|  | Hydraulic press | For pressing bearings and bushes to place | 1 | 1:25 |
|  | Oil change equipment kits | For removing and oil filter | 5 | 1:5 |
| **F Special Tools** | | | | |
|  | Piston ring expanders | For installing and reinstalling piston rings | 5 | 1:5 |
|  | Valve spring compressors | For installing and reinstalling valve spring | 5 | 1:5 |
|  | Piston ring compressor | For installing and reinstalling piston ring | 5 | 1:5 |
|  | Circlip Pliers (Internal and external) | For removing and reinstalling circlip washers | 10 | 1:3 |
|  | Pullers | For pulling bearings | 5 | 1:5 |
| **G** | **Reference Materials** | | | |
| 1 | Operation sheets/ templates | For reference | 6 pcs | 1:5 |
| 2 | Manufacturers service manuals | For reference | 25 pcs | 1:1 |
| 3 | Training Presentations/Slides | Digital format for shared access among trainees | 1 | 1:25 |
| 4 | Practical Assessment Guides | Worksheets for practical assessments | 25 pcs | 1:1 |

# MOTORCYCLE FRAME MAINTENANCE

**UNIT CODE: 0716 251 02A**

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency**:** Maintain Motorcycle Frame

**Duration of Unit:** 150 hours

**Unit Description**

This unit of learning covers the learning outcomes, content, assessment methods, methods of delivery and resources required to train maintain motorcycle frame. It involves service motorcycle braking system, service motorcycle wheels and tyres, service motorcycle suspension components and service motorcycle steering system.

**Summary of learning outcomes**

By the end of this unit of learning, the trainee should be able to:

|  |  |  |
| --- | --- | --- |
| **S/No** | **Learning Outcomes** | **Duration (Hours)** |
| 1. | Motorcycle Braking System | 40 |
| 2. | Motorcycle Wheels and Tyres | 40 |
| 3. | Motorcycle Suspension System Components | 30 |
| 4. | Motorcycle Steering System | 40 |
| **Total** | | **150** |

**Learning outcomes, content, suggested assessment methods**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Motorcycle Braking System | * 1. Work Area Organization      1. Workplace cleaning      2. Tools, equipment, and parts organization      3. Safety Measures in the Work Area      4. Hazards associated with braking system service         1. fire         2. fall and slip      5. Emergency procedures   2. Personal Protective Equipment (PPE) for fuel system maintenance      1. Gloves      2. Safety shoes      3. safety goggles      4. Dust mask   3. Motor cycle braking system inspection      1. Types of braking system         1. Mechanical drum brake         2. Disc brake      2. Brake System Components and Functions         1. Brake pads         2. Brake drum         3. Brake shoe         4. Brake lining         5. Brake discs         6. Brake calipers         7. Brake fluid lines         8. Fluid reservoirs         9. Brake switch         10. Brake cable         11. Brake lever         12. Brake pedal         13. Brake switch      3. Inspection checks         1. Wear         2. Leaks         3. Fluid levels         4. Brake hose condition      4. Using the Manufacturer’s Manual for Inspection   4. Braking Components service      1. Cleaning braking components      2. Brake system service         1. Brake lever and pedal         2. Brake caliper         3. Worn brake pads         4. Worn shoe and lining         5. Leaking brake lines         6. Faulty brake cable      3. Manufacturer recommendation for;         1. Part compatibility         2. Brake fluid type         3. Pad thickness      4. Brake system Bleeding      5. Brake adjustment procedure      6. Brake fluid top up   5. Common Brake Issues Post-Testing      1. Noise      2. Spongy pedal feel   6. Post-Service Brake Testing      1. Test rides      2. Pedal/ lever feel      3. Fluid leak detection   7. Safe handling and waste disposal procedures.   8. Brake waste handling      1. Asbestos waste handling         1. Health risks of asbestos in brakes         2. PPE to minimize exposure to brake dust.         3. Environmental Standards for Asbestos Disposal         4. Asbestos waste Disposal Procedures      2. Used brake fluid disposal      3. Brake Waste segregation | * Practical tests * Written * Oral test * Portfolio of evidence |
| 1. Motorcycle Wheels and Tyres | * 1. Work Area Organization for Wheel and Tyre Servicing      1. Cleaning      2. Organized space for efficient wheel and tyre maintenance      3. Tool arrangement   2. Tyre and Wheel Work safety measures      1. Hazards associated with tyre and wheel maintenance         1. Heavy wheels         2. Potential punctures      2. Personal Protective Equipment (PPE) use         1. Gloves         2. Safety goggles         3. Anti-slip footwear      3. Workplace Safety Protocols   3. Types of rims      1. Wire spoke      2. Alloy   4. Types of tyres.      1. Tubeless      2. Tubed tyres   5. Tools, equipment and material use and maintenance      + 1. Tyre levers        2. Tubeless tyre repair kit        3. Patches        4. Air compressor        5. Vulcanizing glue        6. Alignment tools        7. Tyre pressure gauge        8. Replacement valve stems        9. Soapy water   6. Motorcycle Tyre and Wheel Inspection      1. Key areas to inspect         1. Tread         2. Sidewall         3. Rim         4. Spokes         5. Valve nozzle      2. Manufacturer-recommended inspection procedures      3. Signs of Wear and Damage         1. Uneven tread         2. Cuts         3. Cracks         4. Bulges   7. Motorcycle Tyres service      1. Tyre inflation      2. tread inspection      3. worn out tyre replacement      4. rim inspection and replacement      5. tyre valve replacement      6. puncture repair      7. Service Manual Specifications   8. Wheel alignment      1. front and rear wheel alignment      2. Consequences of improper alignment         1. Uneven tyre wear         2. Compromised handling      3. Wheel alignment procedure         1. String alignment      4. Manufacturer-specific alignment standards   9. Worn out tyre disposal      1. Environmental Impact of Tyre Disposal      2. Safe methods of tyre disposal      3. Used tyres recycling | * Observation * Practical tests * Written * oral test * Portfolio of evidence |
| 1. Motorcycle Suspension System Components | * 1. Work Area Organization for Suspension Servicing      1. Workplace organization      2. Tools organization      3. Safety Measures in Suspension System Maintenance      4. Safety risks in suspension work.      5. Personal Protective Equipment (PPE) needed         1. Gloves         2. safety glasses         3. Footwear      6. Workplace Safety Procedures   2. Tools, equipment and material use and functionality      + 1. Assorted spanners        2. Spring compressors        3. Suspension fluids        4. Seals        5. Replacement components   3. Types of suspension system      1. Front suspension system         1. Conventional (telescopic) forks      2. Rear suspension system         1. Dual shock absorbers         2. Monoshock suspension   4. Motorcycle suspension components functionality      1. Front suspension components         1. Forks         2. Triple clamps         3. Dust seals      2. Rear suspension components         1. Shock absorber         2. Springs         3. Swing arm         4. Linkages   5. Suspension System Diagnosis      1. Common suspension system problems         1. leaking fluids         2. unbalanced handling      2. Diagnosing procedures         1. Visual inspections            1. Oil leaks            2. Bent fork            3. Worn rubber boot         2. Bounce tests         3. Manufacturer’s manual   6. Suspension system components inspection      1. Inspection Procedures      2. Manufacturer’s manual inspection guidelines      3. Inspection checks         1. Wear or damage         2. Leaking seals         3. Bent forks         4. Weak springs   7. Suspension Component service      1. Servicing procedures         1. Worn out seals replacement         2. Damaged shocks replacement         3. Lubricating moving parts         4. Preload adjustment         5. Broken spring replacement         6. Linkage replacement      2. Manufacturer-approved parts      3. Manufacturer’s Servicing Instructions   8. Motorcycle suspension system tests      1. Bounce test      2. Static sag test      3. Compression and rebound tests      4. Wheel alignment test.      5. Load testing | * Observation * Practical tests * Written * oral test * Portfolio of evidence |
| 1. Motorcycle Steering System | * 1. Work Area Organization for Steering Servicing      1. Workplace organization      2. Tools organization      3. Safety Measures in steering System Maintenance      4. Safety risks in steering system work.      5. Personal Protective Equipment (PPE) needed         1. Gloves         2. safety glasses         3. Safety boots   2. Motorcycle steering system components      1. Steering handlebar      2. Steering column      3. Steering linkages      4. Kingpin      5. Stub-axle      6. Forks      7. Steering stem (or head tube)   3. Tools, equipment and material use      1. Socket wrenches      2. torque wrenches      3. pullers      4. bearing presses      5. Grease      6. Lubricants      7. Replacement bearings and seals   4. Diagnosing steering components      1. Common steering system problems         1. Fork misalignment         2. Worn out bearing         3. Steering stem play         4. Misalignment         5. Stiff steering         6. Knocking or clunking noises         7. Unresponsive steering         8. Pulling to one side      2. Manufacturers diagnostic procedures   5. Inspecting steering components      1. Inspection checks to be carried out         1. Handlebar         2. steering stem         3. fork tubes         4. loose bearings      2. Signs of wear or damage         1. Loose bearings         2. bent handlebars         3. worn-out seals      3. Manufacturer’s Inspection Guidelines   6. Servicing Steering Components      1. Servicing techniques      2. bearing adjustment      3. lubrication      4. Handle bar alignment and adjustments   7. Replacement of Worn or Damaged Parts      1. Bearings      2. Seals      3. handlebar mounts      4. Following Manufacturer’s Servicing Instructions   8. Testing the steering system      1. Response time      2. Movement checks      3. Alignment check      4. Play check | * Observation * Practical tests * Written * oral test * Portfolio of evidence |

**Suggested Methods of Delivery**

* Practical
* Projects
* Demonstrations
* Group discussion
* Direct Instructions

**Recommended Resources for 25 Trainees**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/No.** | **Category/Item** | **Description/Specifications** | **Quantity** | **Recommended Ratio (Item: Trainee)** |
| **A** | **Learning Materials** | | | |
|  | Textbooks | Comprehensive textbooks on Motorcycle Mechanics | 25 | 1:1 |
|  | Projector | Functional projector for displaying content during presentations | 1 | 1:25 |
|  | Computer | Functional desktop computer with online instructional content | 1 | 1:25 |
|  | White board | Quality whiteboard of approximately 6 ft by 3 ft for writing during theory instruction | 1 | 1:25 |
|  | Printer | An ink-jet, laser-jet or toner-cartridge printer for printing notes, instructions and working drawings | 1 | 1:25 |
| **B** | **Learning Facilities & Infrastructure** | | | |
|  | Lecture/Theory Room | Spacious room with seats for 25 trainees, approximately 60 sqm | 1 | 1:25 |
|  | Workshop | Standard workshop with bench/fitting area and welding booths approximately 180 sqm | 1 | 1:25 |
| **C** | **Materials and Supplies** | | | |
|  | Dust coat/ overall | Shields skin and regular clothes from sparks | 25 | 1:25 |
|  | Gloves | Shields hands from sharp edges, heat, and chemical exposure | 25 | 1:1 |
|  | Safety boots | Protects feet from heavy objects, sharp materials, and impact. | 25 | 1:1 |
|  | Ear muffs/ ear plugs | Shields against prolonged exposure to high noise levels from machinery | 25 | 1:1 |
|  | Safety goggles | Protects eyes from flying metal particles, sparks, and dust | 25 | 1:1 |
|  | Engine oil-20W50 |  | 5 | 1:5 |
|  | Petrol |  | 10 litres | 1:3 |
|  | Brake fluid |  | 10 litres | 1:3 |
|  | Grease |  | 10 kgs | 1:3 |
|  | Gaskets and seals |  | 10 sets | 1:3 |
|  | anti-rust fluid (WD 40) | For cleaning and lubricating | 1 litre | 1:25 |
|  | Brake Bleeding kit | For brake bleeding | 1 | 1:25 |
|  | P400 sanding paper | For cleaning the drum, disc, linings and brake pads | 25 | 1:25 |
|  | Brake System replacement Components; | Including brake pads, brake shoes, calipers, return springs and cables for replacement | 5 sets | 1:5 |
|  | Sets of Suspension Replacement components | including seals and shock absorbers with springs | 5 sets | 1:5 |
|  | Steering System replacement Component | including handlebars, linkages, and bearings | 5 sets | 1:5 |
|  | Tubeless Tyre Repair Kits | Puncture repair of tubeless tyres | 5 | 1:5 |
|  | Tyre Patches | Puncture repair of tubed tyres | 50 |  |
|  | Vulcanizing Glue | Puncture repair | 5 | 1:5 |
|  | Brooms and cleaning stuff | Hand brooms and mops for cleaning | 10 | 2:5 |
|  | Cotton waste | Absorbent cotton waste for cleaning of oils and other dirt on machines, tools and equipment | Enough |  |
|  | Cleaning detergents | General degreasers | 10 liters |  |
| Floor detergents | 10 liters |
| Hand detergents | 10 liters |
| **D** | **Tools and Equipment** | | | |
| **Measuring tools** | | | | |
|  | testing lamp | For circuit continuity tests | 10 | 1:3 |
|  | vernier calipers | For measuring with precision | 5 | 1:5 |
|  | micrometers | For measuring with precision | 5 | 1:5 |
|  | Cylinder bore gauge | For measuring engine bore | 5 | 1:5 |
| **Fastening tools** | | | | |
|  | Full Spanner Sets | For fastening bolts and nuts | 5 | 1:5 |
|  | 6-piece Screwdriver Sets | For fastening screws | 5 | 1:5 |
|  | Torque Wrenches | For fastening bolts and nuts at specific torque | 5 | 1:5 |
| **Striking Tools** | | | | |
|  | Hammers | For striking | 10 | 1:3 |
|  | Soft hammers | For striking soft parts without damaging | 10 | 1:3 |
| **Cutting tools** | | | | |
|  | Chisel | For cutting | 5 | 1:5 |
|  | Combination Pliers | For various functions including cutting and holding. | 5 | 1:5 |
|  | Tinsnips | For cutting sheet metals | 5 | 1:5 |
|  | Hacksaw | For cutting metal parts | 5 | 1:5 |
| **E** | **Machines and Equipment** | | | |
|  | Fire Extinguishers |  | 2 | 1:12.5 |
|  | First Aid Kits |  | 2 | 1:12.5 |
|  | Computers | with internet access and manufacturers technical information | 5 | 1:5 |
|  | Dust Masks |  | 25 | 1 |
|  | Working Motorcycles | with working Braking Systems | 5 | 1:5 |
|  | Brake Bleeding kit |  | 1 | 1:25 |
|  | Air Compressor. | with an adjustable pressure gauge for tyre inflation | 1 | 1:25 |
|  | Tyre Pressure Gauges | To check tyre pressure | 2 | 1:12.5 |
|  | 3 Waste Disposal bins | For waste disposal in the workshop | 5 | 1:5 |
|  | 1 Bearing Press machine | For removing and reinstalling bearings and bushes | 1 | 1:25 |
| **F Special Tools** | | | | |
|  | Circlip Pliers (Internal and external) | For removing and reinstalling circlip washers | 10 | 1:3 |
|  | Pullers | For pulling bearings | 5 | 1:5 |
| **G** | **Reference Materials** | | | |
| 1 | Operation sheets/ templates | For reference | Enough |  |
| 2 | Manufacturers service manuals | For reference | 25 pcs | 1:1 |
| 3 | Training Presentations/Slides | Digital format for shared access among trainees | 1 | 1:25 |
| 4 | Practical Assessment Guides | Worksheets for practical assessments | 25 pcs | 1:1 |

# MODULE II

# MOTORCYCLE ELECTRICAL SYSTEMS MAINTENANCE

**UNIT CODE: 0716 351 03A**

**Relationship to Occupational Standards**

**This unit addresses the Unit of Competency:** Maintain Motorcycle Electrical Systems

**Duration of Unit: 140 Hours**

**Unit Description**

This unit of learning covers the learning outcomes, content, assessment methods, methods of delivery and resources required to train motorcycle electrical systems maintenance. It includes; service motorcycle ignition system, service motorcycle lighting system and service motorcycle auxiliary system.

**Summary of learning outcomes**

|  |  |  |
| --- | --- | --- |
| **S/No** | **Learning Outcomes** | **Duration (Hours)** |
| 1. | Motorcycle Ignition System | **50** |
| 2. | Motorcycle Charging System | **50** |
| 3. | Motorcycle Lighting System | **20** |
| 4. | Motorcycle Auxiliary System | **20** |
| **Total** | | **140** |

**Learning outcomes, content, suggested assessment methods.**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Motorcycle Ignition System | * 1. Work area organization and safety measures   2. Importance of a well-organized work area   3. Safety measures   4. Emergency procedures   5. Tools, equipment, and materials assembly.   6. Hand tools      1. Power tools      2. Specialty tools   7. Equipment for motorcycle maintenance      1. Work stands and lifts      2. Cleaning and maintenance equipment   8. Materials management      1. Insulating tape      2. Replacement parts      3. Safety materials   9. Ignition system components      1. Ignition coil (magneto)      2. Spark plugs      3. High tension cables      4. Low tension cables      5. Sensors      6. Ignition switch      7. Regulator/Rectifier (RR) Unit      8. CDI (Capacitor Discharge Ignition)      9. TCI (Transistor Control Ignition)      10. Secondary coil      11. Plug cap      12. Solenoid      13. Construction and operation of ignition system components;      14. Ignition coil (magneto)   10. Ignition system diagnosis       1. Ignition switch testing       2. Checking the spark plug       3. Testing the ignition coil       4. Examining the CDI/ECU   11. Ignition system components service.       1. Spark plug       2. Ignition coil       3. Ignition switch       4. CDI/ECU       5. Wiring and Connectors   12. Ignition system tests       1. - spark plug       2. - ignition coil       3. - ignition switch       4. - CDI/ECU       5. - Wiring and Connectors       6. Visual Inspection | * Practical tests * Written test * Projects * Portfolio of evidence * Third party report |
| 1. Motorcycle Charging System | * 1. Charging system components service      1. Stator (Alternator) repair      2. Rectifier/Regulator service      3. Wiring and Connectors repair   2. Charging system tests.      1. Static Voltage Test      2. Stator (Alternator) Test      3. Rectifier/Regulator Test      4. Load Test   3. Safe handling and waste disposal procedures.      1. Electrolyte Disposal      2. Battery Disposal      3. Charging Cables and Connectors | * Practical tests * Written test * Projects * Portfolio of evidence * Third party report |
| 1. Motorcycle Lighting System | * 1. Lighting system components      1. Head lamps      2. Bulbs      3. Switches      4. Low tension cables      5. Battery   2. Lighting system diagnosis      1. Battery voltage check      2. Bulb testing      3. Fuses and relays      4. Wiring and ground connections      5. Switch and control test   3. Lighting system service      1. Headlight service      2. Taillight and brake light repair      3. Turn signal repair      4. Wiring and connectors      5. Fuses and relays   4. Lighting system test      1. - Headlight test      2. - Taillight and brake light test      3. - Turn light signal test      4. - Wiring and connectors | * Practical tests * Written test * Projects * Portfolio of evidence * Third party report |
| Motorcycle Auxiliary System | * 1. Auxiliary system components      1. Instrument cluster      2. Security system      3. Control knobs   2. Auxiliary system components operation.      1. - Instrument cluster      2. - Security system      3. - Control knobs      4. Fuel gauge      5. Temperature gauge   3. Auxiliary system components service.      1. Gauge Calibration      2. Testing Warning Lights      3. Temperature Gauge Service      4. Alarm System Functionality      5. Immobilizer System Service      6. Fuel Gauge Testing   4. Auxiliary system components tests      1. Pre-Test Inspection | * Practical tests * Written test * Projects * Portfolio of evidence * Third party report |

**Suggested Methods of Delivery**

* Practical
* Projects
* Demonstrations
* Group discussion
* Direct Instructions

**Recommended Resources for 25 Trainees**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/No.** | **Category/Item** | **Description/Specifications** | **Quantity** | **Recommended Ratio (Item: Trainee)** |
| **A** | **Learning Materials** | | | |
|  | Textbooks | Comprehensive textbooks on Motorcycle Mechanics | 25 | 1:1 |
|  | Projector | Functional projector for displaying content during presentations | 1 | 1:25 |
|  | Computer | Functional desktop computer with online instructional content | 2 | 1:13 |
|  | White board | Quality whiteboard of approximately 6 ft by 3 ft for writing during theory instruction | 1 | 1:25 |
|  | Printer | An ink-jet, laser-jet or toner-cartridge printer for printing notes, instructions and working drawings | 1 | 1:25 |
| **B** | **Learning Facilities & Infrastructure** | | | |
|  | Lecture/Theory Room | Spacious room with seats for 25 trainees, approximately 60 sqm | 1 | 1:25 |
|  | Workshop | Standard workshop with bench/fitting area and welding booths approximately 180 sqm | 1 | 1:25 |
| **C** | **Materials and Supplies** | | | |
|  | Dust coat/ overall | Shields skin and regular clothes from sparks | 25 | 1:1 |
|  | Gloves | Shields hands from sharp edges, heat, and chemical exposure | 25 | 1:1 |
|  | Safety boots | Protects feet from heavy objects, sharp materials, and impact. | 25 | 1:1 |
|  | Ear muffs/ ear plugs | Shields against prolonged exposure to high noise levels from machinery | 25 | 1:1 |
|  | Safety goggles | Protects eyes from flying metal particles, sparks, and dust | 25 | 1:1 |
|  | Head lamps | Electrodes used in TIG welding | 5 | 1:5 |
|  | Starter Motors | For Replacement | 2 | 1:13 |
|  | Spark Plugs | For Replacement | 5 | 1:5 |
|  | Batteries | For Replacement | 5 | 1:5 |
|  | Wiring Connectors and Crimping Tools | Connecting electric circuits | 5 | 1:5 |
|  | Electrical Contact Cleaner | For cleaning electrical circuits | 10 litres | 1:3 |
|  | Fuses and Relays | For Replacement | 10 sets | 1:3 |
|  | Ignition Coils | For Replacement | 5 | 1:5 |
|  | Solenoid switches | For Replacement | 5 | 1:5 |
|  | Spark Plug Wires | For Replacement | 5 | 1:5 |
|  | Indicator Bulbs | For Replacement | 10 | 1:3 |
|  | Headlight Bulbs | For Replacement | 10 | 1:3 |
|  | Tail light Bulbs | For Replacement | 10 | 1:3 |
|  | First Aid kit | Fully equipped First Aid kit for use in case of accidents | 2 | 1:13 |
|  | Anti-rust fluid (WD 40) | For cleaning and lubricating | 1 litre | 1:25 |
|  | Brooms and cleaning stuff | Hand brooms and mops for cleaning | 10 | 2:5 |
|  | Cotton waste | Absorbent cotton waste for cleaning of oils and other dirt on machines, tools and equipment | Enough |  |
|  | Cleaning detergents | General degreasers | 10 liters |  |
| Floor detergents | 10 liters |
| Hand detergents | 10 liters |
| **D** | **Tools and Equipment** | | | |
| **Measuring tools** | | | | |
|  | Multimeters | For electric checks (Voltage, resistivity, amperage) | 5 | 1:5 |
|  | Test Lamp | For circuit continuity tests | 10 | 1:3 |
|  | Vernier Calipers | For measuring with precision | 5 | 1:5 |
|  | Micrometers | For measuring with precision | 5 | 1:5 |
|  | Cylinder bore gauge | For measuring engine bore | 5 | 1:5 |
| **Fastening tools** | | | | |
|  | Full Spanner Sets | For fastening bolts and nuts | 5 | 1:5 |
|  | 6-piece Screwdriver Sets | For fastening screws | 5 | 1:5 |
|  | Torque Wrenches | For fastening bolts and nuts at specific torque | 5 | 1:5 |
| **Striking Tools** | | | | |
|  | Hammers | For striking | 10 | 1:3 |
|  | Soft hammers (Rubber, Plastic, Copper, Leather) | For striking soft parts without damaging | 10 | 1:3 |
| **Cutting tools** | | | | |
|  | Chisel | For cutting | 5 | 1:5 |
|  | Combination Pliers | For various functions including cutting and holding. | 5 | 1:5 |
|  | Tinsnips | For cutting sheet metals | 5 | 1:5 |
|  | Hacksaw | For cutting metal parts | 5 | 1:5 |
| **E** | **Machines and Equipment** | | | |
|  | Motorcycles with Working electrical systems | For training/ demonstration | 5 | 1:5 |
|  | Motorcycle electrical system models | For training | 5 | 1:5 |
|  | Fire Extinguishers | for ensuring safety in fabrication workshops where fire hazards are present, such as sparks | 3 |  |
| **F Special Tools** | | | | |
|  | Circlip Pliers | Internal and external | 10 | 1:3 |
|  | Pullers | For pulling bearings | 5 | 1:5 |
| **G** | **Reference Materials** | | | |
| 1 | Operation sheets/ templates | For reference | enough |  |
| 2 | Manufacturers service manuals | For reference | 25 pcs | 1:1 |
| 3 | Training Presentations/Slides | Digital format for shared access among trainees | 1 | 1:25 |
| 4 | Practical Assessment Guides | Worksheets for practical assessments | 25 pcs | 1:1 |

# ELECTRIC MOTORCYCLE POWER TRAIN MAINTENANCE

**UNIT CODE: 0716 351 04A**

**Relationship to Occupational Standards**

**This unit addresses the Unit of Competency:** Maintain Electric Motorcycle Power Train

**Duration of Unit:** 120 Hours

**Unit Description**

This unit of learning covers the learning outcomes, content, assessment methods, methods of delivery and resources required to train maintain electric motorcycle power train. It involves service high voltage batteries, service electric motorcycle convertors /controllers and service electric motorcycle transmission system.

**Summary of Learning Outcomes**

By the end of this unit of learning, the trainee should be able to:

|  |  |  |
| --- | --- | --- |
| **S/No** | **Learning Outcomes** | **Duration (Hours)** |
| 1. | High Voltage Batteries | **40** |
| 2. | Electric Motorcycle Convertors /Controllers | **40** |
| 3. | Electric Motorcycle Transmission System | **40** |
| **Total** | | **120** |

**Learning Outcomes, Content, and Suggested Assessment Methods**

| **Learning Outcome** | **Content** | **Suggested**  **Assessment Methods** |
| --- | --- | --- |
| 1. High Voltage Batteries | 1. Work area organization and safety measures 2. Importance of a well-organized work area 3. Safety measures 4. Emergency procedures 5. Tools, equipment, and materials assembly.    * 1. Hand tools      2. Power tools      3. Specialty tools 6. Equipment for motorcycle maintenance    * 1. Work stands and lifts      2. Cleaning and maintenance equipment 7. Materials management    * 1. Insulating tape      2. Replacement parts      3. Safety materials    1. Battery inspection       1. Visual inspection for physical damage, leaks, or corrosion on battery terminals and casing.       2. Connection check       3. Voltage level check    2. Battery servicing       1. Cleaning of terminals       2. Electrolyte level check and top up procedure.       3. Torque specifications for terminal connections    3. Battery testing    4. Testing equipment: 8. Multimeter   1.11.2 Battery testers  1.11.3 Hydrometer   * 1. Load testing   2. Documentation of test.   3. Environmental compliance:   4. Waste disposal method | * Practical tests * Written test * Projects * Portfolio of evidence * Third party report |
| 1. Electric Motorcycle Convertors /Controllers | * 1. Motorcycle Convertors /Controllers components      1. Septic convertor      2. Power switch      3. Conductor coil      4. Storage capacitor      5. Switching analysis      6. Control loop      7. Sensors      8. Controllers      9. Output devices      10. Valves      11. Dampers   2. Converter/controllers inspection      1. Visual inspection      2. Electrical connections inspection   3. Converter/controllers servicing      1. Maintenance tasks      2. Accessory replacement      3. Lubrication procedures   4. System testing      1. Testing equipment: multimeters      2. and oscilloscopes      3. Functionality check of testing equipment      4. Documentation of results | * Practical tests * Written test * Projects * Portfolio of evidence * Third party report |
| 1. Electric Motorcycle Transmission System | * 1. Component Inspection      1. Electric Motorcycle Transmission Components:      2. DC series motors      3. Brushless DC motor      4. Permanent Magnet Synchronous Motor (PMSM)      5. Inspection procedures.   3.1.5.1 Check for wear and damage on gears, bearings, and seals.   * + 1. Inspection of electrical connections for corrosion or damage.     2. Measurement of component tolerances   1. Service and Replacement      1. Servicing/Replacement:   2. System Testing      1. Testing After Assembly procedures:      2. Operation of the transmission system.      3. Test for secure and functioning electrical connections      4. Diagnostic tests for system performance.   3. Final Steps      1. Documentation of maintenance activities and findings      2. Cleanup of work area | * Practical tests * Written test * Projects * Portfolio of evidence * Third party report |

**Suggested Methods of Delivery**

* + Practical
  + Projects
  + Demonstrations
  + Group discussions
  + Direct instructions

**Recommended Resources for 25 Trainees**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Category/Item** | | **Description/Specifications** | **Quantity** | **Recommended Ratio (Item: Trainee)** |
|  | PPE (Personal Protective Equipment) | Safety gear for protection | 25 | 1:1 |
|  | Fire Extinguishers | Fire safety devices | 5 | 1:5 |
|  | First Aid Kits | Medical emergency supplies | 5 | 1:5 |
|  | Tool Sets | Basic tools for mechanical work | 5 | 1:5 |
|  | Multimeters | Electrical measurement devices | 5 | 1:5 |
|  | Battery Testers | Equipment for testing batteries | 5 | 1:5 |
|  | Hydrometers | Instruments for measuring fluid density | 5 | 1:5 |
|  | Torque Wrenches | Tools for tightening bolts and nuts | 5 | 1:5 |
|  | Cleaning Kits | Supplies for cleaning workstations | 5 | 1:5 |
|  | Sets of Cleaning Materials | Materials for general cleaning | 5 | 1:5 |
|  | Waste Disposal Containers | Containers for disposal of waste | 5 | 1:5 |
|  | Sets of Battery Terminal Protectors | Protection for battery terminals | 5 | 1:5 |
|  | Oscilloscopes | Devices for observing electrical signals | 5 | 1:5 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Category/Item** | | **Description/Specifications** | **Quantity** | **Recommended Ratio (Item: Trainee)** |
|  | Replacement Parts | Spare parts for machinery and equipment | 10 | 1:2.5 |
|  | Sets of Converter/Controller Components | Electrical components for systems | 5 | 1:5 |
|  | DC Series Motors | Direct current motors | 5 | 1:5 |
|  | Brushless DC Motors | Brushless DC motors | 5 | 1:5 |
|  | PMSMs (Permanent Magnet Synchronous Motors) | Type of electric motor | 5 | 1:5 |
|  | Switched Reluctance Motors (SRMs) | Electric motor technology | 5 | 1:5 |
|  | Diagnostic Tools | Tools for troubleshooting and repairs | 5 | 1:5 |
|  | Lifting Equipment Kits | Equipment for lifting heavy objects | 5 | 1:5 |
|  | Workbenches | Workstations for assembly and repairs | 5 | 1:5 |
|  | Lubrication Kits | Kits for maintaining machinery | 5 | 1:5 |
|  | Sets of Seals, Gaskets, and Replacement Gears/Bearings | Parts for maintenance and repair | 5 | 1:5 |
|  | Sets of Inspection Tools | Tools for inspecting equipment | 5 | 1:5 |
|  | Documentation Sheets | Sheets for recording data and information | 5 | 1:5 |

# MOTORCYCLE BODY MAINTENANCE

**UNIT CODE: 0716 351 05A**

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Maintain Motorcycle Body

**Duration of Unit:** 140 Hours

**Unit Description**

This unit of learning covers the learning outcomes, content, assessment methods, methods of delivery and resources required to train maintain motorcycle body. It involves perform motorcycle body panel beating, perform motorcycle spray painting and perform motorcycle body panel surface finishing.

**Summary of learning outcomes**

By the end of this unit of learning, the trainee should be able to:

|  |  |  |
| --- | --- | --- |
| **S/No** | **Learning Outcomes** | **Duration (Hours)** |
| 1. | Motorcycle Body Panel Beating | **50** |
| 2. | Motorcycle Spray Paintings | **50** |
| 3. | Motorcycle Body Panel Surface Finishing | **40** |
| **Total** | | **140** |

**Learning outcomes, content, suggested assessment methods.**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Motorcycle Body Panel Beating | * 1. Work area organization and safety measures   2. Importance of a well-organized work area   3. Safety measures   4. Emergency procedures   5. Tools and equipment for panel beating works      1. Dent removal tools      2. Dinging hammer      3. Chipping hammer      4. Soft hammer      5. Lever      6. Body file      7. Body jack      8. Sand bag      9. Sanding blocks      10. Body jig   6. Materials for panel beating works      1. Body filler      2. Spot putty      3. Sand paper      4. Safety materials   7. Body dent identification      1. Types of dents      2. Visual inspection techniques      3. Assessing paint damage   8. Motorcycle body parts      1. Frame      2. Fairings      3. Fuel tank      4. Fenders      5. Wheels      6. Handlebars   9. Waste materials disposal      1. Paint and solvent disposal      2. Body panel and scrap metal disposal      3. Adhesives and sealants disposal      4. Dust and debris management | * Practical tests * Written test * Projects * Portfolio of evidence * Third party report |
| 1. Motorcycle Spray Paintings | * 1. Spray paint tools and equipment;      1. Air compressor      2. Spraying gun      3. Compressor hose   2. Spray painting materials;      1. Primer      2. Paint      3. Thinner      4. Paint hardener      5. Masking supplies   3. Spray painting procedure.      1. Surface preparation      2. Priming      3. Paint preparation      4. Spray painting      5. Finishing   4. Waste paint disposal      1. Disposal methods      2. Handling and storage      3. Cleanup of tools and equipment | * Practical tests * Written test * Projects * Portfolio of evidence * Third party report |
| 1. Motorcycle Body Panel Surface Finishing | * 1. Surface finishing tools and equipment      1. Sanding tools      2. Polishing tools      3. Clear coating tools      4. Cleaning tools   2. Upholstery items      1. Seat covers      2. Tank pads      3. Handlebar grips      4. Pannier and saddlebag liners   3. Upholstery tools and equipment      1. Cutting tools      2. Measuring tools      3. Sewing tools      4. Stapling tools      5. Marking tools      6. Sewing machine table      7. Workbench      8. Cutting mat   4. Upholstery materials      1. Upholstery fabric      2. Adhesives      3. Tacks and nails      4. Fasteners   5. Motorcycle body valeting procedure      1. Initial inspection      2. Washing      3. Detailing      4. Polishing      5. Final inspection   6. Motorcycle body waxing procedure      1. Preparation      2. Washing the motorcycle      3. Applying the wax      4. Buffing the wax      5. Curing time      6. Final inspection   7. Motorcycle body buffing      1. Preparation      2. Selecting the right product      3. Preparing the buffing machine      4. Applying polish      5. Buffing process      6. Final inspection and cleanup   8. Waste materials management      1. Sorting materials      2. Identifying recycling options      3. Preparing materials for recycling | * Practical tests * Written test * Projects * Portfolio of evidence * Third party report |

**Suggested Methods of Delivery**

* Practical
* Projects
* Demonstrations
* Group discussion
* Direct Instructions

**Recommended Resources for 25 Trainees**

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| --- | --- | --- | --- | --- |
| **Category/Item** | | **Description/Specifications** | **Quantity** | **Recommended Ratio (Item: Trainee)** |
|  | First Aid Kit | Emergency medical supplies | 5 | 1:5 |
|  | Complete Motorcycle | Fully assembled motorcycles for training | 2 | 1:12.5 |
|  | Work Place | Designated area for work and training | 1 | 1:25 |
|  | Compound Filler/Hardener (10kg) | Filler material for bodywork and repairs | 10 kg | 1:2.5 |
|  | Thinner (15 liters) | Solvent for cleaning and thinning paints | 15 liters | 1:5 |
|  | Dinging Hammer | Hammer for metalwork and shaping | 5 | 1:5 |
|  | Chipping Hammer | Hammer for chipping off rust and debris | 5 | 1:5 |
|  | Soft Hammer | Non-marring hammer for gentle work | 5 | 1:5 |
|  | Lever | Tool for prying and lifting | 5 | 1:5 |
|  | Body File | File for smoothing and shaping metal | 5 | 1:5 |

**Repair and Painting Equipment**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Category/Item** | | **Description/Specifications** | **Quantity** | **Recommended Ratio (Item: Trainee)** |
|  | Body Jack | Hydraulic or mechanical jack for lifting | 2 | 1:12.5 |
|  | Sand Bag | Sand-filled bag for securing parts or work pieces | 1 | 1:25 |
|  | Sanding Blocks | Blocks for smoothing and finishing work | 5 | 1:5 |
|  | Body Jig | Fixture for holding vehicle parts in place | 1 | 1:25 |
|  | Paint (5 litres) | Paint for bodywork and finishing | 5 litres | 1:5 |
|  | Spraying Gun | Equipment for spray painting | 5 | 1:5 |
|  | Compressor | Air compressor for powering tools | 1 | 1:25 |
|  | Dollies | Tools for shaping and leveling body panels | 5 | 1:5 |
|  | Spoons | Shaping tools for bodywork and panel repair | 5 | 1:5 |
|  | Pullers | Tools for removing parts, e.g., dents or fittings | 5 | 1:5 |