

## Assessment Requirements

### Unit MC03K – Knowledge of Removing and Replacing Motorcycle Electrical Units and Components

#### Content:

#### Electrical/Electronic Principles

- a. Electrical units:
  - i. volt (electrical pressure)
  - ii. ampere (electrical current)
  - iii. ohm (electrical resistance)
  - iv. watt (power)
- b. The requirements for an electrical circuit:
  - i. battery
  - ii. cables
  - iii. switch
  - iv. current consuming device
  - v. continuity
- c. The direction of current flow and electron flow.
- d. Series and parallel circuits to include:
  - i. current flow
  - ii. voltage of components
  - iii. volt drop
  - iv. resistance
  - v. the effect on circuit operation of open circuit component(s)
- e. Earth and insulated return systems.
- f. Cable sizes and colour codes.
- g. Different types of connectors, terminals and circuit protection devices.
- h. Common electrical and electronic symbols.
- i. The meaning of:
  - i. short circuit
  - ii. open circuit
  - iii. bad earth
  - iv. high resistance
  - v. electrical capacity
- j. The principles of motorcycle electronic systems and component.
- k. Interpret motorcycle wiring diagrams to include:
  - i. motorcycle lighting
  - ii. auxiliary circuits
  - iii. indicators
  - iv. starting and charging systems
- l. Function and construction of electrical components including:
  - i. circuit relays
  - ii. bulb types
  - iii. cooling fan
  - iv. circuit protection
- m. The safety precautions when working on electrical and electronic systems to include:
  - i. disconnection and connection of battery
  - ii. avoidance of short circuits
  - iii. power surges

- iv. prevention of electric shock
  - v. protection of electrical and electronic components
  - vi. protection of circuits from overload or damage
- n. The set-up and use of:
- i. digital and analogue multi-meters
  - ii. voltmeter
  - iii. ammeter
  - iv. ohmmeter
  - v. oscilloscope
  - vi. manufacturer's dedicated test equipment
- o. Electrical and electronic checks for electrical and electronic systems to include:
- i. connections
  - ii. security
  - iii. functionality
  - iv. performance to specifications
  - v. continuity, open circuit
  - vi. short circuit
  - vii. high resistance
  - viii. volt drop
  - ix. current consumption
  - x. output patterns (oscilloscope)
- p. Symptoms and faults associated with electrical and electronic systems to include:
- i. high resistance
  - ii. loose and corroded connections
  - iii. short circuit
  - iv. excessive current consumption
  - v. open circuit
  - vi. malfunction
  - vii. poor performance
  - viii. battery faults to include flat battery
  - ix. failure to hold charge
  - x. low state of charge
  - xi. overheating
  - xii. poor starting

### **Battery and Charging**

The construction and operation of motorcycle batteries including:

- i. low maintenance and maintenance free
- ii. lead acid and nickel cadmium types
- iii. cells
- iv. separators
- v. plates
- vi. electrolyte

The operation of the motorcycle charging system:

- i. alternator
- ii. rotor
- iii. stator
- iv. slip ring
- v. brush assembly
- vi. three phase output
- vii. diode rectification pack
- viii. voltage regulation
- ix. phased winding connections

- x. cooling fan
- xi alternator drive

### **Starting**

- a. The layout, construction and operation of engine starting systems:
- b. The function and operation of the following components:
  - i. starter motor
  - ii. starter clutch mechanism
  - iii. pinion
  - iv. starter solenoid
  - v. clutch and gear safety switch
  - vi. ignition/starter switch
  - vii. stand switches
  - viii. starter relay (if appropriate)

### **Lighting**

- a. Function and construction of electrical components including:
  - i. front and tail lamps
  - ii. main and dip beam headlamps
  - iii. lighting and dip switch
  - iv. directional indicators
  - v. flash
- b. The circuit diagram and operation of components for:
  - i. side and tail lamps
  - ii. headlamps
  - iii. direction indicators
- c. The statutory requirements for motorcycle lighting when using a motorcycle on the road.
- d. Headlamp adjustment and beam setting.

### **Auxiliary Systems**

- a. Function and construction of electrical components including:
  - i. anti theft devices
  - ii. horn
  - iii. heated grips
  - iv. power screen
- b. The circuit diagram and operation of components for:
  - i. anti theft devices
  - ii. horn
  - iii. heated grips
  - iv. power screen

### **General**

- a. The preparation, testing and use of:
  - i. tools and equipment
  - ii. electrical meters and equipment used for dismantling
  - iii. removal and replacement of electrical and electronic systems and components
- b. Appropriate safety precautions:
  - i. PPE
  - ii. motorcycle protection when dismantling
  - iii. removal and replacing electrical and electronic components and systems

- c. The important of logical and systematic processes.
- d. Preparation of replacement units for re-fitting or replacement electrical and electronic components and systems.
- e. The reasons why replacement components and units must meet the original specifications (OES) – warranty requirements, to maintain performance, safety requirements.
- f. Refitting procedures.
- g. The inspection and testing of units and systems to ensure compliance with manufacturer's, legal and performance requirements.
- h. Inspection and re-instatement of the motorcycle following repair to ensure:
  - i. customer satisfaction
  - ii. cleanliness of motorcycle interior and exterior
  - iii. security of components and fittings
  - iv. re-instatement of components and fittings
- i. Construction and operation of motorcycle auxiliary systems Auxiliary systems to include:-
  - i. Lighting systems
  - ii. security and alarm systems
  - iii. comfort and convenience systems
  - iv. information system
  - v. communication systems
  - vi. monitoring and instrumentation systems