

Assessment Requirements

Unit MC02.2K – Knowledge of Motorcycle Fuel, Ignition, Air and Exhaust System Units and Components

Content:

Fuel - Petrol

- a. The function and layout of carburettor systems:
 - i. carburettor, single and multi-type
 - ii. fuel tank and control lever
 - iii. fuel pumps
- b. The operation of carburettor systems
 - i. carburettor, single and multi-type
 - ii. float chamber and designs
 - iii. vacuum and piston assembly
 - iv. needles and jets
 - v. adjustment for idle and mixture
 - vi. choke and enrichment device
 - vii. fuel tank and control lever
 - viii. fuel pumps
- c. The function of petrol injection systems and components
 - i. petrol injection systems
 - ii. injection components
 - iii. injection pump
 - iv. pump relay
 - v. injector valve
 - vi. air flow sensor
 - vii. throttle potentiometer
 - viii. idle speed control valve
 - ix. coolant sensor
 - x. MAP and air temperature sensors
 - xi. mechanical control devices
 - xii. electronic control units
- d. The operation petrol injection systems and components:
 - i. injection pump
 - ii. pump relay
 - iii. injector valve
 - iv. air flow sensor
 - v. throttle potentiometer
 - vi. idle speed control valve
 - vii. coolant sensor
 - viii. MAP and air temperature sensors
 - ix. electronic control units
 - x. fuel pressure regulators
 - xi. fuel pump relays
 - xii. lambda exhaust sensors
 - xiii. flywheel and camshaft sensors
 - xiv. air flow sensors (air flow meter and air mass meter)

- e. The procedures used when inspecting petrol system
- f. The chemically correct air/fuel ratio for petrol engines
- g. weak and rich air/fuel ratios for petrol engines.
- h. exhaust composition and by-products for chemically correct, rich and weak air/fuel ratios of petrol engines:
 - i. water vapour (H₂O)
 - ii. nitrogen (N)
 - iii. carbon monoxide (CO)
 - iv. carbon dioxide (CO₂)
 - v. carbon (C)
 - vi. hydrocarbon (HC)
 - vii. oxides of nitrogen (NO_x, NO₂, NO) and particulates
- i. Symptoms and faults associated with fuel systems
 - i. erratic running
 - ii. weak mixture
 - iii. rich mixture
 - iv. two stroke mixtures
 - v. excessive smoke
 - vi. leaks
 - vii. failure to start
 - viii. poor economy
 - ix. failure to meet emission control

Ignition

- a. The layout of ignition systems,
- b. Ignition circuits and components:
 - i. LT Circuit
 - ii. battery
 - iii. ignition switch
 - iv. electronic trigger devices
 - v. HT Circuit
 - vi. spark plugs (reach, heat range, electrode features)
 - vii. ignition leads
 - viii. ignition coil
 - ix. ignition timing advance system
- c. The operation electronic system components:
 - i. amplifiers
 - ii. triggering systems
 - iii. inductive pick-ups
 - iv. amplifier units.
 - v. control units
- d. Ignition terminology:
 - i. dwell angle
 - ii. dwell time
 - iii. advance and retard of ignition timing
 - iv. static and dynamic ignition timing
- e. The operation of electronic ignition systems under various conditions and loads to include:
 - i. engine idling
 - ii. during acceleration
 - iii. under full load

- iv. cruising
 - v. overrun
 - vi. cold starting
- f. Basic principle of engine management systems:
- i. closed loop system
 - ii. integrated ignition
 - iii. injection systems
 - iv. sensors
- g. The procedures used when inspecting
- i. ignition system
 - ii. engine management
 - iv. sensors
- h. Symptoms and faults associated with ignition system operation
- i. failure to start hot or cold
 - ii. exhaust emissions
 - iii. poor performance
 - iv. ignition noise
 - v. misfire
 - vi. damp

Air supply and exhaust systems

- i. The construction and purpose of air filtration systems.
- ii. The operating principles of air filtration systems.
- iii. The construction and purpose of the exhaust systems.
- iv. The operating principles of the systems.
- v. Exhaust system design to include silencers and catalytic converters.
- vi. The procedures used when inspecting induction, air filtration and exhaust systems
- vii. Symptoms and faults associated with air and exhaust systems

General

The preparation, testing and use of tools and equipment used for:

- i. dismantling
- ii. removal and replacement of engine units and components

Appropriate safety precautions:

- i. PPE
- ii. motorcycle protection when dismantling
- iii. removal and replacing engine units and components

The importance of logical and systematic processes.

The inspection and testing of engine units and components.

The preparation of replacement units for re-fitting or replacement.

The reasons why replacement components and units must meet the original specifications (OES) – warranty requirements, to maintain performance and safety requirements.

Refitting procedures.

The inspection and testing of units and system to ensure compliance with manufacturer's, legal and performance requirements.

The inspection and re-instatement of the motorcycle following repair to ensure customer satisfaction;

- i. cleanliness of motorcycle interior and exterior
- ii. security of components and fittings

re-instatement of components and fittings

construction and operation of motorcycle engine fuel systems

- a) carburettor
- b) multi point injection

v.. key engineering principles that are related to motorcycle engine fuel systems

- a) properties of fuels
- b) combustion processes
- c) exhaust gas constituents

key engineering principles that are related to motorcycle engine ignition systems

- a) flame travel
- b) ignition timing
- c) voltages

construction and operation of motorcycle engine air supply and exhaust systems

- a) manifolds
- b) filters
- c) silencers, including two stroke
- d) catalytic converter

y. key engineering principles that are related to motorcycle engine air supply and exhaust systems

- a) sound absorption
- b) reduction of harmful emissions