Occupational Profile: *Motor Vehicle Technician*

A competent Motor Vehicle Technician should be able to demonstrate the following skills and competences:

1. Routine Servicing and repair of Light and Heavy vehicles, as per manufacturers' recommended schedules

2. Undertakes part repair work of a non-routine nature following unscheduled stoppages arising out of accidents or otherwise, including subcontracting work to specialist repairers.

3. Decides when, what and to whom specialist repair work is to be sub-contracted out

4, Be responsible (given adequate power and facilities) for the quality of work done under his supervision

5. Be accountable for any estimates, costs and charges for work done, parts replaced and eventually passed on to customers.

The candidate applying to be trade tested for the Certificate of Competence should be in possession of the majority of the following knowledge, competencies & skills:

Consulting manuals in the English language for the specification of operational tasks
Accessing technical information on-line and downloading

Common Tools for Measuring
The handling and the use of the following:
Vernier Calliper
Micrometer
Feeler gauges
Clock gauge

Hand Cutting Tools
The handling and the use of the following:
Files
Hacksaws
Cold chisels drills
Taps
Dies
Identifying and application of metric and unified screw threads
Identifying and application of screw thread fasteners used in automobiles

Soldering
The handling and the use of the following:
Soldering iron

Brazing
The handling and the use of the following:
Brazing Torch

Welding
The handling and the use of the following:
Electric & Gas Welding

Screw Drivers
The handling and the use of the following:
Flat blade
Philips
Posidrive
Torx

Machine Tools
The handling and the use of the following:
Bench or Pillar type drilling machine
Off-Hand grinder

Metric and AF Wrenches
The handling and the use of the following:
Open jaw
Ring
Hexagonal
Bi-hexagonal
Torx
Torque control wrenches and sockets

Dismantling, Inspecting, Replacement of parts, Assembling & Testing:
Engines (spark and compression ignition types)
Lubrication systems
Ignition systems
Clutches and torque converters
Gearboxes, manual and automatic
Final drives and differential
Universal joints
Braking systems and components
Suspension, steering systems and components
Electrical & Electronic systems & components
Ensuring surroundings are clean and 100% safe to work in
Raising vehicles and having it supported with maximum security

Checking fluid levels, tyre pressures and effectiveness of locking devices on nuts and bolds
Simple first line of preventive maintenance
Applying manufacturer's instructions regarding the specification of consumables
Replacing parts and materials correctly using the right tools and with due regard for safety and avoidance of damage to related parts
Awareness of the risks involved concerning air bags
Diagnosing faults
Recommending means of rectifying these faults
Testing and analysing the performance of the vehicle after the repair or modification has been completed

ASSESSMENT CRITERIA

Motor Vehicle Technician

1. Introduction

The following is a detailed description of the assessment criteria to be adopted by the Trade Testing Board (TTB) to reach a final decision on the award of the Certificate of Competence.

2. Trade Test

The trade test is to be made up of the following components:

1. Practical Test
2. The Interview
3. Written

The Board has agreed on the sequence of the test and the markings allocated to each specific component as indicated below:

Component	Mark	Pass Mark
Written	**100**	**50%**
Interview	**100**	**50%**
Practical	**100**	**50%**

The Written Component

The written test has a duration of 2 ½ hr and is divided into 2 sections.
Section A is made up of multiple choice type and focuses on the layout, construction, function and operation of the following:

1. The four and two stroke cycles of operations of internal combustion engines of small and medium power outputs
2. Performance curves of:
   Power output
   Torque and fuel consumption of internal combustion engines of small and medium power outputs

3. Combustion in air and petrol mixtures ignited by a spark mechanism, detonation
4. The three phases of combustion in compression-ignition engines
5. Chemistry of fuels:
   Air required for combustion
   Octane numbers
   Cetane numbers

6. Fuel injection systems:
   Petrol and diesel (including common rail types)

7. Electronic ignition systems
8. Engine management systems
9. Lubrication systems
10. Cooling systems
11. Transmission systems
12. Brakes
13. Steering
14. Suspension
15. Lighting, signalling, starting, generating and storage systems
16. Electric & hybrid vehicles

Section B is made up of descriptive and sketching type questions on technology and may include the following topics:

1. Areas and volumes relating to:
   - Circular objects
   - Swept volumes engine capacities
   - Tanks

2. Compression ratios and volumes of liquids to be added to mixtures and dilutions such as radiator coolants and Petrol fuels for two-stroke engines.

3. Distance, velocity and acceleration:
   - Newton's laws of motion
   - Design features of cam profiles

4. Forces on a vehicle:
   - Distinction between mass and weight
   - Distribution of the weight of a static vehicle on the level and on a meline

5. Transfer of weight on a vehicle during accelerating and braking in both cases when front and rear wheel driven

6. Calculating resulting pressures and temperatures of gas during:
   - Isothermal
   - Adiabatic

7. Heat engine cycles:
   - Constant volume
   - Constant pressure
   - The dual cycle
   - Calculations of peak pressures and temperatures

8. Thermal efficiency, air standard efficiency, relative thermal efficiency, relationship between compression Ratio and thermal efficiency

9. Mechanical efficiency, indicated power, brake power, engine testing for fuel consumption, brake power And torque, Morse test

10. Volumetric efficiency, factors affecting power output, cam profile design, variable valve timing.

11. Stress and Strain
    - Young's modulus of elasticity
    - Types of stress: Bending Moment
    - Shearing Force diagrams on simple supported and cantilever beams
    - Meanings and practical applications of the following material properties :strength, hardness, toughness and ductility of materials

12. Engineering Drawing: Systems of Projection
    - First angle
    - Third angle
    - Oblique
    - Isometric

The Interview Component

All candidates will be called for an interview. The duration of the interview will be from 20 to 30 minutes.

The interview questions will cover the topics as listed in the Theory and Practical components in addition to the following:

Health & Safety
Work Experience
Tools & Machinery

The Practical Component

This session is generally of a 2 hour duration practical test, ideally carried out at the place work. It is generally based on what the candidate has carried out during the apprenticeship. Candidates, who are setting at the technician level, are expected to know the additional knowledge as follows. The practical test will consist of a number of tasks from the list below:

(a) Diagnose faults
(b) Recommend means of rectifying these faults
(c) To test and analyze the performance of the vehicle after the repair or modification has been completed
(d) To eventually assume responsibility for their decisions and be accountable
(e) Replacing a timing belt on single and twin overhead camshaft engines
(f) Re-timing a conventional ignition distributor, sorting out and re-connecting high tension leads
(g) Re-timing an in-line type fuel injection pump including the use of a stroboscopic timing light
(h) Removal and replacement of a cylinder head
(i) Dismantling and assembling valves
(j) Re-setting valve clearances, determining shim thicknesses, inspecting and testing hydraulic tappets
(k) Selecting spark plugs on the basis of heat range using chars/manuals
(l) Removal/dismantling examining and assembling a plate clutch
(m) Dismantling, examining and assembling a manual gearbox
(n) Servicing and overhauling brakes
(o) Assembling wheel bearings and adjusting pre-loads
(p) Overhauling suspension system and components
(q) Programming an electronic control unit according to local regulations
(r) Fault finding, repair and testing motor vehicles using dedicated and/or general testing and monitoring equipment
(s) Programming engine and systems management