AUTO MECHANICS 2

1. **GENERAL COMMENTS**

The standard of the paper was comparable to that of the previous years.

The performance of the candidates was the same as the previous years.

2. **SUMMARY OF CANDIDATES' STRENGTHS**

(1) Most candidates had a good comprehension of the items.
(2) The arrangements and spacing of the answers in most cases were commendable, making scoring of the items easier.
(3) Candidates had a great insight in the basic principles of machine engine torgues.

3. **SUMMARY OF CANDIDATES' WEAKNESSES**

(1) The candidates, in few cases, did not answer each question on a fresh page. Part of the answers for some questions were mixed up with others and it was quite difficult for the examiners to mark those scripts.
(2) A few candidates also had literacy challenge. It was very difficult to understand whatever they had written.
(3) Some candidates could not distinguish between fuel pump and oil pump.

4. **SUGGESTED REMEDIES**

The Auto Mechanics subject has both practical and theoretical components which require prospective candidates to learn hard and gain more insight into the subject.

(1) The candidates must ensure each question is answered on a fresh page and properly numbered.
(2) Teachers must ensure that they complete the entire syllabus.
(3) Teachers must provide appropriate textbooks with illustrated diagrams of parts of a motor vehicle to reinforce whatever they teach.

5. DETAILED COMMENTS

QUESTION 1

(a) Name the appropriate tool used for:
- **(i) Tightening main bearing journal to specified torque;**
- **(ii) Removing chain sprocket;**
- **(iii) Removing broken spark plug.**

(b) The sketch in fig. 1 shows the fuel system of a petrol-engine vehicle.

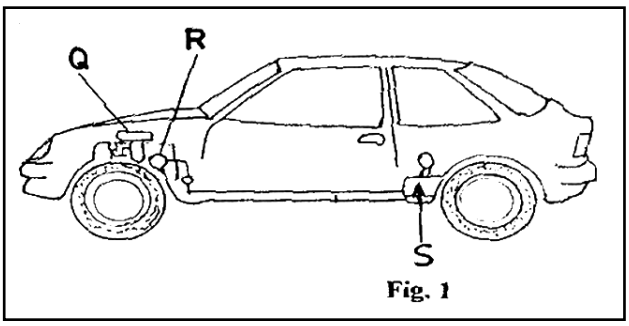

Fig. 1

(i) Name the parts labelled Q, R and S.

(ii) State the main function of each of the parts labelled R and S.

(iii) What drive arrangement is most suitable for the automobile shown in the sketch?

(a) Most of the candidates had no clue to the tools required for the following operations:

(i) Tightening of bearing journal - Torgue Wrench

(ii) Removing chain sprocket - Sprocket extractor/puller

(iii) Removing broken spark plug - Tapered left-hand extractor

(b) (i) Q - Carburettor/Air cleaner

R - Fuel pump

S - Fuel tank

Greater number of candidates responded positively to the questions in this section.

(ii) The main functions of the following;

R (pump) - It lifts fuel from fuel tank and supplies to the carburettor.

-It transfers fuel from the tank to the carburettor

S (tank) - It is a storage for fuel

- It contains the fuel used in the vehicle

The following were some of the wrong answers provided by the candidates:

(i) The fuel pump transfers fuel from the carburettor

(ii) The fuel pump distributes fuel to all parts of the engine that needs fuel for operation.

(iii) The fuel pump lifts oil from gallery to the sump.

(iv) It contains fuel which helps in lubrication.

The appropriate response for the type of drive of the car shown in the diagram are;

(i) Front engine - front wheel drive

(ii) Conventional drive

(iii) Front engine-rear wheel drive

Candidates' performance was average.

QUESTION 2

(a) (i) What is the difference between wheel and wheel rim?

(ii) What instrument is appropriate for checking tyre pressure?

(b) List two types of:

(i) Wheel;

(ii) Wheel rim.

(c) An automobile tyre has the mark 195/60/R15 written on its outer surface. Explain, as applied to the mark, what the following indicate:

(i) 195;

(ii) 60;

(iii) R15.

(a) DIFFERENCE BETWEEN A WHEEL AND A WHEEL RIM

The response expected are:

(i) The wheel is made up of a rim and a disc.

The wheel rim is the metallic part of a wheel on which the tyre is fitted.

(ii) CHECKING TYRE PRESSURE:

– Tyre pressure gauge

– Tyre gauge

It was an easy item which candidates responded to positively.

Only few candidates had good marks from answering those questions.

(b) (i) TYPES OF WHEEL ARE

- Steel pressed/Disc wheel
- Wire or spoked
- Alloy Based wheel

TYPES OF WHEEL RIM ARE

- Safety rim/one-piece rim
- Two - piece rim
- Divided/split rim
- Semi-drop centre/Well rim

(c) TYRE MARKING 195/60/R15:

195: It indicates the sectional width of the tyre in mm

60: It indicates the sectional height (60% of the width)

R15: R means radial plytyre with a rim diameter of 15 inches

The wrong answers provided by a number of candidates were:

195: Width/Weight

60: Height
R15: Radius 15 inches
Candidates' performance was average.

QUESTION 3

(a) The sketch in Fig. 2 shows a dry liner used on automobile engine.

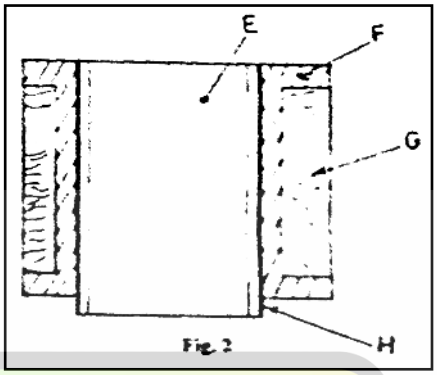

Fig. 2

(i) Explain why the liner is called dry liner.

(ii) Name the parts labelled E, F, G and H.

(b) State three differences between dry liner and wet liner, as applied to automobile engines.

(c) What is the main purpose for cooling automobile engines?

(a) Most candidates responded positively and named the parts i.e.
E: Cylinder bore or engine bore
F: Cylinder block or Engine block
G: Water/Coolant
H: Cylinder liner or liner

(b) The right responses provided by the candidates were;
(i) The wet liner can be fitted and removed easily.
– The dry liner requires use of machines to both remove and refit.
(ii) The wet liner has direct contact with the cooling water.
– The dry liner is not in direct contact with coolant.
(iii) The wet liner has thicker wall.
– The dry liner has thin wall.

The candidates responded very well, but it was suprising that some candidates reversed the features of the dry liner and wet liner e.g. A wet liner has thin wall whilst the dry liner has a thick wall.

(c) THE MAIN PURPOSE OF COOLING ENGINES

The expected responses were:

- To remove excessive heat from the engine
- To prevent engine overheating
- It was a popular question and majority of the candidates' performance was average.

QUESTION 4

(a) The sketch in Fig. 3 shows a detailed view of an automobile fuel tank.

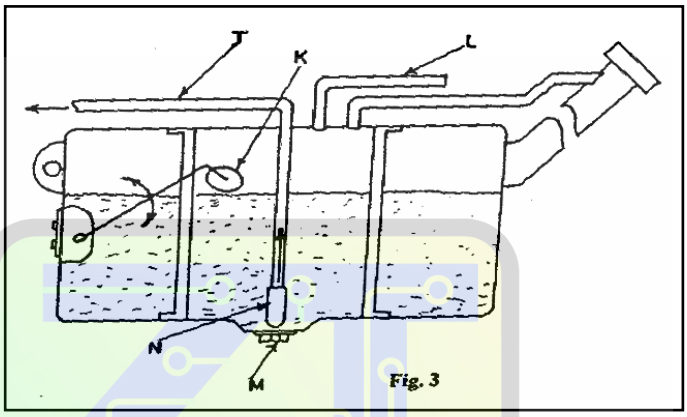

Fig. 3

(i) Name the parts labelled J, K, and N.

(ii) State one reason each why the parts labelled L and M are installed on the tank.

(b) (i) Where in automobile is fuel tank located if the engine is located at the front?

(ii) Explain why the location the tank is as stated in 4(b)(i).

(c) State two merits of electrical fuel pump.

(a) (i) Naming of labelled parts

The expected responses were

J: Outlet pipe/supply pie/feed pipe

K: Float

N: Fuel filter/fuel strainer

A greater number of the candidates had all the answers right while a few others were only familiar with N, the fuel filter/fuel strainer.

(ii) Reason why L and M are mounted on petrol tank.

L (VENT)

- It prevents the build up of excessive pressure when the fuel level rises.

– It allows atmospheric pressure to act on the fuel which assists easy flow to the engine.

M (DRAIN)

- It is used to drain fuel and any water collected in the tank
- It drains any impurities that may collect in the tank.

Most candidates had no difficulty with the question.

(b) (i) LOCATION OF PETROL TANK

– At the rear
– Under the back seat

(ii) – To prevent fire risk

– To prevent explosion
– To prevent vapour lock

The candidates provided the correct answers.

(c) Two merits of electrical fuel pump:

– It is easier to install
– It operates as soon as engine is switched on
– It is cheaper to maintain
– It has longer life span

That question was well answered. Candidates' performance was good.

QUESTION 5

(a) Sketch a coil-ignition system for a four-cylinder petrol engine and label the following parts: ignition coil, distributor and contact breaker.

(b) State one function each of the following electronic devices:

(i) Diode;

(ii) Transistor.

(c) State one use of a hydrometer in auto mechanics workshop.

(a) The candidates sketched various ignition circuits and labelled the three essential components e.g., ignition coil, distributor and contact breaker.

Some of the candidates however wrongly labelled components in the ignition circuit. For example;

(i) The high-tension cable of the distributor was labelled as ignition coil
(ii) Another candidate also referred to the distributor as throttle.
(iii) In another development, earthed cable of the battery was labelled as diode.

(b) (i) Function of Diode:

- It is an electrical device that allows current to flow in just one direction.
- It is a device that prevents current to flow in the reverse direction.
- It converts alternating current to direct current.

The majority of candidates provided answers close to those stated above to the questions.

(ii) Function of Transistor

- The transistor is a semi-conductor device used for switching on and off current in a circuit.
- It is a device that enables a large current to be controlled (switched on and off) by a small current.
- It is used to amplify electronic signals and power

A good number of candidates provided satisfactory answers.

(c) The purpose of hydrometer:

- It is used for checking the specific gravity of electrolyte.
- It is used for measuring the relative density of electrolyte.

Candidates' performance was average.

AUTO MECHANICS 3

1. GENERAL COMMENTS

The standard of the paper was comparable to that of the previous year.

The general performance of the candidates was above average and compared to that of previous year.

2. SUMMARY OF CANDIDATES' STRENGTHS

(1) The majority of the candidates answered the two practical questions.
(2) Candidates were specific in responding to the oral aspect of the questions.
(3) Candidates were able to use the tools and equipment provided with ease.

3. SUMMARY OF CANDIDATES' WEAKNESSES

(1) Candidates were slow in carrying - out the task assigned them.
(2) The majority of the candidates observed poor safety precautions measures.
(3) Candidates were not able to pick the correct tools for right assigned task.

4. SUGGESTED REMEDIES

(1) Teachers should encourage candidates to attach themselves to mechanics during the long vacation.
(2) Teachers should intensify their practical activities with their students.
(3) Teachers should lay more emphasis on identification of tools and equipment.

5. DETAILED COMMENTS

QUESTION 1

From the vehicle provided:

(a) check the brake fluid level. Report to the Examiner;
(b) remove the master cylinder. Report to the Examiner;
(c) remove a wheel, as indicated by the Examiner;
(d) inspect the wheel cylinder. Report to the Examiner;
(e) refit the master cylinder. Report to the Examiner;
(f) explain to the Examiner the process of bleeding;
(g) refit the wheel. Report to the Examiner;
(h) Answer two relevant questions from the Examiner.

(a) Checking of the brake fluid level was done with ease by the majority of the candidates as the master cylinder is marked to indicate maximum and minimum fluid levels.

(b) To remove the master cylinder, the brake fluid is drained. The pipe is disconnected, and the securing nuts are removed to detach the master cylinder. A good number of the candidates performed the task successfully.

(c) To remove a road wheel, the vehicle must be parked on a flat ground and one other wheel wedged. The wheel nuts of the particular wheel is slacked, and the vehicle is jacked up and supported with axle stand. The wheel nuts are then removed after which the roadwheel is also removed. The majority of the candidates were able to carry out this task.

(d) To remove the wheel cylinder, the brake drum must first be removed. The wheel cylinder is inspected for leakage, seizure of the piston, worn cylinder and weak rubber boots and seals. Majority of the candidates performed well.

(f) The purpose of bleeding the brake is to remove any air trapped in the braking system which may render it in effective.
To bleed the brake, ensure there is enough fluid in the master cylinder. Clean the bleed nipple and connect it with a flexible transparent hose whose end is dipped below the level of the brake fluid in a transparent container.
The locknut on the nipple is slackened and tightened repeatedly whilst the brake pedal is also pressed. It is very important to maintain the correct fluid level in the master cylinder and ensure the other end of the flexible hose is kept below the fluid level in the transparent container, most candidates found this task beyond their ability.

Candidates' performance was fair.

QUESTION 2

From the engine provided, having both cylinder head assembly and sump removed:

(a) remove one piston and connecting rod assembly specified by the Examiner;
(b) inspect the condition of the cylinder bore. Report to the Examiner;
(c) remove one compression ring specified by the Examiner;
(d) check the ring for wear and breakage. Report to the Examiner;
(e) refit the compression ring to the piston. Report to the Examiner;
(f) refit the piston and the connecting rod assembly to the engine. Report to the Examiner;
(g) Answer two relevant questions from the Examiner.

(a) To remove the piston and connecting rod assembly, the cylinder block is laid on its side. The big end cap nuts are slackened and removed. The crankshaft could be

turned to provide a space to tap out the connecting rod and piston through the upper part of the cylinder bore.

The majority of the candidates performed satisfactorily.

(b) The condition of the cylinder block is checked by visual inspection coupled with using the hand to feel inside the bore to determine the smoothness and wear.

This was a simple task, but most candidates performed poorly.

(c) Checking the piston ring for breakage involves inspecting the ring to observe signs of cracks, pitting and marks or scratches.
The correct feeler gauge is selected to measure the gap at the ends of the piston ring and this measurement is compared with the gap of a new piston ring.

Majority of the candidates lacked the skill needed to carry out the task

(d), (e) and (f) Rifitting the compression ring was an easy task for the candidates as the piston ring expander is used to expand the ring into its groove. In the refitting of the piston and connecting rod assembly, the ring compressor is used to compress the rings in the grooves. The big end bearings are lubricated and positioned in the bearing cap.

Majority of the candidates had great challenges in the refitting of the piston and connecting assembly.

The candidates' performance was average.