THE UNITED REPUBLIC OF TANZANIA
NATIONAL EXAMINATIONS COUNCIL
CERTIFICATE OF SECONDARY EDUCATION EXAMINATION

093

MOTOR VEHICLE MECHANICS
(For Both School and Private Candidates)

Time: 3 Hours ***Wednesday, 19th October 2011 p.m.***

Instructions

1. This paper consists of sections A, B and C.
2. Answer **all** questions in sections A and B and **three (3)** questions from section C.
3. Calculators are **not** allowed in the examination room.
4. Cellular phones are **not** allowed in the examination room.
5. Write your **Examination Number** on every page of your answer booklet(s).

This paper consists of 4 printed pages.

SECTION A (10 Marks)

Answer **all** questions in this section.

1. For each of the items (i) – (x), choose the correct answer from the given alternatives and write its letter beside the item number.

(i) In a four wheel drive, the number of gearboxes are
A Six B Two C Four D Three E Five

(ii) What is the theoretically quantity of air required for the combustion of 1 kg of fuel?
A 10 kg B 16.7 kg C 14.5 kg D 17.4 kg E 18.9 kg.

(iii) The effect of water in lubricating oil is the formation of
A Decomposition B oxidation C dilution D sludge E mixing.

(iv) In the fuel injection pump of a diesel engine, the fuel injection timing is adjusted by adjusting the
A delivery valve B rotation of plunger C list of plunger
D pump cam shaft E tappets.

(v) Which of the following is not a part of alternator?
A Roller B Rotor C Voltage regulator D Rectifier bridge E Stator.

(vi) Loss of engine compression can result from
A defect fan belt B loose valves C excessive tappet clearance
D worn out rings E wrong timing.

(vii) The capacity of a battery is usually expressed in terms of
A volts B current in amperes C weight D ampere-hours E watts.

(viii) Brake shoes of a braking system are made of
A pressed steel B cast aluminium
C pressed plastic fibre or aluminium D pressed steel or cast aluminium
E pressed steel or plastic fibre.

(ix) What happens to the clutch when the pedal is depressed?
A The pressure plate comes closer to the flywheel.
B The pressure plate moves away from the flywheel.
C The driven plate moves towards the flywheel.
D The driven plate slows down to flywheel speed.
E The pressure plate and driven plate move closer to the flywheel.

(x) The purpose of a thermostat in an engine cooling system is to
A allow the engine to warm up quickly
B prevent the coolant from boiling
C pressurise the system to raise the boiling point
D indicate to the driver the coolant temperature
E raise the freezing point of the coolant.

SECTION B (30 Marks)

Answer **all** questions in this section.

2. (a) Mention two factors which would increase the voltage required to produce a spark at the sparking plug.
   (b) What happens in piston number 4, when piston number 1 in a four-cylinder in-line four-stroke engine is performing the power stroke?

3. Explain briefly three disadvantages of water used as cooling medium in an engine.

4. State three types of the live axles as referred to motor vehicle.

5. Explain briefly three purposes of the gear box.

6. Mention three probable causes of lack of engine power.

7. Indicate when a driver should use the clutch of a motor vehicle.

8. Mention six probable causes of engine overheats.

9. What are the three probable causes of dragging brakes?

10. (a) Explain briefly two main functions of a carburettor.
    (b) Explain briefly why in modern cars the rear wheels are fitted with one 'leading' and one 'trailing' drum shoes brake?

11. Mention three main clutch faults.

SECTION C (60 Marks)

Answer **three (3)** questions from this section.

12. With the aid of sketches explain the operations of the four-stroke cycle engine. **(20 marks)**

13. (a) Explain the operation of a hydraulic braking system of a motor vehicle. **(10 marks)**
    (b) A simple single plate clutch transmits a torque of 80 Nm. Six springs supply the clamping force. What force must each spring exert if the mean radius of the friction plate is 200 mm? Take the coefficient of friction to be 0.4. **(03 marks)**
    (c) Describe the procedure for bleeding a braking system of a motor vehicle. **(07 marks)**

14. (a) Explain the safety precautions to be observed in the workshop with regard to
    (i) when using small tools.
    (ii) suitable clothes and footwear.
    (iii) protective and dark goggles.
    (iv) when working with other persons. **(10 marks)**

(b) Define and explain the function of each of the following:
(i) Flywheel.
(ii) Connecting rod.
(iii) Crankshaft.
(iv) Damper (Shock absorber). **(10 marks)**

15. (a) Explain four types of steering gearboxes which are commonly used. **(10 marks)**
(b) Briefly explain four functions of the engine oil as used in a motor vehicle. **(10 marks)**

16. (a) What is a Cam? **(01 mark)**

(b) Figure 1 is a view of valve-operating mechanism assembly. Give the name of the parts indicated by number 1 to 9. **(4.5 marks)**
(c) Describe the operating processes of a valve mechanism assembly in Figure 1. **(4.5 marks)**
(d) Explain four methods of securing the piston pin to the piston or connecting rod. **(10 marks)**

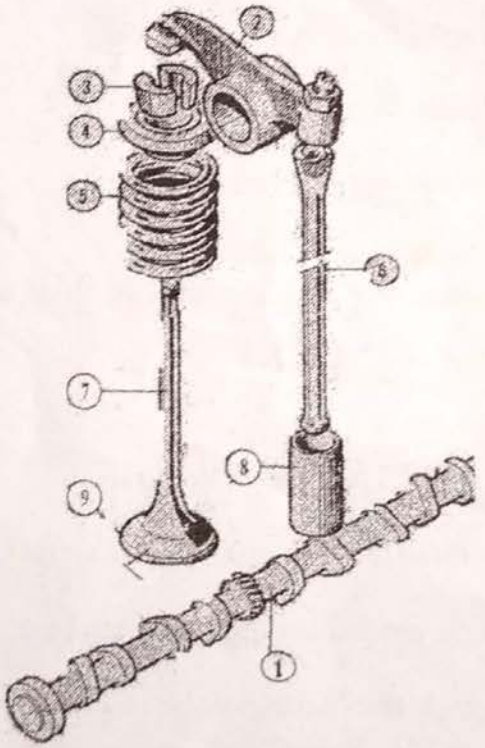

Figure 1: Valve-operating mechanism assembly.