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 **Tuesday, 11th November 2014 p.m.**

Instructions

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

SECTION A (10 Marks)

Answer **all** questions in this section.

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

(i) The purpose of a torque wrench as used in motor vehicle is to
A provide the standard readings
B control the pressure being applied
C check nuts and bolts if they are weak
D provide lightening energy
E ensure standard tightening.

(ii) The electric drill jaws are opened and closed when griping and releasing the drill bit by using
A hammer B key chuck C bench vice D chisel E grip plier.

(iii) The task of a hydraulic press in the motor vehicle workshop is to
A press bolts in and out
B rise up heavy vehicles
C press out strong bars and bushes
D press bushes/sleeve and pins in and out
E rise engine sleeves and bushes out of the chassis.

(iv) From which materials is the motor vehicle's body made of?
A Steel pressings
B Iron pressings
C Plastic pressings
D Fibre pressings
E Rubber pressings.

(v) The engine and the gearbox are supported in the chassis by
A rigid bolts and nuts
B strong steel mountings
C springs controlled by chassis frame
D mountings of special form of rubber
E mountings of special form of brass.

(vi) What types of washers are used at excessive vibrations?
A Flat washers. B Round washers. C Spring washers.
D Slit washers. E Castle washers.

(vii) Which of the following is one of the frictional locking devices?
A Locking plate.
B Damper pin.
C Wired nut.
D Fibre inserted nut.
E Tab washer with drilled hole.

(viii) When engine is cold, the thermostat prevent circulation of coolant between the
A engine and radiator
B water pump and engine
C cylinder block and water pump
D radiator and lower tank
E cylinder block and cylinder head.

(ix) The internal combustion engine which uses external ignition source is known as
A diesel engine
B steam engine
C petrol engine
D hydraulic engine
E pneumatic engine.

(x) The liquid fuel which is used for compression ignition engine is called
A diesel B petrol C kerosene D paraffin E bio gas.

SECTION B (30 Marks)

Answer **all** questions in this section.

2. (a) Why the workshop exit must be kept free from all obstructions?
(b) Briefly, explain how safety stands should be placed before mechanic works under a car.
(c) What is to be done if chemicals splash into eyes?

3. (a) State three tools which are used to turn nuts and bolts with hexagonal heads.
(b) Outline three uses of the 'puller' as used in a motor vehicle workshops.

4. (a) Name the two types of a motor vehicle chassis.
(b) What is the function of motor vehicle body?
(c) Mention two common engine location/arrangement in motor vehicles.

5. (a) Provide two classifications of locking devices.
(b) Briefly explain how the following nut locking devices secure a nut:
(i) Lock nut (ii) Spring washers

6. (a) Why is the baffle plates fitted into the oil sump?
(b) What is the purpose of fins on air cooled engine?

7. (a) What is ignition timing in spark ignition engines?
(b) Specify two types of fuel injection pumps in diesel engines.
(c) What are the related engines for the following fuel mixture formations?
(i) External fuel mixture.
(ii) Internal fuel mixture.

8. Explain three functions of the final drive.

9. (a) What is the use of 'bench vice' in a motor vehicle workshop?
(b) Give the two types of thermostats.
(c) Briefly, explain the function of a water pump in motor vehicle engine.

10. (a) State the main function of a carburetor float system.
(b) Name two types of carburetors.
(c) What is the use of an engine fuel pump?

11. (a) What is the importance of brake testing?
(b) Enumerate the two categories of fuel pump testing.
(c) Mention the two types of pressure plate springs.

SECTION C (60 Marks)

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

12. (a) (i) Name the parts indicated by numbers in Figure 1.
(ii) Briefly, explain the principle of operation of the system shown in Figure 1. **(6.5 marks)**

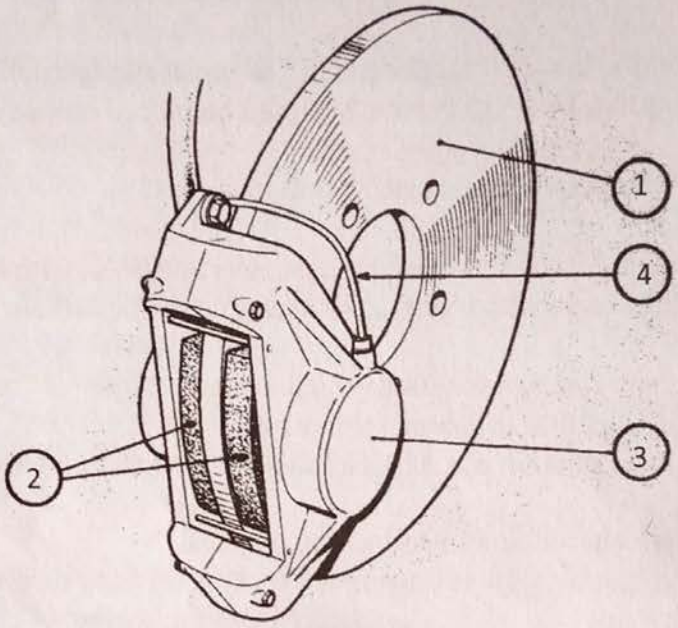

Figure 1

(b) Briefly, explain the following terms with regard to their meaning, causes and curative as associated with ignition system. **(13.5 marks)**
(i) Misfiring (ii) Pre-ignition (iii) Running on

13. (a) (i) What does 'atomization of petrol' in the internal combustion engine mean?
(ii) Why is it important for the petrol to be atomized before it is burnt in combustion chamber? **(2 marks)**

(b) Briefly, state three points of safety precautions to be observed when the following activities are conducted
(i) welding a petrol tank.
(ii) preparing to work under the vehicle with one or more wheels removed.
(iii) using hammer and a bench vice.

(c) Explain two points to illustrate why safety precautions should be observed when conducting activities mentioned in 13 (b) (i-iii) above. **(18 marks)**

14. (a) (i) Which part of the motor vehicle engine is used to accommodate water and assists the cooling process of engine?

(ii) Briefly, explain how water circulates and cooled in the engine when a cold engine of a motor vehicle is started. **(5 marks)**

(b) Elaborate two merits and three demerit of using water as cooling medium in motor vehicle engine cooling system. **(5 marks)**

(c) Briefly explain five effects of running the motor vehicle engine at too high temperature. **(10 marks)**

15. (a) With the aid of sketches, explain the operational cycle of the single cylinder two - stroke petrol engine, stating clearly the event below and above the piston. **(12 marks)**

(b) With regard to the types of arrangement of the cylinders of a vehicle engine briefly state

(i) how the in-line cylinders and vee-cylinders are arranged.

(ii) two advantages of the in-line cylinders and vee-cylinders. **(8 marks)**

16. (a) (i) An engine has a cylinder bore diameter of 84 mm and a stroke of 75mm with a compression ratio of 8.5:1. Compute the clearance volume in cubic centimeters, using $\pi = \frac{22}{7}$ and give your answer to one decimal place. **(5.5 marks)**

(ii) State whether the compression ratio in 16 (a)(i) will be raised, lowered or remain the same when the following modification are made:

- Fitting a thicker cylinder head gasket.
- Machining the top face of the cylinder block.
- Reboring the cylinders oversize.
- Fitting pistons having a convex crown instead of a flat top. **(4 marks)**

(b) (i) What is the name of the component of the motor vehicle engine Figure 2?

(ii) From which material is the component in Figure 2 is made?

(iii) Name the parts of the component of the motor vehicle engine in Figure 2 indicated by numbers 1- 3. **(3 marks)**

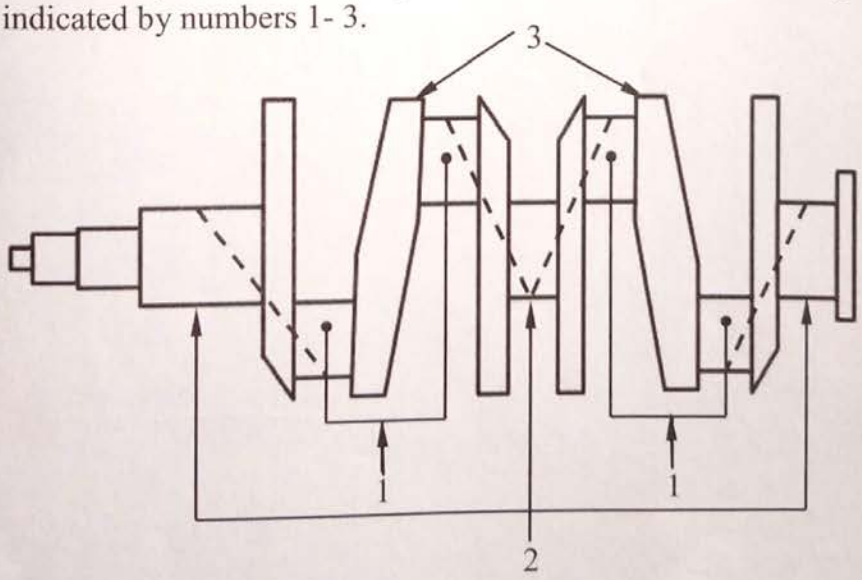

Figure 2

(c) Briefly explain three functions of the flywheel as used in motor car. **(3 marks)**

(d) (i) Identify the mechanism of the part of engine indicated by letter **a**.
(ii) What is the name of the instrument indicated by letter **b**?
(iii) What is the operations being carried out as indicated in Figure 3?
(iv) What happens if the operations in Figure 3 are wrongly done? **(4.5 marks)**

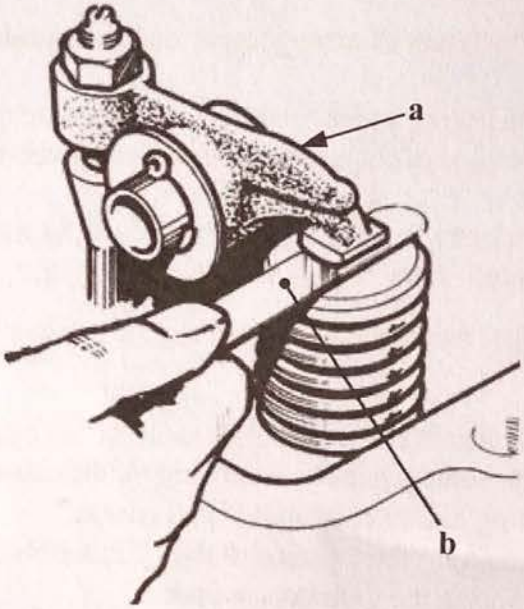

Figure 3