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, 12th November 2013 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 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.

(i) Which of the following is the arrangement of an opposed cylinder engine?
A One crankshaft and one camshaft. B Two camshaft and one crankshaft.
C Two crankshaft and two camshaft. D Four camshaft and two crankshaft.
E Two crankshaft and one camshaft.

(ii) The device for smoothing out the power of engine is called
A clutch B differential C gear box
D torque converter E flywheel.

(iii) Some examples of non- positive locking device in motor vehicles are
A split pin, castelleted nut and spring washer
B nylon locknut, tab washer and flat washer
C flat washer, spring washer and nylon locknut
D bolt, nut and split pin
E nut, spring washer, split pin.

(iv) What is the name of the openings in the cylinder block through which coolant pass through?
A Water jackets. B Water channels. C Water path.
D Water ways. E Water circuit.

(v) Petrol engines are sometime known as
A gas ignition engines B spark ignition engines
C coil ignition engine D light ignition engines
E carburettor ignition engines.

(vi) The function of the 'dip stick' in lubrication system of the engine is to measure
A amount of the pressure in the system B quality of the lubricating oil
C fluidity of the lubricating oil D quantity of the oil in the sump
E viscosity of the lubricating oil in the sump.

(vii) The main purpose of a damper in suspension system is to
A support the oscillation of the springs
B cut off the prolonged oscillation of springs
C extend the springs oscillation
D extend the life of the springs
E control the sideways rolling of the vehicle.

(viii) What is the name of instrument which controls the working temperature of an engine?
A Controller unit. B Thermometer. C Temperature limiter.
D Relief valve. E Thermostat.

(ix) The level of petrol in a carburettor is controlled by a

A venturi B choke C float
D control chamber E compensating jet.

(x) If a leaf spring is fixed to the frame of a chassis without swinging shackle, the spring will

A break B be weakened C oscillate for a long time
D cause the damper to fail E become loose.

SECTION B (30 Marks)

Answer **all** questions in this section.

2. (a) Briefly state why it is strictly prohibited to indulge in horseplay when working in the workshop?
   (b) State why is it advised to wear safety boot with stout design when working in the workshop?

3. (a) State how files are classified.
   (b) Why a file should always be fitted with handle?

4. Mention six advantages of C.I engine with regard to S.I engine.

5. (a) (i) Name two parts of the drive line.
   (ii) What is the purpose of the drive line?
   (b) State two purposes of the final drive in a motor vehicle.

6. (a) List three causes of a motor vehicle backfiring.
   (b) Enumerate three possible causes of engine which turns over at normal speed but does not start.

7. Define the following as encountered in motor vehicle mechanics.
   (a) Oil galleries (b) Oil additives (c) Oil sump

8. (a) Mention the qualities which the break shoes must meet.
   (b) Distinguish between master cylinder and wheel cylinder as employed in a motor vehicle braking system.

9. Briefly explain how the combustion occurs in petrol and diesel engine.

10. (a) What preventative measure must be considered before jacking a motor vehicle?
    (b) What will be the outcome if the fault thermostat will
    (i) remain open (ii) remain closed.

11. (a) What are the two major parts of the chassis frame?
    (b) Briefly state how propeller shaft is supported?

(c) What is the name of the measuring instrument which gives more accurate linear measurement in a motor vehicle workshop?

SECTION C (60 Marks)

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

12. (a) Identify five causes and their remedial of the excessive brake pedal travel of a car. **(10 marks)**

(b) Briefly explain the following as encountered in motor vehicle with regard to their configuration and operations.

(i) Rack and pinion gear boxes
(ii) Recirculation ball gear boxes
(iii) Worm and roller gear boxes
(iv) Cam and peg gear boxes
(v) Screw and nut gear boxes. **(10 marks)**

13. (a) (i) What is firing order of a motor vehicle engine?
(ii) What is the importance of firing order of an engine?
(iii) Briefly explain the problems that might rise in the engine if improper firing order is applied. **(3.5 marks)**

(b) (i) Sketch and label an elevation with side cam of an arrangement for operating overhead valve consisting the following parts.

- Push rod
- Valve spring
- Valve guide
- Camshaft
- Rocker arm
- Adjusting screw
- Tappet or follower
- Valve

(ii) Briefly explain the importance of air cleaner in the carburettor system.
(iii) Explain the effect of the excessive valve clearance and too little valve clearance in an engine. **(14.5 marks)**

(c) Why the camshaft does not rotate at the same speed as the crankshaft? **(2 marks)**

14. (a) (i) At which part of the braking system is the brake pressure control/regulating valve fitted in a motor vehicle? **(1 mark)**
(ii) What is the importance of the brake pressure control/regulating valve fitted in a motor car? **(1.5 marks)**
(iii) Briefly elaborate how brake pressure control valve operates. **(2.5 marks)**

(b) (i) What is 'asbestos-friction materials' as used in brake and clutch systems? **(2 marks)**
(ii) Why asbestos materials are rarely applied nowadays? **(2 marks)**
(iii) Briefly explain the new material used to substitute 'asbestos-friction material' in brake and clutch systems with regard to their strengths and drawbacks. **(4 marks)**

(c) (i) What is the purpose of the load-apportioning valve as used in brake systems?
(ii) Analyse the effect the 'load-apportioning valve' serves in a car. **(3 marks)**

(d) Briefly describe the constant mesh and synchromesh gearboxes. **(4 marks)**

15. (a) With the aid of sketches, describe three types of engine cylinder liners with regard to installation and water jacket. **(18 marks)**

(b) Briefly describe the header tank as a part of radiator. **(2 marks)**

16. (a) With the aid of sketches, explain how the following affect the tyre of the motor vehicle.

(i) Under inflated tyre.
(ii) Over inflated tyre.
(iii) Excessive camber angle.
(iv) Incorrect toe alignment.
(v) Slackness steering. **(15 marks)**

(b) (i) Identify the component of the motor vehicle in Figure 1 as used in suspension system.
(ii) Name the parts of the component in Figure 1 indicated by letters A-D.
(iii) Briefly explain the function of the component in Figure 1. **(5 marks)**

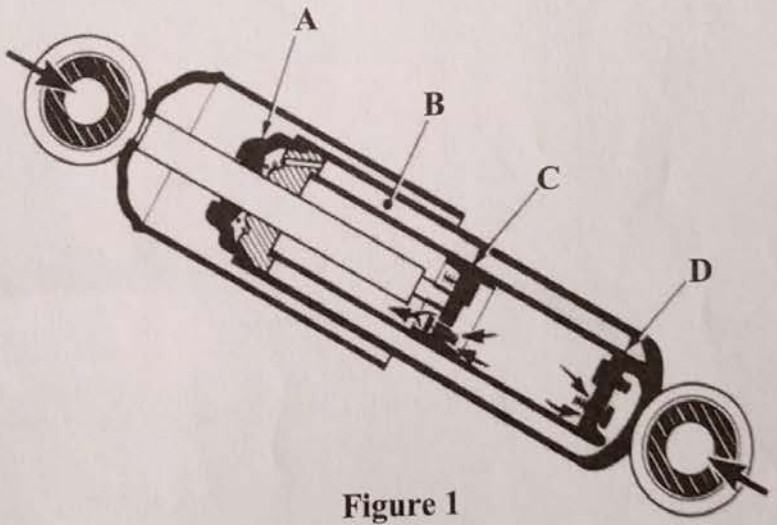

Figure 1