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, 16th October 2012 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).

SECTION A (40 Marks)

Answer **all** questions in this section.

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

(i) During the suction stroke of spark ignition engine, the cylinder is charged with
A air only B diesel/air mixture C diesel only
D exhaust gas E petrol/air mixture.

(ii) The component for building up pressure sufficient to atomize the diesel fuel is called
A mechanical fuel pump B electric fuel pump C engine pump
D vaccum pump E injector pump.

(iii) What does the term 'firing order' stand for?
A Order of pistons arrangements. B Periods of firing point.
C Firing sequence of multi-cylinders. D Firing intervals of multi - cylinders.
E Rotation of a distributor.

(iv) The hydrolastic suspension is the combination of
A rubber and fluid under pressure B plastic and fluid under pressure
C metal and fluid under pressure D phosphor and fluid under pressure
E zinc and fluid under pressure.

(v) The spark ignition engine distributor is driven by
A distributor shaft B camshaft gear C rocker shaft
D ignition timing E camshaft.

(vi) The heating element of the heater plug is located inside the
A cylinder head B combustion chamber C sump
D crankcase E engine block.

(vii) What is the cause of a low engine oil pressure in motor vehicle?
A Worn engine bearings. B Strong relief valve spring. C High pump speed.
D Tight engine bearing. E Dirty pump.

(viii) Which of the following drives the pump for lubrication in motor vehicle engine?
A Half shaft. B Distributor. C Camshaft.
D Rotor. E Rocker shaft.

(ix) Locking devices can be classified as follows:
A Single and double B Negative and positive C Flat and round
D Split and stolid E Frictional and positive.

(x) Over tightening the water pump drive belt causes the following defect:
A bearing failure B radiator problem C engine failure
D drive belt sleeper E thermostat failure.

SECTION B (30 Marks)

Answer **all** questions in this section.

2. Write six requirements of a wheel alignment.

3. (a) What does the term 'gear' means as employed in a motor vehicle?
   (b) What is the function of the sliding joints of a propeller shaft?
   (c) State the function of a brake master cylinder.

4. (a) Name three advantages of tubeless tyres.
   (b) What are the three functions of a steer's damper?

5. (a) List two types of engine oil filters.
   (b) List two types of lubrication system in common use on internal combustion engines.
   (c) Enumerate two types of hacksaw frames.

6. (a) What is a wheel with regard to motor vehicle?
   (b) Why are soft metal caps placed over steel jaws of the bench vice?

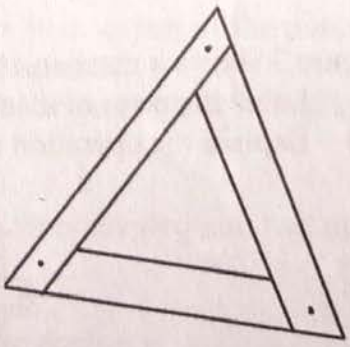
7. (a) Explain the importance of a frame as a main vehicle layout.
   (b) Sketch the following sections of the motor vehicle frame.
      (i) Channel section
      (ii) Box section.

8. (a) Define the 'ignition intervals' of reciprocating engines.
   (b) Name two types of shock absorbers.
   (c) Define 'viscosity' with regard to motor vehicle mechanics.

9. Sketch a diagram of crankshaft and label its three common parts.

10. Identify and briefly explain the following tools in Figure 1, as included in a motor vehicle.

(i)



(ii)

Figure 1

11. Name and define two categories of suspension system.

SECTION C (60 Marks)

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

12. (a) (i) What is the 'brake fade' with regard to car braking operations?
(ii) Explain briefly how is brake fade in 12 (a) (i) arise?
(iii) Why brake fade is more prevalent in drum brakes than in disc brakes? (Give two points) **(7.5 marks)**

(b) (i) Name the parts of the drum brake indicated in Figure 2.
(ii) How is leading and trailing shoe brake differ from two leading shoe brake?
(iii) Explain briefly three advantages of two leading shoe braking over leading and trailing shoe brake. **(12.5 marks)**

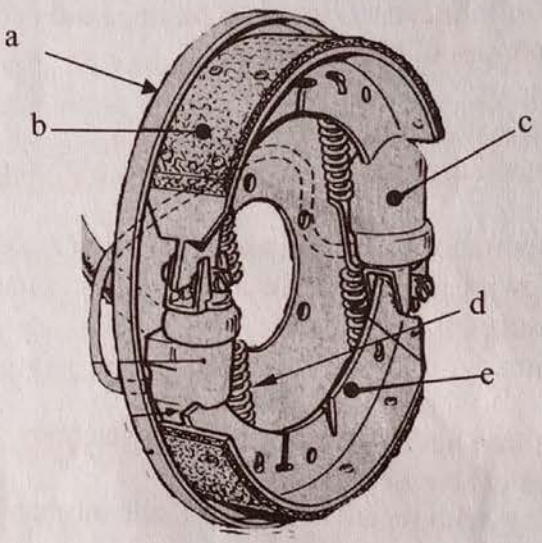


Figure 2

13. (a) (i) What is the mixture strength with regard to vehicle engine operation?
(ii) Explain briefly three functions of carburetor.
(iii) Differentiate between direct and indirect fuel injection in diesel engine. **(6 marks)**

(b) Figure 3 shows a mechanical fuel pump for motor vehicle.
(i) Label the parts of mechanical fuel pump indicated by letters a, b, c, d and e.
(ii) Explain the operation of the mechanical fuel pump. **(7.5 marks)**

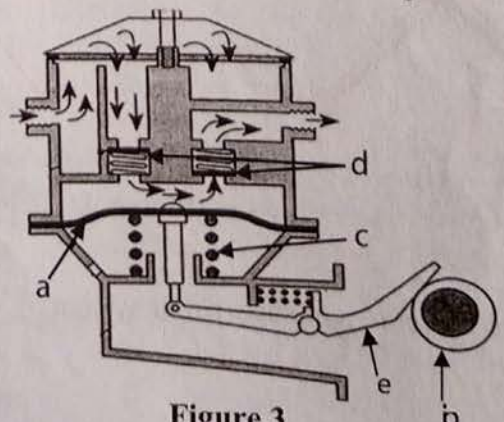


Figure 3

(c) (i) What is an 'air cleaner' as encountered on carbureted motor vehicle engine?
(ii) Describe how air cleaner is fitted on carbureted engine. **(2.5 marks)**

(d) (i) Define 'muffler' and state its function with regards to exhaust system.
(ii) Briefly explain how exhaust gas enters and leaves in muffler of reverse flow type with slotted holes. **(4 marks)**

14. (a) (i) State the use of thermostat in a motor vehicle.
(ii) Why the thermostat closes when the cold engine is started?
(iii) How water/coolant is cooled in the radiator? **(5.5 marks)**

(b) Explain two types of radiators with regard to the way water flows through it and its water tanks. **(4 marks)**

(c) (i) What is the purpose of engine fan?
(ii) How is the engine fan mounted and driven? **(2 marks)**

(d) (i) State the purpose of the tire on motor vehicle.
(ii) Describe two types of the tires commonly employed on motor vehicle. **(4.5 marks)**

(e) Figure 4 shows types of engine cylinder liners; differentiate them with regards to installation and water jacket. **(4 marks)**

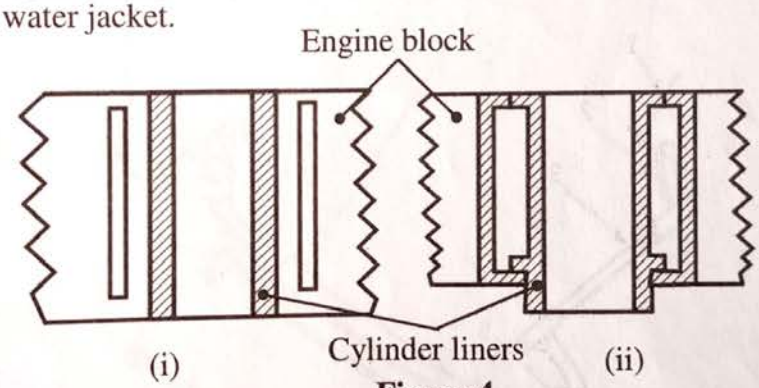


Figure 4

15. (a) (i) Briefly state seven possible causes of the oil leak as part of the transmission fault and suggest the remedial to be taken after diagnosis.
(ii) Briefly state three causes with their remedial of gears clash in shifting in the transmission system. **(6 marks)**

(b) Briefly explain four reasons why the propeller shaft is divided into two pieces and joined by centre bearing? **(4 marks)**

(c) Figure 5 shows operations of the four-stroke cycle engine.
(i) In each Figure 5 (i) – (iv), identify the stroke of the cycle of operation of the engine.
(ii) Explain the operation of each cycle shown in Figure 5. **(10 marks)**

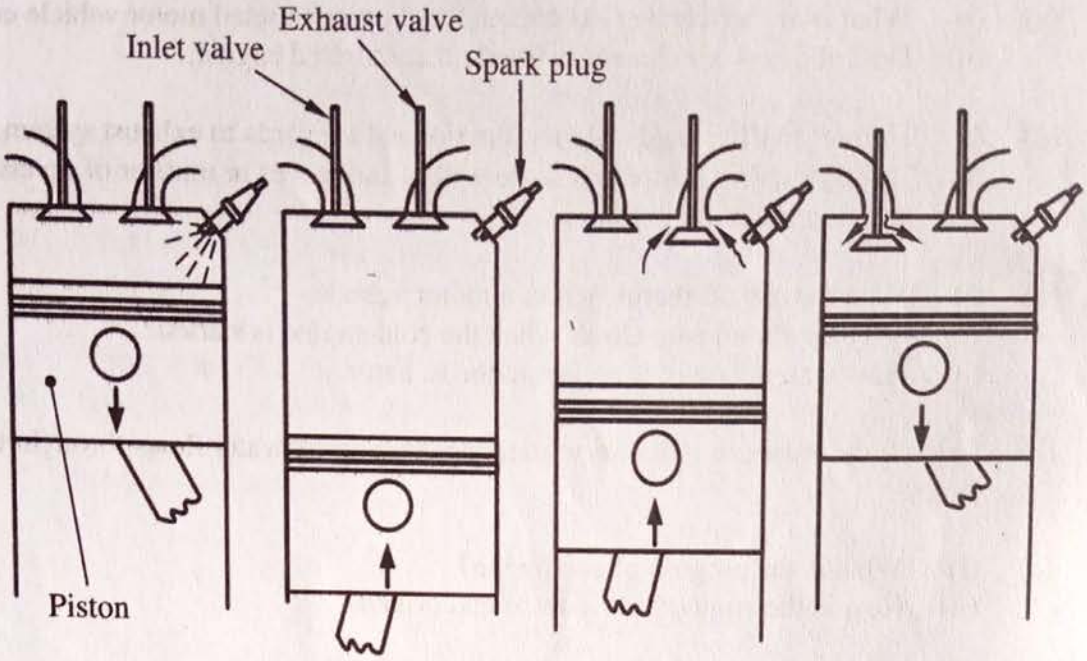


Figure 5

16. (a) Name the parts of the front axle components and steering linkage indicated by the numbers in Figure 6. **(4 marks)**

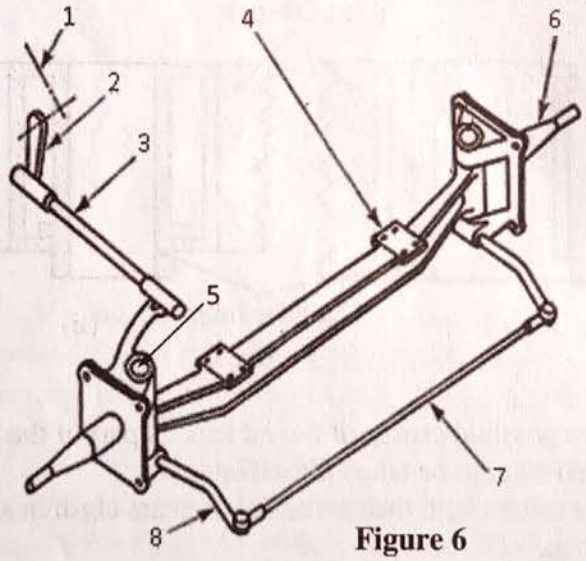


Figure 6

(b) (i) What is king pin inclination?
(ii) What is the purpose of kingpin inclination?
(iii) Sketch a kingpin inclination and indicate its main parts. **(5 marks)**

(c) With the aid of diagram, briefly define and give the function of the following.
(i) Camber angle (ii) Castor angle **(11 marks)**