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, 19th October 2010 a.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.

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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) Petrol is obtained by
- A refining crude oil
- B processing vegetable products
- C fractionizing coal
- D heating wooden substances
- E vaporizing coal.

(ii) The input and output torque of a gearbox is 70 Nm and 210 Nm respectively. If the efficiency is 70 percent, the gear ratio is
- A 2.25:1
- B 3:1
- C 4:1
- D 22.5:1
- E 0.3:1.

(iii) In an automobile engine the temperature of piston will be more at
- A the crown of the piston
- B the skirt of the piston
- C the piston pin
- D the piston rings
- E gudgeon pin.

(iv) Water in lubricating oil aids in
- A decomposition
- B oxidation
- C formation of sludge
- D dilution
- E burning.

(v) The fuel is injected into the cylinder in diesel engine when the piston is
- A exactly at TDC after compression stroke
- B exactly at BDC before compression stroke
- C approaching TDC during compression stroke
- D approaching TDC during exhaust stroke
- E just after TDC during compression stroke.

(vi) In case of clutch, if the springs become weak, the remedy is to
- A tighten further the springs
- B interchange the spring
- C re-temper the springs
- D replace the springs
- E loosen the springs.

(vii) The pressure of air in case of heavy duty trucks
A is usually of the order of 1 to 2 atm
B is usually of the order of 2 to 3 atm
C is usually of the order of 4 to 7atm
D is usually of the order of 14 to 17 atm
E depends upon the road conditions.

(viii) The king pin inclination is usually
A less than $^1/_2°$
B between 1° and 2°
C between 1° and 5°
D more than 7°
E $10° \pm 2°$.

(ix) The provision made to allow a leaf spring to vary its length is a
A swinging shackle
B rubber u- bolt mounting
C sliding centre bolt
D spline in the spring eye
E universal joint.

(x) The term "brake fade" as applied to a braking system means
A decrease in friction due to wear
B fall-off in efficiency due to heat
C increase in effort as the shoe clearance increases
D discolouration of the lining when it is soaked
E decrease of brake fluid in master cylinder.

SECTION B (30 Marks)

Answer **all** questions in this section.

2. State the purpose of oil
(a) dip stick
(b) pressure relief valve and
(c) pressure gauge.

3. Give advantages of a four stroke engine compared to a two stroke engine.

4. A customer's car fitted with a single plate clutch experiences clutch drag. What are the three (3) probable causes?

5. Name three (3) angles which are often used to describe the steering geometry.

6. What is the effect of too big valve clearance?

7. The following are the conditions of tyre wear due to improper inflation.
   (a) Rapid wear at tyre shoulder.
   (b) Rapid wear at centre.
   What are the causes of each condition?

8. About 70% of accidents in the workshops are due to negligence and carelessness on the part of the workers. Explain important points to watch on 'tidiness' in practicing safety when working in a workshop.

9. Explain briefly why in modern cars the rear wheels are filled with one "leading" and one "trailing" down shoe brakes.

10. Explain the functions of each of the following:
   (a) An injector pump.
   (b) An injector nozzle.

11. Calculate the torque transmitted by single plate clutch having a mean radius of 100 mm, total spring thrust of 1500 N and coefficient of friction of 0.3.

SECTION C (60 Marks)

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

12. (a) Describe the main function of piston rings.
   (b) Differentiate between working gap and free gap of piston rings.

13. (a) What is the purpose of fitting a thermostat in the vehicle cooling system?
   (b) Describe how to test a thermostat.

14. What is the importance of changing engine lubricating oil at regular intervals?

15. (a) Explain briefly, why brakes are designed so that two thirds of the braking effort is on the front wheels?
   (b) Explain briefly the function of a propeller shaft.

16. (a) Explain the following spring and damper conditions.
      (i) Rebound
      (ii) Bump
   (b) (i) With a simple sketch describe what a caster angle is?
      (ii) Explain the purpose of a caster angle.