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

093

MOTOR VEHICLE MECHANICS
(For Both School and Private Candidates)

Time: 3 Hours **Year: 2020**

Instructions

1. This paper consists of sections A, B and C with a total of **fourteen (14)** questions.
2. Answer **all** questions in sections A and B and **three (3)** questions from section C.
3. Section A carries **ten (10)** marks and sections B and C carry **forty five (45)** marks each.
4. Calculators, cellular phones and any unauthorised materials are **not** allowed in the examination room.
5. Write your **Examination Number** on every page of your answer booklet(s).

SECTION A (10 Marks)

Answer **all** questions in this section.

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

(i) What do diesel engines require differently compared to petrol engines?
A Bigger flywheel B Smaller flywheel
C Same size of flywheel D Hollow flywheel
E No flywheel

(ii) What converts the rotary motion of steering wheel into lateral motion?
A Steering wheel B Steering shaft
C Steering gear box D Tie rod
E Steering belt

(iii) Which condition causes large quantities of CO emission?
A Equal air –fuel ratio combustion B Insufficient fuel during combustion
C Low temperature combustion D High temperature combustion
E Insufficient air during combustion

(iv) How can you attach clutch facings to the plate?
A By steel rivets B By brass rivets
C By aluminium screws D By steel screws
E By wood rivets

(v) How is the lower cylindrical portion of the piston which improves the effect of piston cooling called?
A Piston crown B Piston lower C Piston pin boss
D Piston skirt E Piston end

(vi) Which one is the correct arrangement of the flow of power through the drive train?
A Engine drive shafts, clutch, main shaft, counter shaft, final driven gear, wheels.
B Engine clutch, main shaft, counter shaft, final driven gear, drive shafts, wheels.
C Engine clutch, counter shaft, main shaft, final driven gear, drive shafts, wheels.
D Engine main shaft, counter shaft, clutch, final driven gear, drive shafts, wheels.
E Engine clutch, main shaft, counter shaft, final driven gear, drive shafts, flywheel.

(vii) Which meter measures the engine r.p.m. of a motor car?
A Speedometer B Revometer C Barometer
D Galvanometer E Tachometer

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(viii) Which of the following are factors of a brake power?
A Indicated Power (I.P) and Frictional Power (F.P)
B Indicated Power (I.P) and Consumed Power (C.P)
C Consumed Power (C.P) and Frictional Power (F.P)
D Wheel Power (W.P) and Frictional Power (F.P)
E Indicated Power (I.P) and Wheel Power (W.P)

(ix) What are the two general types of tyres employed in motor vehicle?
A Solid and tubeless
B Tube type and tubeless
C Air and pneumatic
D Split rim and drop centre
E Solid and tube type

(x) What drives the oil pump in the motor car engine?
A Camshaft
B Pulley
C Sprockets
D Crankshaft
E Belt

SECTION B (45 Marks)

Answer **all** questions in this section.

2. (a) Why a cam shaft does not rotate the same speed as crank shaft?
(b) What are the three factors which should be considered while designing a motor car body.

3. (a) State five portable types of fire extinguishers with their colour code.
(b) Give the type of fire extinguished by each type of fire extinguishers mentioned in part 3(a).

4. Identify five important information which are found on the side of a tyre.

5. Give five types of handles and in each state how it is used with box or socket spanners.

6. (a) What is meant by 'temporary fasteners' in engineering processes?
(b) Give four examples of temporary fasteners and their uses.

7. What are the five emission gases that can be obtained during test emission using exhaust gas analyser?

8. (a) Which type and size of the electric cooling fan motor is used in motor vehicle?
(b) How can someone control the electrical fan in cooling system? Give three ways.

9. How does a cam operated 'internal expanding brakes' work?

10. Briefly explain ten safety rules that should be followed in the motor vehicle workshop.

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SECTION C (45 Marks)

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

11. (a) Briefly explain the following terms as used in the motor vehicle wheel dimension:
    (i) Rim diameter
    (ii) Wheel width
    (iii) Wheelbase. **(3 marks)**

    (b) What will be the effects on the tyre when the following conditions occur?
    (i) Under-inflation
    (ii) Over-inflation **(6 marks)**

    (c) (i) Differentiate static wheel imbalance from dynamic wheel imbalance.
    (ii) What are the four advantages of the radial-ply?
    (iii) What is the use of tyre valves? **(6 marks)**

12. (a) (i) Classify the radiators with respect to water flow in it.
    (ii) Describe the working principle of a radiator. **(6 marks)**

    (b) (i) Why radiators are equipped with pressure cap?
    (ii) Describe the working principle of a radiator pressure cap. **(6 marks)**

    (c) (i) Explain the purpose of the expansion tank in the engine cooling system.
    (ii) How is water drawn by the radiator from the expansion tank? **(3 marks)**

13. (a) (i) What is a constant velocity joint?
    (ii) Distinguish between a birfield plunge joint and a tripode plunge joint. **(7 marks)**

    (b) Briefly explain the uses of 'universal joint' and 'sliding joint' in a hotchkiss propeller shaft. **(4 marks)**

    (c) (i) What is the effect of using a long hotchkiss propeller shaft?
    (ii) How can the effect stated in 13 (c) (i) be prevented? **(4 marks)**

14. (a) How can the following actions be achieved by friction clutch?
    (i) Engaging gears and vehicle engine smoothly when the vehicle is in motion.
    (ii) Acting as positive brake. **(4 marks)**

    (b) Describe three symptoms and two causes of the following clutch faults: **(11 marks)**
    (i) Clutch slip.
    (ii) Clutch spin.

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