THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATION COUNCIL OF TANZANIA

DIPLOMA IN TECHNICAL EDUCATION EXAMINATION

790 **AUTOMOBILE TECHNOLOGY**

Time: 3 Hour. **Monday, 08th May 2001 p.m.**

Instructions

1. This paper consists of **ten (10)** questions.
2. Answer any **five (5)** questions
3. Each question carries **twenty (20)** marks.
4. Programmable calculators, cellular phones and other unauthorized materials are **not** allowed in the examination room.
5. Write your **Examination Number** on every page of your answer booklet(s).

1. (a) Explain five safety precautions a technician must follow when working on a vehicle engine in a workshop.

(b) Describe how to safely dispose of used engine oil and coolant.

(c) Sketch and label the following vehicle body constructions:

(i) Body-on-frame construction

(ii) Unibody construction

2. (a) Differentiate between torque and horsepower in vehicle performance.

(b) List and explain four factors that affect engine power output.

(c) With the help of a simple diagram, explain how torque is transmitted from the engine to the drive wheels in a rear-wheel-drive vehicle.

3. (a) State and explain the functions of the following engine components:

(i) Camshaft

(ii) Crankshaft

(iii) Cylinder head

(iv) Gudgeon pin

(b) List four symptoms of a worn-out piston ring and explain the effects on engine performance.

(c) Describe the steps involved in replacing a head gasket in an internal combustion engine.

4. (a) Describe the working principle of a four-stroke compression ignition engine.

(b) A four-cylinder engine has a bore of 80 mm and a stroke of 100 mm. Calculate the engine capacity in cubic centimeters (cc).

(c) Highlight three mechanical differences between a naturally aspirated engine and a turbocharged engine.

5. (a) Explain the operation of a hydraulic braking system using a well-labeled diagram.

(b) List three causes of spongy brake pedal and explain their remedies.

(c) Describe how to perform a brake bleeding procedure on a vehicle.

6. (a) Describe the construction and function of a diaphragm-type clutch.

   (b) Explain the importance of clutch free play and describe how it is adjusted.

   (c) List four signs of a faulty clutch and explain the possible causes for each.

7. (a) Differentiate between positive and negative camber and explain their effects on vehicle handling.

   (b) Describe three common types of wheel alignment angles.

   (c) A front-wheel-drive car shows uneven tire wear on the inner edge. What could be the cause and how is it corrected?

8. (a) Define the term "voltage drop" and explain its significance in vehicle electrical circuits.

   (b) Describe how to test an alternator using a digital multimeter.

   (c) List four causes of battery overcharging and explain the consequences if not corrected.

9. (a) Outline the procedure for diagnosing a no-start condition in a petrol engine vehicle.

   (b) What is an OBD-II system? Explain its function in modern automotive diagnostics.

   (c) Mention three common diagnostic trouble codes (DTCs) and what they indicate.

10. (a) Describe the working of an electronically controlled fuel injection (EFI) system.

    (b) Explain the role of the Mass Air Flow (MAF) sensor and Throttle Position Sensor (TPS) in engine control.

    (c) A vehicle shows poor fuel economy and loss of power. List five possible causes and explain each.