THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATION COUNCIL OF TANZANIA

DIPLOMA IN TECHNICAL EDUCATION EXAMINATION

790 AUTOMOBILE TECHNOLOGY

Time: 3 Hour. **Monday, 13th May 2014 p.m.**

Instructions

1. This paper consists of **eight (8)** 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) List five engine-related faults that may trigger the check engine light on a modern vehicle dashboard.

   (b) Describe the correct procedure for removing a cylinder head from an overhead camshaft engine.

   (c) Explain three advantages of using aluminum alloy in engine block construction.

2. (a) (i) What is the function of a manifold absolute pressure (MAP) sensor?

   (ii) Mention four symptoms of a faulty MAP sensor in an engine.

   (iii) Why is accurate MAP sensor data critical to engine performance?

   (b) (i) State the difference between direct and indirect fuel injection in diesel engines.

   (ii) Explain two benefits and two drawbacks of direct injection.

   (c) Sketch and describe a simple fuel return system in a diesel engine.

3. (a) A vehicle fitted with anti-lock braking system (ABS) skids on wet roads. Identify five likely causes.

   (b) Briefly explain how to diagnose an alternator using a multimeter and observation.

   (c) What is meant by engine surging, and what are three potential causes?

   (d) Mention three factors that influence the efficiency of an internal combustion engine.

4. (a) With reference to vehicle electrical systems, explain the function of the following:

   (i) Starter solenoid

   (ii) Voltage regulator

   (iii) Fusible link

   (b) Describe how to perform a cylinder balance test on a petrol engine and interpret the results.

   (c) A four-cylinder engine has a firing order 1-3-4-2. Fill in the table below for the strokes assuming cylinder 1 is on the power stroke.

5. (a) Differentiate between lean and rich air-fuel mixtures. How does each affect combustion and emissions?

   (b) A six-cylinder engine has a bore of 86 mm and a stroke of 90 mm. Determine the engine displacement in liters.

   (c) List four possible effects of operating an engine with incorrect valve timing.

6. (a) Explain the construction and working of a torsion bar suspension system.

   (b) Describe the difference between toe-in and toe-out, and state the effect of incorrect adjustment on tyre

wear.

(c) Give three effects of a faulty steering damper on vehicle performance.

7. (a) Identify four advantages of using a double universal joint in a propeller shaft system.

   (b) Explain the working principle of a limited-slip differential (LSD).

   (c) An engine produces a torque of 210 Nm at 2500 rpm. If the transmission has an efficiency of 85% and a gear ratio of 4:1, calculate the torque and speed at the propeller shaft.

8. (a) Give four symptoms of a faulty thermostat in a cooling system.

   (b) Describe the step-by-step procedure of pressure testing a radiator for leaks.

   (c) Identify four common faults in the exhaust system and explain their effects on engine performance and emissions.