THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATION COUNCIL OF TANZANIA

DIPLOMA IN TECHNICAL EDUCATION EXAMINATION

790 AUTOMOBILE TECHNOLOGY

Time: 3 Hour. **Monday, 09th May 2017 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) Describe five symptoms of a failing head gasket in an internal combustion engine.

   (b) Explain the correct procedure for testing engine compression using a compression gauge.

   (c) State three possible effects of low engine compression on overall performance.

2. (a) (i) What is the purpose of a camshaft position sensor in an engine management system?

   (ii) Mention four signs that may indicate a failing camshaft position sensor.

   (iii) How does the ECU respond when the camshaft position sensor fails?

   (b) (i) Differentiate between sequential and simultaneous fuel injection systems.

   (ii) Give two advantages of sequential injection over simultaneous injection.

   (c) Explain the intake process in a naturally aspirated engine and how it differs from a turbocharged engine.

3. (a) Identify five possible causes of a rough idle in a petrol engine.

   (b) Describe how to carry out a charging system voltage test using a multimeter.

   (c) What is the purpose of a mass airflow sensor and how can it affect fuel delivery?

   (d) Mention three causes of irregular engine vibrations at idle.

4. (a) Explain four engine-related conditions that may cause overheating in a vehicle.

   (b) Describe the step-by-step procedure for replacing a thermostat in a vehicle cooling system.

   (c) Explain the effect of a stuck-open thermostat on engine operation and fuel economy.

   (d) Give three possible reasons why a cooling fan may fail to operate when needed.

5. (a) List four functions of engine oil in internal combustion engines.

   (b) A four-cylinder engine has a bore of 87 mm and a stroke of 92 mm. Calculate the total engine displacement in liters.

   (c) State four consequences of using the wrong viscosity oil in a modern engine.

6. (a) Explain the construction and function of a stabilizer (anti-roll) bar in a suspension system.

   (b) What are the effects of worn-out suspension bushings on handling and stability?

   (c) Identify three signs of a failing ball joint and their impact on safety.

7. (a) Give four functions of the gearbox in a vehicle transmission system.

   (b) Explain how gear ratios affect torque and speed in a manual transmission.

(c) An engine produces 220 Nm at 2800 rpm. If the gear ratio is 4.2:1 and transmission efficiency is 85%, calculate the output torque and output shaft speed.

8. (a) State four main sources of automotive noise pollution and their causes.

   (b) Describe how to inspect an exhaust system for leaks without using electronic diagnostic tools.

   (c) Identify four effects of a leaking exhaust manifold on engine efficiency and emissions.