THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATION COUNCIL OF TANZANIA

DIPLOMA IN TECHNICAL EDUCATION EXAMINATION

790 AUTOMOBILE TECHNOLOGY

Time: 3 Hour. **Monday, 10th May 2016 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) Explain five engine mechanical faults that may lead to poor acceleration in a petrol-powered vehicle.

   (b) Describe the procedure for removing and inspecting spark plugs in a multi-cylinder engine.

   (c) State three advantages of using iridium spark plugs compared to conventional copper spark plugs.

2. (a) (i) What is the function of an idle air control (IAC) valve in an EFI system?

   (ii) Mention four signs of a malfunctioning IAC valve.

   (iii) How does the ECU regulate engine idle speed using the IAC valve?

   (b) (i) Differentiate between wet sump and dry sump lubrication systems.

   (ii) Explain two reasons why dry sump systems are used in performance vehicles.

   (c) Describe the air intake and filtration process in a modern turbocharged engine.

3. (a) Identify five causes of a petrol engine running rich and explain the effect on engine performance.

   (b) Explain how to test a throttle position sensor (TPS) using a digital multimeter.

   (c) What is the purpose of an engine control module (ECM), and how does it interact with engine sensors?

   (d) List three potential causes of poor fuel economy in a vehicle.

4. (a) Explain four reasons that may cause a vehicle engine to crank but fail to start.

   (b) Describe how a fuel pressure test is performed on a multipoint injection system.

   (c) What is meant by ignition timing advance, and why is it critical for engine efficiency?

   (d) Mention three benefits of using a distributor-less ignition system in modern engines.

5. (a) List four functions of a radiator cap in a vehicle cooling system.

   (b) A 4-cylinder diesel engine has a bore of 100 mm and a stroke of 110 mm. Calculate the engine displacement in liters.

   (c) State four negative effects of operating an engine without a functioning thermostat.

6. (a) Describe the construction and operation of a double wishbone suspension system.

   (b) Explain the effects of excessive toe-in and toe-out on tyre wear and vehicle stability.

   (c) Mention three suspension faults that may result in poor ride quality.

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

   (b) Explain the working principle of a diaphragm spring clutch.

(c) An engine produces 200 Nm at 3000 rpm. The gearbox has a gear ratio of 2.8:1 and efficiency of 88%. Calculate the torque and speed at the output shaft.

8. (a) List four components of an emission control system and state the function of each.

   (b) Describe how an EGR valve helps reduce nitrogen oxide emissions.

   (c) Identify four common exhaust-related faults and how each can be diagnosed in the workshop.