THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATION COUNCIL OF TANZANIA

DIPLOMA IN TECHNICAL EDUCATION EXAMINATION

790 AUTOMOBILE TECHNOLOGY

Time: 3 Hour. **Monday, 14th May 2013 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 possible causes that may lead to sudden engine shutdown during highway driving in a petrol-powered vehicle.

   (b) Describe the procedures that should be followed when performing engine compression testing using a compression gauge.

   (c) Briefly explain three effects of prolonged engine overheating on aluminum engine components.

2. (a) (i) Describe how a dial test indicator is used to check crankshaft end play.

   (ii) Why is excessive crankshaft end play a concern in engine operation?

   (iii) State two signs that may indicate crankshaft end play in an operating engine.

   (b) (i) Explain the function of the catalytic converter in the exhaust system.

   (ii) Identify four conditions that can cause premature failure of a catalytic converter.

   (c) With aid of a labeled outline, describe the air intake system in a turbocharged diesel engine.

3. (a) A technician observes poor acceleration and black smoke emission from the exhaust of a diesel vehicle. Identify five possible causes.

   (b) Describe how a multimeter can be used to test:

   (i) Battery voltage

   (ii) Continuity in a circuit

   (iii) Alternator charging voltage

   (c) Discuss three benefits of using electronic fuel injection (EFI) over a carburetor system in modern vehicles.

   (d) Highlight three challenges associated with diagnosing faults in electronically controlled engines.

4. (a) State four vehicle systems that are directly affected when the engine's ECU malfunctions and briefly explain how.

   (b) Explain the term "detonation" in internal combustion engines and its effects on engine components.

   (c) Complete the following table by filling the stroke activity of each cylinder at a given crank angle for a four-cylinder engine with firing order 1-3-4-2.

Cylinder	Stroke
1	
3	
4	
2	

5. (a) Compare four differences between dry-sump and wet-sump lubrication systems.

   (b) A 4-cylinder engine with a bore of 90 mm and a stroke of 100 mm operates at 3500 rpm with a volumetric efficiency of 85%. Calculate the volume of air inducted per minute in cubic meters.

   (c) Outline four essential conditions for achieving complete combustion in internal combustion engines.

6. (a) Explain the importance of performing wheel alignment and how it affects the following:

   (i) Tyre wear

   (ii) Steering response

   (iii) Fuel economy

   (b) Describe the operational difference between mechanical drum brakes and hydraulic disc brakes.

   (c) What are the effects of each of the following faults in a braking system?

   (i) Air in brake lines

   (ii) Worn brake pads

   (iii) Damaged master cylinder

   (iv) Uneven brake fluid levels

7. (a) List four components mounted on a propeller shaft and explain the function of each.

   (b) Describe the operation of a constant velocity joint and give two advantages over universal joints.

   (c) An automotive technician is tasked with replacing rear axle bearings. Outline the step-by-step procedure to perform this service, mentioning at least five steps.

   (d) Explain how torque is transferred from the engine to the drive wheels in a front-wheel-drive vehicle.

8. (a) List four functions of engine mountings in a motor vehicle.

   (b) Describe the procedure of adjusting valve clearance in a four-stroke engine.

   (c) Identify five common faults found in suspension systems and explain their impact on vehicle handling and safety.