THE UNITED REPUBLIC OF TANZANIA
NATIONAL EXAMINATIONS COUNCIL OF TANZANIA
DIPLOMA IN TECHNICAL EDUCATION EXAMINATION

790 **AUTOMOBILE TECHNOLOGY**

Time: 3 Hours **Tuesday, 14th May 2019 a.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 any unauthorized materials are **not** allowed in the examination room.
5. Write your **Examination Number** on every page of your answer booklet(s).

1. (a) The practice of safety in the workshop goes beyond the knowledge of the proper use of hand tools and equipment. Explain safety precautions to be adhered to by a technician on removal and replacement of worn out brake linings and repair of wheel cylinders in the workshop.

(b) What are the safety precautions to be considered when using each of the following hand tools?
(i) A file (ii) Chisel (iii) Adjustable wrench.

(c) Sketch and label three common frame sections applicable on vehicles.

2. (a) (i) Briefly explain the use of reamers.
(ii) Outline four types of reamers which are commonly used in a tool workshop.
(iii) What is the use of a feeler gauge in automobile workshops?

(b) (i) What is the meaning of popping back as used in fuel system?
(ii) Mention four causes of popping back in a fuel system.

(c) Explain the purpose of adjusting the steering angles and specifically describe how the following angles are adjusted.
(i) Castor angle
(ii) Comber angle
(iii) Toe – in angle.

3. (a) What is meant by the term engine as used in automobile technology?

(b) Differentiate external combustion engine from internal combustion engine and give two examples in each case.

(c) The Tanzania Revenue Authority rate vehicle tax payments according to engine size 'cc'. How is the engine size obtained?

(d) Briefly diescribe the procedures of testing and adjusting injectors in an automobile for the following job descriptions:
(i) Pressure test
(ii) Leak – off test
(iii) Spray test.

4. (a) Two common firing order of the four cylinder inline engine are 1342 and 1243. Fill the table given below when the piston move in pairs.

Cylinder Number	1	2	3	4
1st Stroke	P	C or E	E or C	I
2nd Stroke				
3rd Stroke				
4th Stroke				

Where: P – power stroke, C – compression stroke, E – exhaust stroke and I – induction stroke.

(b) Explain the induction stroke on a four stroke spark ignition engine (S.I.E).

(c) Briefly explain four distinguishing features between four stroke engine and two stroke engine.

5. (a) Briefly explain four basic differences between petrol and diesel engines.

(b) An engine develops a torque of 90 NM at the flywheel at a speed of 1500 rev/min and drives through a gear box which has a low gear ratio of 3:1. If the efficiency of the drive is 90%, what is the torque and speed of the propeller shaft?

(c) What are the four ideal requirements for an anti-freeze mixture?

6. (a) Why adjustment is provided in the differential for shifting the pinion in or out in the housing, or for shifting the crown wheel right or left to the pinion?

(b) (i) What is the release bearing as applied on clutch operation

(ii) Briefly explain how is release bearing engaged when the clutch pedal is pressed?

(iii) Briefly explain how is the torque released from the engine to the gearbox?

(iv) What happen when release bearing is left free as applied on clutch operation?

(c) What are the five friction lining property requirements on the clutch plate construction?

(d) (i) Where is the location of the thermostat on a motor car?

(ii) briefly explain how to test the thermostat.

7. (a) What are the four functions of the front axle in a vehicle?

(b) (i) Explain the operation and construction of rack and pinion steering.

(ii) Outline three main functions of delivery valve.

(c) Counter check and compute by tabulation the cost estimates of engine parts upon dismantling $5V_2$ – FE engine model, four cylinder inline engine from some of the selected parts as follows:

7S1516 engine overhaul kit – Tsh.250,000/= per kit; 3S8827 main bearing – Tsh.25,000/= per set (2 pcs); 4T3125 connecting rod bearing – Tsh.22,500/= per set (2 pcs); 8T3042 piston rings – Tsh.65,000/= per set; 6T4812 camshaft bearing – Tsh.12,000/= each; 2S8994 valve inlet – Tsh.15,000/= each; 2S8995 valve exhaust – Tsh.16,000/= each; 1P2437 rocker shaft – Tsh.21,000/= each; 2T2826 sleeve – 51,400/= each and 3S8998 thrust (side) bearing – Tsh.25,000/= per pair (2 pairs).

8. (a) What is the effect of the following parts on the leaf spring?
   (i) Worn out bushes.
   (ii) Broken centre bolt.
   (iii) Loose eye of spring.
   (iv) Broken shackle.

(b) (i) Outline five causes of pre – ignition in an engine.
   (ii) Explain how a condenser is tested.

(c) Describe the procedure for ignition timing in an automobile.