TEVETA
Technical Education, Vocational and Entrepreneurship Training Authority

DIPLOMA IN HEAVY EQUIPMENT ENGINEERING

LEVEL 6 YEAR 1 EXAMINATIONS

FINAL INTEGRATED SUMMATIVE EXAMINATIONS

SITTING: APRIL/MAY 2026

SUBJECT: DIESEL ENGINES AND TRANSMISSION SYSTEMS

TOTAL MARKS: 100

TIME: THREE (3) HOURS

PASS MARK: 50

INSTRUCTIONS TO CANDIDATE

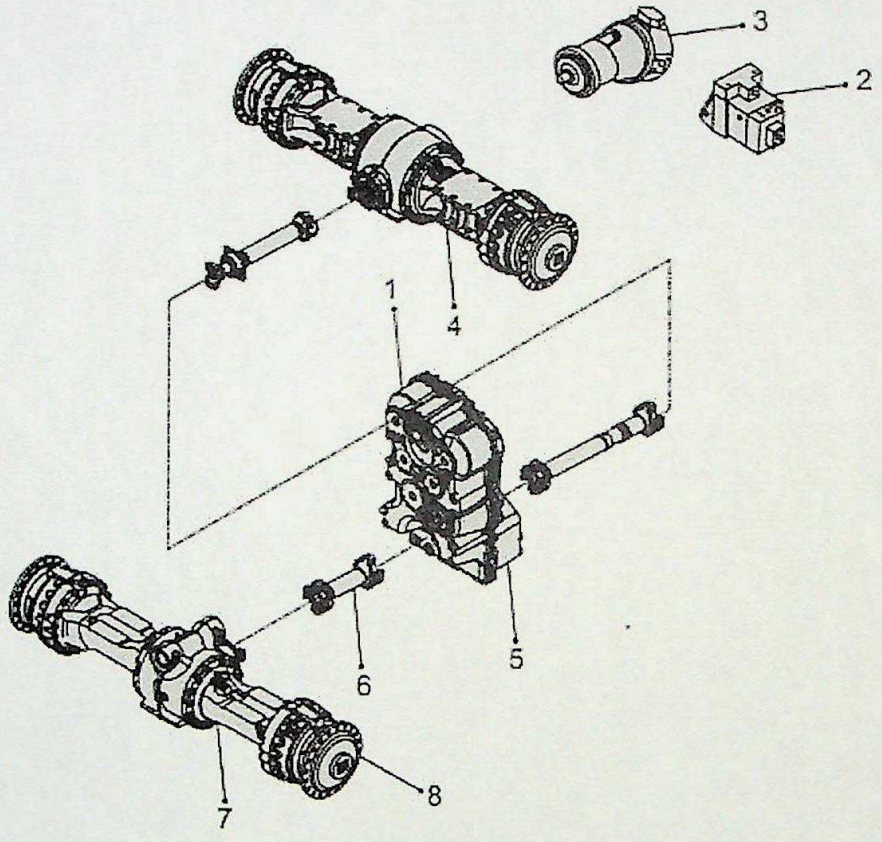
1. Write your examination number and National Registration Card Number on the answer booklet provided. Ensure you append your signature in the space provided on the answer booklet.
2. Write the ANSWER SCRIPT SERIAL NUMBER on the examination register and on the entry slip provided.
3. There are Eight (8) questions in this paper question one (1) is compulsory, attempt any Four (4) from the remaining seven (7) questions.
4. No Cell phones and programmable calculators in the examination room
5. No candidate shall be allowed to leave the examination room in the first ONE (1) hour at the start of the examination and the last thirty (30) minutes before the end of examination

DO NOT TURN THIS PAPER UNTIL YOU ARE TOLD TO DO SO

QUESTION 1 (COMPULSORY)

A. Define the term hydrostatic drive. [2marks]

B. Many earths moving equipment like excavator, compactors and skid steers are hydrostatically driven. Identify the parts of a hydrostatic drive system numbered **1-8.** [8 marks]



C. State the functions of the parts labeled 2,3,5,6,8 [10marks]

TOTAL: 20 MARKS

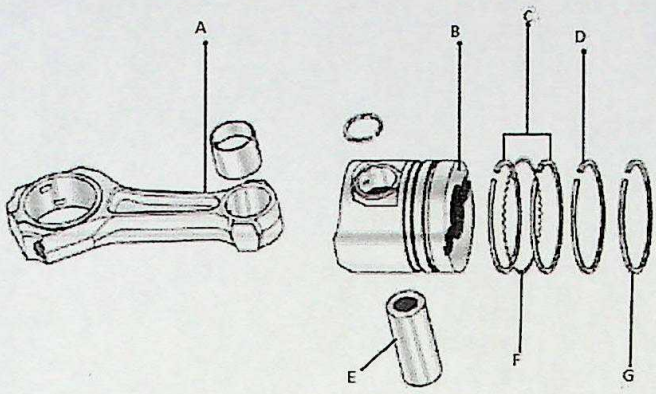
QUESTION 2

A. List five (5) functions of the engine block. [5marks]

B. State three (3) typical forces that a cylinder block must sustain [3marks]

C. Identify four (4) common categories of cylinder blocks. [4marks]

D. Identify the engine component below and name the parts label A-G [8marks]



TOTAL: 20 MARKS

QUESTION 3

A. Explain the functions of the following components of the lube system.

i. Oil sump. [2marks]

ii. Oil pump. [2marks]

iii. Oil filter. [2marks]

iv. Oil cooler. [2marks]

v. Oil piston cooling jets. [2marks]

B. List four (4) factors that affect the thickness of hydro-dynamic wedge on crankshaft journals when the engine is running. [8marks]

C. State the recommended temperature operating ranges for the following engine oil grades.

i. 10W-40 [1mark]

ii. 15W-40 [1mark]

TOTAL: 20 MARKS

QUESTION 4

A. State the functions of the following parts of the gear box.

i. Selector fork. [1mark]

ii. Selector rod. [1mark]

iii. Synchronizer unit. [1mark]

iv. Output shaft. [1mark]

v. Countershaft. [1mark]

B. List two (2) causes of the following gearbox problems.

i. Gearbox noisy in neutral. [2marks]

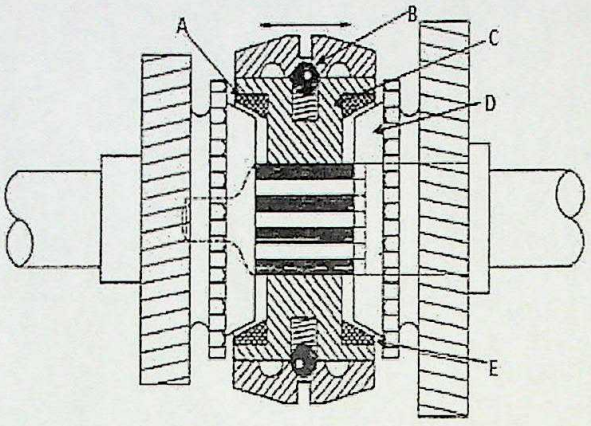
ii. Gearbox noisy in engagement (in gear). [2marks]

iii. Gearbox difficult to shift. [2marks]

iv. Gearbox oil leaks. [2marks]

v. No drive or torque being transmitted. [2marks]

C. Identify the parts of the synchromesh unit labeled A-E. [5marks]



TOTAL: 20 MARKS

QUESTION 5

A. Define the term "final drive". [2marks]

B. List four (4) categories of final drive systems and give examples of a machine that uses it. [8 marks]

C. The motor grader is one of the machines that uses the chain drive to transmit torque to the wheels through a component called "Tandem". State one (1) cause of the following problems associated with chain drives.

i. Chain whip. [2marks]

ii. Chain climbing sprocket. [2marks]

iii. Broken sprocket teeth. [2marks]

iv. Chain sticks to sprocket. [2marks]

v. Chain drive lubrication overheats. [2marks]

TOTAL: 20 MARKS

QUESTION 6

A. Define the term "engine power train". [2marks]

B. List six (6) components of engine power train. [6marks]

C. Give three (3) advantages of using aluminum pistons. [6marks]

D. Explain the following functions of the piston rings.

i. Sealing. [2marks]

ii. Lubrication. [2marks]

iii. Cooling. [2marks]

TOTAL: 20 MARKS

QUESTION 7

A. State two (2) methods of differential construction. [2marks]

B. Define the following terms in relation to the differential unit gear tooth nomenclature.

i. Toe [2marks]

ii. Heel [2marks]

iii. Pitch line [2marks]

iv. Flank [2marks]

C. Explain the following differential terms.

i. Drive [2marks]

ii. Overrun [2marks]

iii. Float [2marks]

iv. Bearing pre-load [2marks]

v. Radial run-out [2marks]

TOTAL: 20 MARKS

QUESTION 8

A. State four (4) factors that determines diesel knock. [4 marks]

B. Differentiate between direct injections from indirect injection. [5 marks]

C. With the help of a sketch, explain the three (3) phases of combustion. [10 marks]

D. In which phase does diesel knock more pronounced. [1 mark]

TOTAL: 20 MARKS