



ZIMBABWE

**MINISTRY OF HIGHER AND TERTIARY EDUCATION,
INNOVATION, SCIENCE AND TECHNOLOGY
DEVELOPMENT**

**HIGHER EDUCATION EXAMINATIONS COUNCIL
(HEXCO)**

NATIONAL CERTIFICATE

IN

DIESEL PLANT FITTING

SUBJECT: Diesel Technology

PAPER NO: 319/22/S01

DURATION: 3 Hours

MARCH/APRIL 2025 EXAMINATION

REQUIREMENTS

1. Pen
2. Pencil
3. Ruler
4. Drawing Instruments
5. Calculator

INSTRUCTIONS TO CANDIDATES

1. Section A: Answer all questions - 20 marks
2. Section B: Answer all questions - 20 marks
3. Section C: Choose any five (5) questions - 60 marks. Each question carries 12 marks

SECTION A (20 marks)

Answer all questions

QUESTION 1

- a) State the three (3) safety precautions observed when using sockets?
(3 marks)
- b) Give three (3) safety precautions to be observed when using the grip tool?
(3 marks)
- c) A 0 - 25mm micrometer is set to a reading of 3.20mm, the thimble is then unscrewed by half a turn, the new reading will be _____
(2 marks)
- d) Define the following terms:
- i) Ineffective crank angle (2 marks)
 - ii) Valve lead (2 marks)
 - iii) Volumetric efficiency (2 marks)
 - iv) Injector pump delivery valve (2 marks)
 - v) Cetane number (2 marks)
- e) Give the component that controls the fuel pump rack towards less fuel
(2 marks)

SECTION B (20 marks)

Answer all questions.

QUESTION 2

- a) State five (5) cold starting devices used in CI engines. (5 marks)
- b) Give three (3) advantages of an overdrive unit and two (2) disadvantages of the unit. (5 marks)

QUESTION 3

- a) Give the three (3) factors that the temperatures at which the coolant boils is dependent upon. (3 marks)
- b) List the three (3) types of governors that may be fitted to diesel injection pumps. (3 marks)
- c) Give the functional purpose of the modulation valve in the automatic transmission. (2 marks)
- d) Give the two (2) advantages of the pilot control system in hydraulics. (2 marks)

SECTION C (60 marks)

Answer any five (5) questions. Each question carries 12 marks.

QUESTION 4

- a) Outline the six (6) cold starting devices in automotive engineering. (6 marks)
- b) State two (2) applications of screw threads. (2 marks)
- c) Give four (4) advantages of the integral valve guides over detachable types. (4 marks)

QUESTION 5

During troubleshooting of a hydraulic valve, state two (2) probable causes of:

- a) Low or erratic pressure (2 marks)
- b) Excessive noise or chatter (2 marks)
- c) Pressure sequence valve not functioning properly (2 marks)
- d) Faulty or incomplete shifting (2 marks)
- e) Actuating cylinder creeps or drift (2 marks)
- f) Explain drift with regards to hydraulic cylinders and its cause (2 marks)

QUESTION 6

- a) List three (3) major components of manual steering system. (3 marks)
- b) State the purpose of each of the above components. (3 marks)
- c) State the difference between sprung mass and unsprung mass. (2 marks)
- d) Outline the effects of unsprung mass on ride quality. (2 marks)
- e) State any two (2) good properties of brake fluid. (2 marks)

QUESTION 7

- a) Explain the operation of power shift transmission and how speed is attained. (10 marks)
- b) Give the purpose of the interlocking mechanism in the gearbox. (2 marks)

PAPER NO: 319/22/S01 - DIESEL TECHNOLOGY

QUESTION 8

- a) State the four (4) components of the undercarriage of a track-type machine and describe their respective functional purpose. (8 marks)
- b) Give two (2) advantages of a track-type machine over wheel-mounted machine in earthmoving machines. (2 marks)
- c) Give two (2) advantages of an elevated sprocket dozer over the conventional or horizontal one. (2 marks)

QUESTION 9

- a) List two (2) types of pre-engaged starter motor. *stator rectifier* (2 marks)
- b) State the purpose of the following:
 - i) Tachometer (1 mark)
 - ii) Ohmmeter (1 mark)
 - iii) Ammeter (1 mark)
 - iv) Stroboscopic light (1 mark)
- c) Give the meaning of ISO. (2 marks)
- d) State units of the following:
 - i) Power *- Joules* (1 mark)
 - ii) Current *- Amperes* (1 mark)
 - iii) Resistance (1 mark)
 - iv) Potential difference (1 mark)

QUESTION 10

Define the following differential terminology:

- a) Pitch line (2 marks)
- b) Tooth force (2 marks)
- c) Tooth heel (2 marks)
- d) Tooth toe (2 marks)
- e) Drive side of crown wheel tooth (2 marks)
- f) Coast side of crown wheel tooth (2 marks)

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