



**higher education
& training**

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE

DIESEL TRADE THEORY N3

(11044823)

**19 April 2021 (X-paper)
09:00–12:00**

This question paper consists of 7 pages.

237Q1A2119

DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA
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DIESEL TRADE THEORY N3
TIME: 3 HOURS
MARKS: 100

INSTRUCTIONS AND INFORMATION

1. Answer all the questions.
2. Read all the questions carefully.
3. Number the answers according to the numbering system used in this question paper.
4. Start each section on a new page.
5. Use only blue or black ink.
6. Write neatly and legibly.

$$V_s = \frac{\pi D^2}{4} \times SL \quad C.R = \frac{V_s + V_c}{V_c} \quad N = 1 - \frac{1}{r^{0.4}} \quad h = \frac{SL}{C.R - 1}$$

QUESTION 1

Various options are given as possible answers to the following questions. Choose the correct answer and write only the letter (A–D) next to the question number (1.1.1–1.1.10) in the ANSWER BOOK.

1.1.1 Give an advantage of a straight bevel gear:

- A Very expensive
- B Relatively inexpensive
- C Silent operation
- D Strong gear teeth



1.1.2 Give a disadvantage of a straight bevel gear:

- A Very expensive
- B Relatively inexpensive
- C Noisy in operation
- D Strong gear teeth

1.1.3 Give an advantage of a spiral bevel gear:

- A Very expensive
- B Relatively inexpensive
- C Silent operation
- D Strong gear teeth



1.1.4 Give a disadvantage of a spiral bevel gear:

- A Very expensive
- B Relatively inexpensive
- C Silent operation
- D Strong gear teeth

1.1.5 Give an advantage of a Hypoid bevel gear:


- A Very expensive
- B Relatively inexpensive
- C Silent operation
- D Large strong gear teeth

1.1.6 Give a disadvantage of a hypoid bevel gear:

- A Very expensive
- B Relatively inexpensive
- C Silent operation
- D Strong gear teeth



1.1.7 The viscosity of an oil is a measure of its thickness or of its ...


- A ability to freeze. 
- B ability to flow.
- C ability to boil at a high temperature.
- D ability to lubricate engine parts.

1.1.8 The viscosity of an oil is expressed as a number prefixed by the letters SAE.

SAE stands for the

- A Society of American Engineers.
- B size of American Engines.
- C Society of Automotive Engineers.
- D size of Automatic Engines.

1.1.9 Select an advantage of a belt drive from the list below:

- A This type of drive is cheap
- B It's a quiet and efficient way of driving a camshaft
- C It serves a wide range speed range 
- D All of the above

1.1.10 If a valve opens or closes before TDC or BDC it is said to have...

- A valve lead
- B valve lag
- C valve overlap
- D None of the above.

(10)

1.2 An engine has a bore diameter of 80 mm and the stroke length is also 80 mm. The cylinder bore is then increased to 81 mm. The piston head as well as the cylinder head is flat.

Calculate the following:

1.2.1 The original stroke volume (2)

1.2.2 The new stroke volume  (2)

1.2.3 The percentage increase in stroke volume (3)

1.2.4 The size of the combustion area for the original engine if the compression ratio is 9:1. (3)

1.2.5 The percentage increase in compression ratio after the engine has been rebored (5)

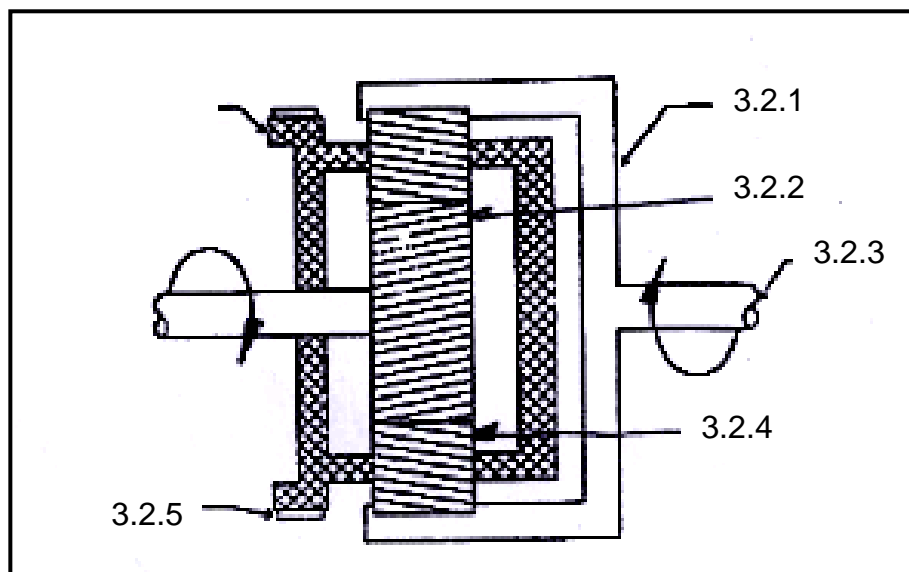
[25]

QUESTION 2

- 2.1 Show by means of neat sketches the following:
- 2.1.1 F – head valve arrangement (2)
- 2.1.2 T – head valve arrangement (2)
- 2.2 List FOUR advantages of a W – head valve arrangement in comparison to a side valve layout. (4)
- 2.3 Draw a labelled sketch of a camshaft belt drive and show the following:
crankshaft gear; camshaft gear; belt; injection pump drive gear and tensioner (5)
- 2.4 Give THREE negative effects of too much valve clearance on the operation of an engine. (3)
- 2.5 State FOUR advantages of a camshaft belt drive compared to a camshaft chain drive. (4)
- [20]**

QUESTION 3

- 3.1 State FOUR advantages of fluid clutches over friction clutches. (4)
- 3.2 The sketch below shows the layout of an epicyclic gear train.
Name the numbered parts by writing only the answer next to the number (3.2.1– 3.2.5) in the ANSWER BOOK. (5)



- 3.3 Make a simple, labelled sketch of a one-way clutch. (6)
- [15]**

QUESTION 4

4.1 **FIGURE 2** show a sectioned view of a two-speed final drive.

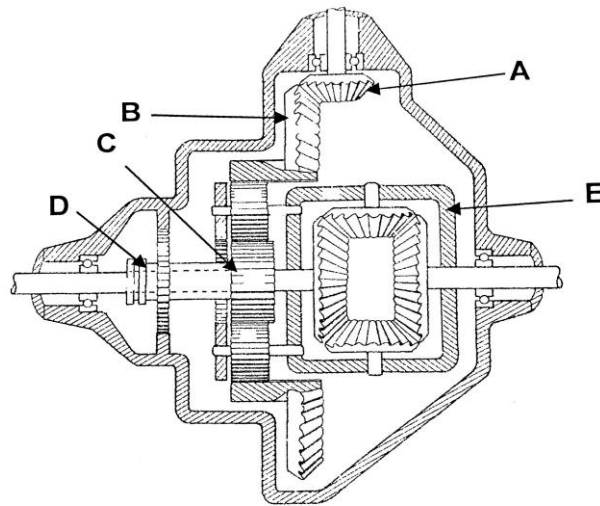


FIGURE 2

4.1.1 Label items (A–E) in your answer book (5)

4.1.2 State the drive that is being selected. (1)

4.1.3 Explain the operation and power flow through this final drive (5)

4.2 Explain how you will go about bleeding a power steering system after repairs to the system. (4)

4.3 State FIVE disadvantages of power steering. (5)

[20]

QUESTION 5


5.1 A customer returns a car to a dealership for faulty work. The customer is very angry.

Describe (using the following headings below) how the receptionist should deal with the customer to ensure that the customer does not take his business to another workshop

5.1.1 Cooling the customer down. (4)

5.1.2 Satisfying the customer. (4)



5.2	Regular stock taking of parts and goods have many benefits for companies. Give TWO important benefits of stock taking for a company.	(2)
5.3	State THREE requirements an apprentice must satisfy during an appointment.	(3)
5.4	Briefly explain how the original and copies of a five-part job card are distributed in a motor workshop. 	(5)
5.5	Name TWO advantages of a diagnostic centre at a garage	(2)
		[20]
TOTAL		100