higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

# NATIONAL CERTIFICATE

# MOTOR TRADE THEORY N1

(11040651)

**29 November 2023 (X-paper)**
**09:00–12:00**

**Drawing instruments may be used.**

**This question paper consists of 9 pages.**

146Q1E2329

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# DEPARTMENT OF HIGHER EDUCATION AND TRAINING
# REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE
MOTOR TRADE THEORY N1
TIME: 3 HOURS
MARKS: 100

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**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 a black or blue pen.
6. Write neatly and legibly.

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## QUESTION 1

1.1 Various options are given as possible answers to the following questions. Choose the answer and write only the letter (A–D) next to the question number (1.1–1.10) in the ANSWER BOOK.

1.1.1 What does the number 45 indicate on the tyre marking 205/45/R15?

A Tread depth
B Load index
C Aspect ratio
D Rim width

1.1.2 A coolant is not in direct contact with which component?

A Engine block
B Cylinder head
C Pistons
D Thermostat

1.1.3 On a metric micrometer, whole and half millimetres can be read on:

A The anvil
B The sleeve
C The thimble
D The spindle

1.1.4 In a single-cylinder two-stroke engine, if the crankshaft turns at 3 000 rpm, the camshaft will turn at:

A 1 000 rpm
B 1 500 rpm
C 3 000 rpm
D 6 000 rpm

1.1.5 The reason for safety signs is to:

A Make the workshop look neat with different colour signs.
B Increase productivity in the workshop.
C Improve safety and minimise the risk of injuries.
D Help with monthly targets.

1.1.6 Which component does not form part of a timing chain assembly?

A Hydraulic tensioner
B Guide rail
C Camshaft sprocket
D Hydraulic lifter

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1.1.7 The colours of a prohibitory sign are:

A Blue and white
B Black and white
C Red and white
D Green and white

1.1.8 Which of the following tools will not be used to carry out an oil change on a vehicle?

A Combination spanner
B Oil filter wrench
C Stilson wrench
D Hydraulic jack and trestles

1.1.9 An example of an unsafe condition is:

A Working at an unsafe speed
B Working in an unsafe position
C Poor workshop layout
D Working without the correct PPE

1.1.10 Which metal is considered to be non-ferrous?

A Titanium
B Stainless steel
C Nickel
D Chrome

(10 × 1) (10)

1.2 Indicate whether the following statements are TRUE or FALSE by writing only 'True' or 'False' next to the question number (1.2.1–1.2.5) in the ANSWER BOOK.

1.2.1 Electric vehicles have a driving range of 400 km.

1.2.2 Connecting two 12-V batteries in parallel will give a total voltage of 12 V.

1.2.3 A die is used to cut internal threads on metal workpieces.

1.2.4 Cross-ply tyres are constructed with the plies positioned diagonally across the beads.

1.2.5 In an open crankcase ventilation system, an air filter is fitted to the tappet cover.

(5 × 1) (5)

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1.3 Choose a description from COLUMN B that matches a word or term in COLUMN A. Write only the letter (A–J) next to the question number (1.3.1–1.3.5) in the ANSWER BOOK.

| COLUMN A | | COLUMN B | |
|---|---|---|---|
| 1.3.1 | Two-stroke engine | A | changes harmful carbon monoxide to carbon dioxide |
| 1.3.2 | Reamer | B | mixes fuel and air for combustion |
| 1.3.3 | Telescopic gauge | C | changes the flow of exhaust gas through the system |
| 1.3.4 | Fuel injector | D | has a sealed crankcase |
| 1.3.5 | Catalytic convertor | E | enlarges previously drilled holes |
| | | F | supplies fuel to the inlet manifold for combustion |
| | | G | is used to drill new holes |
| | | H | is used to look inside an engine |
| | | I | is used to measure cylinder bores |
| | | J | changes oxygen into carbon monoxide |

(5 × 1) (5)

**[20]**

## QUESTION 2

2.1 Name ONE safety precaution to be taken when working with each of the following equipment:

2.1.1 A vehicle hoist

2.1.2 A hydraulic press

2.1.3 An engine crane

(3 × 1) (3)

2.2 Briefly explain how you would zero a 0–25 mm micrometer. (3)

2.3 What benefits does the Compensation Fund offer the permanent and contract workers of a company? (2)

2.4 Write down THREE general duties that an employer must fulfil to make the work environment safe. (3)

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2.5 Give TWO examples of hazardous substances in workshops. (2)

2.6 List FOUR characteristics of good employees in workshops. (4)

2.7 Study **FIGURE 1** below and name the labelled parts (A–F) in the ANSWER BOOK. (6)

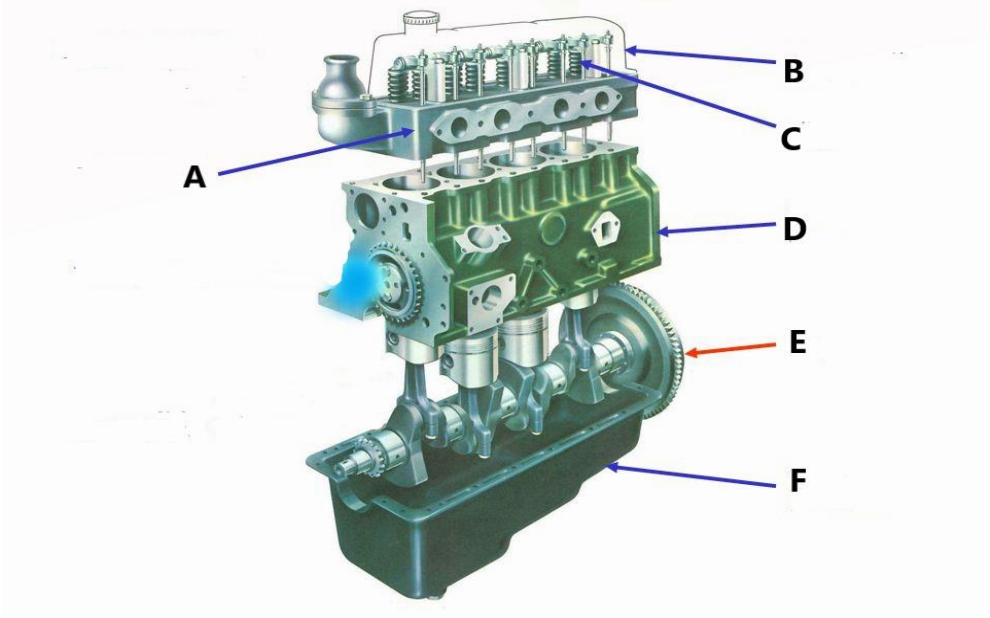


**FIGURE 1**

Of what material is component A in Figure 1 manufactured? (1)
**[24]**

## QUESTION 3

3.1 **FIGURE 2** below shows a partial exhaust system. Study the diagram and label the components (A–D) in the ANSWER BOOK. (4)

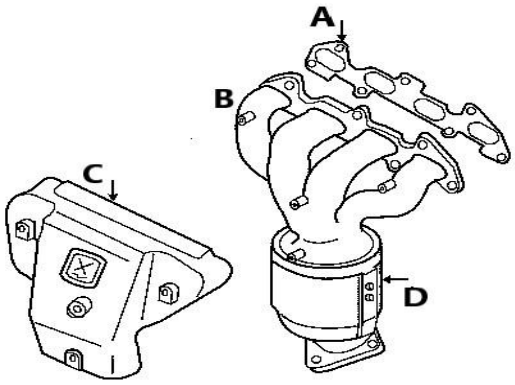


**FIGURE 2**

3.2 Provide a brief description of *the Internet*. (2)

3.3 Write down any TWO types of input information that is required for a diagnostic machine to extract/retrieve information from a vehicles' computer system. (2)

3.4 List TWO examples of application software used in computers. (2)

3.5 **FIGURE 3** below shows the cycles of a four-stroke engine. Study the diagram carefully and answer the questions that follow.

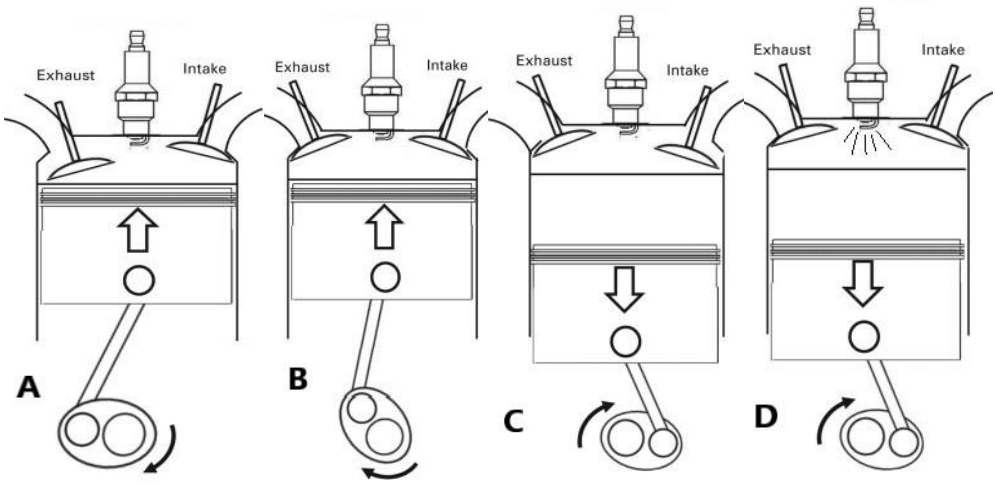


**FIGURE 3**

3.5.1 Name the strokes occurring in A and B. (2)

3.5.2 Arrange the strokes in their correct order of operation (for example, A-B-C-D). (4)

3.5.3 Explain how the inlet/intake stroke of a diesel four-stroke differs from that of a petrol four-stroke. (2)

**[18]**

## QUESTION 4

4.1 Briefly explain the importance of the correct oil pressure in an engine. (2)

4.2 Study **FIGURE 4** and answer the questions below.

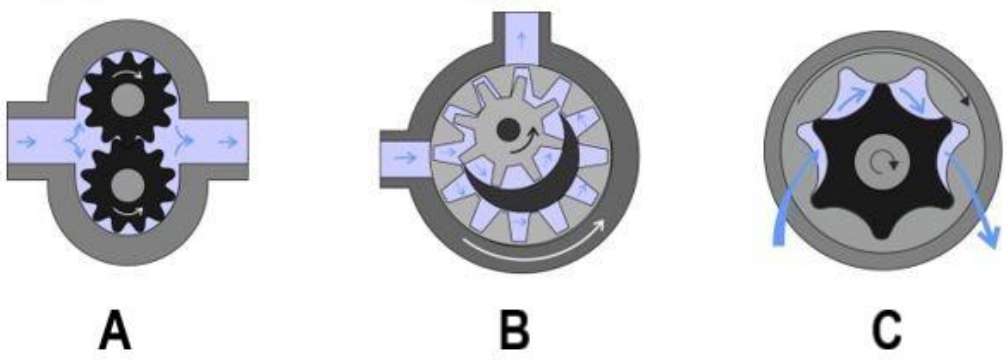


**FIGURE 4**

4.2.1 Write down the names of the pumps (A, B and C) in FIGURE 4. (3)

4.2.2 Give TWO advantages of pump A. (2)

4.2.3 Give ONE disadvantage of pump B. (1)

4.2.4 Give TWO reasons for a low oil pressure in pump C. (2)

4.3 Name FOUR components or places where engine oil can leak. (4)

4.4 Describe the operation of the wax-type thermostat. (4)

4.5 Give TWO reasons why it is important to change the coolant in a cooling system as prescribed by the manufacturer. (2)

4.6 List THREE advantages of a liquid impeller pressurised cooling system. (3)

**[23]**

## QUESTION 5

5.1 **FIGURE 5** below shows three tyre wear patterns. Write down the cause/reason for EACH of the wear patterns (A–C) in the ANSWER BOOK. (3)

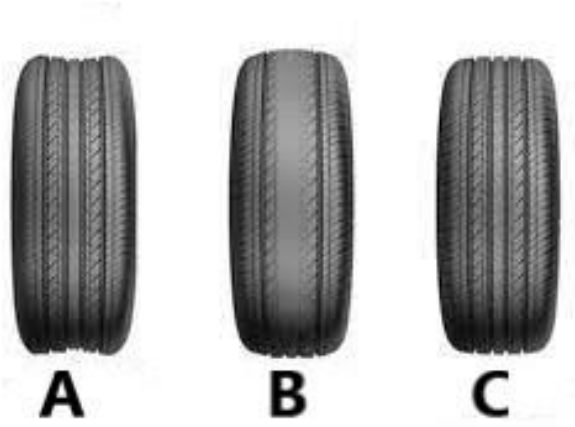


**FIGURE 5**

5.2 Write down the main functions of the tyre beads forming part of a tyre's construction. (2)

5.3 Explain how you would jump-start a vehicle equipped with an on-board computer. (4)

5.4 How does the outside temperature affect the performance of a vehicle's battery? (2)

5.5 There are THREE main types of hybrid vehicle systems. Name TWO of them. (2)

5.6 Describe, in your own words, how hybrid and electric vehicles recharge their batteries while they are in motion. (2)

**[15]**

**TOTAL: 100**

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