higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE

REFRIGERATION TRADE THEORY N1

(11041561)

25 November 2019 (X-Paper)
09:00–12:00

This question paper consists of 6 pages and 1 formula sheet.

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DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE
REFRIGERATION TRADE THEORY N1
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. Sketches must be large, neat and fully labelled.
5. Write neatly and legibly.

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QUESTION 1

1.1 Define the term *accident.* (3)

1.2 Name THREE elements needed to start a fire. (3)

1.3 Briefly explain THREE principal rules for holding and carrying a heavy object. (3 × 2) (6)

1.4 State what each of the following warning signs indicate. Only write the answer next to the question number (1.4.1–1.4.4) in the ANSWER BOOK.

1.4.1



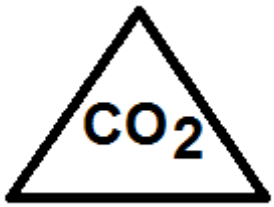
1.4.2



1.4.3



1.4.4



(4 × 1) (4)

1.5 Why must an artisan possess some knowledge of portable fire extinguishers? (4)

[20]

QUESTION 2

2.1 Briefly describe why a good artisan has standards for neatness. (8)

2.2 State THREE checks that should be carried out before commencing with any grinding operation. (6)

2.3 Name TWO types of files. (2)

2.4 How is a hacksaw blade classified? (2)

2.5 What is meant by the term *spot facing*? (2)

[20]

QUESTION 3

3.1 Three resistors are connected in series in a circuit. The values of the resistors are 3,5 ohms, 5,5 ohms and 4 ohms respectively.

Calculate the total resistance of the circuit and show ALL the steps. (2)

3.2 One resistor of 3 ohms is connected in parallel to two resistors of 6 ohms and 9 ohms respectively. The voltage is 110 V.

Calculate the following:

3.2.1 The total resistance in parallel

3.2.2 The total overall resistance

3.2.3 The total current flow

3.2.4 The voltage across the 3 ohms resistor

3.2.5 The power of the circuit in kilowatt

(5 × 2) (10)

3.3 Briefly describe what a *contactor* is and how it functions. (2)

3.4 Name the following types of fixing method:

3.4.1



3.4.2 

3.4.3 

(3 × 2) (6)
[20]

QUESTION 4

4.1 Name THREE phases in which matter can exist. (3)

4.2 Define the following terms:

4.2.1 Temperature

4.2.2 Sensible heat

4.2.3 Latent heat

(3 x 2) (6)

4.3 A gauge pressure on a vessel reads 309 000 Pa.

If the atmospheric pressure is 101 kPa, what is the absolute pressure inside the vessel? (3)

4.4 Copy the following table into the ANSWER BOOK and complete the table by filling in the missing information.

QUANTITY	POWER	HEAT	ABSOLUTE TEMPERATURE	MASS FLOW
SI unit				
Symbol				

(4)

4.5 State TWO laws of thermodynamics. (2 × 2) (4)
[20]

QUESTION 5

5.1 Name THREE types of compressors based on their working principle. (3)

5.2 State the function of a compressor. (3)

5.3 Briefly describe the following compressors:

5.3.1 Semi-hermetic compressor

5.3.2 Open-type compressor

(2 × 3) (6)

5.4 Name THREE types of expansion valves. (3)

5.5 Name THREE methods used to detect a leak in a refrigeration system. (3)

5.6 What is required in the refrigeration system to control the starts and stops of the system to ensure that the correct temperature condition is reached? (2)

[20]

TOTAL: 100

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REFRIGERATION TRADE THEORY N1

FORMULA SHEET

1. **OHM'S LAW**

$I = \frac{V}{R}$ $V = R \times I$

$R_T = R_1 + R_2 + R3$

$\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$

2. **POWER**

$P = V \times I$

$P = I^2R$

$P = \frac{V^2}{R}$

3. **HEAT**

$Q = m \times c \times \Delta t$ $Q_T = Q_1 + Q_2$

$°C = (°F - 32) \times \frac{5}{9}$

$K = 273 + °C$

4. **AREAS AND VOLUMES**

$A = \frac{\pi}{4}D$ $V = A \times L$

$A = L \times B$

5. **BOYLE'S LAW**

$P_1 V_1 = P2 V_2$

6. **CHARLES' LAW**

$\frac{V_1}{T_1} = \frac{V_2}{T_2}$

7. **IDEAL GAS LAW**

$\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$

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