higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

REFRIGERATION PRACTICE
NQF LEVEL 3

(6030053)

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09:00–12:00

This question paper consists of 6 pages.

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DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)
REFRIGERATION PRACTICE
NQF LEVEL 3
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 a black or blue pen.
6. Write neatly and legibly.

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QUESTION 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 (1.1–1.6) in the ANSWER BOOK.

1.1 At lower temperatures and pressures, the latent heat of vaporisation of a refrigerant increases, leading to its phase change from liquid to vapor when passing through the …

A compressor
B condenser
C evaporator
D expansion valve

1.2 What can be done to increase the pressure in a gas?

A Increase the volume.
B Increase the temperature and volume.
C Decrease the temperature.
D Decrease the volume.

1.3 A standard ice point temperature corresponds to the temperature of … .

A water at 0 °C.
B ice at –4 °C.
C a mixture of ice and water in equilibrium condition.
D solid and dry ice.

1.4 The refrigerant for a refrigerator should have …

A high sensible heat.
B high latent heat.
C low sensible heat.
D low latent heat.

1.5 Motors used in household refrigerators:

A DC series motor
B DC shunt motor
C Universal motor
D Single phase induction motor

1.6 Sensible heat describes …

A how fast heat travels.
B the quantity of heat.
C the volume of heat.
D how hot something feels.

(6 × 1) **[6]**

QUESTION 2

2.1 Define the following terms:

2.1.1 Specific volume

2.1.2 Density

2.1.3 Airflow

(3 × 2) (6)

2.2 Calculate the amount of work done when the force applied to a mass is 2 450 N and it moves that mass for 6 m. (2)

2.3 Calculate the amount of power required to keep the mass in QUESTION 2.2 moving for 5 minutes. (3)

2.4 What will the temperature change be if 947J of heat is added to 76,4 g of a material with specific heat of 0,607J/g °C? (4)

2.5 A refrigerant cylinder with a mass of 93 kg is lifted through a vertical height of 78 m by a light cable in 11 seconds at a constant velocity.

Calculate the following:

2.5.1 Work done to lift the mass

2.5.2 The power generated

(2 × 2) (4)

[19]

QUESTION 3

3.1 Electrical installations in South Africa must conform to the South African National Code (SANS 10142-1).

What is the main objective of SANS 10142-1? (3)

3.2 Why is it important to earth electrical installations? (2)

3.3 What is a wire-way? (2)

3.4 What is the purpose of bonding? (2)

3.5 A circuit breaker in a distribution board of a house is faulty.
Taking all operating and safety procedures into account, explain how one will replace a faulty circuit breaker. (7)

3.6 When one compares a circuit breaker and an earth leakage relay as used in a domestic distribution board, what is the difference in the application of a *circuit breaker* and an *earth leakage relay*? (4)

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3.7 A faulty motor has been brought to the workshop for repairs.
Which THREE important electrical tests would one perform on the motor? (3)

3.8 How would one reverse the direction of rotation for a single-phase induction motor? (2)
[25]

QUESTION 4

4.1 List FIVE different types of refrigeration oil and explain their applications. (10)

4.2 Explain the importance of using the correct refrigeration oil. (2)

4.3 Name each of the following testing tools by writing the answer only next to the question number (4.3.1–4.3.5) in the ANSWER BOOK. (5)

4.3.1



4.3.2



4.3.3



4.3.4



4.3.5



4.4 Foam is a collection of small bubbles of air that accumulate on or near the surface of a fluid. Foam is an effective thermal insulator, so the temperature of the oil can become difficult to control. Foaming is usually a common problem with oil-lubricated components.

List EIGHT causes of foaming. (8)
[25]

QUESTION 5

5.1 What is the main objective of the South African National Standard (SANS10147)? (2)

5.2 Write the definition of the following terms:

5.2.1 Pressure relief valve

5.2.2 Bursting disk

5.2.3 Fusible plug

(3 × 2) (6)

5.3 State at least SIX requirements regarding inspection, maintenance and storage of respirators and breathing apparatus. (12)
[20]

QUESTION 6

Biocides are corrosive materials. When dosing a system with biocides one needs to protect one's skin and eyes.

List FIVE protective equipment that can used to protect the skin and the eyes for the safe handling of biocides. **[5]**

TOTAL: 100

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