higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

REFRIGERATION PRINCIPLES
NQF LEVEL 2

(6030052)

22 November 2018 (X-Paper)
09:00–12:00

This question paper consists of 5 pages.

NCV

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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. Write neatly and legibly.

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QUESTION 1

1.1 Briefly explain the operation of a vapour compression system. (2)

1.2 Name the FOUR types of compressors used in refrigeration. (4)

1.3 Indicate with the aid of a block diagram, FOUR major components of a vapour compression system. (4)

1.4 Name the THREE types of evaporators. (3)

1.5 State the functions of the following components in a refrigeration system:

1.5.1 Accumulator

1.5.2 Heat exchanger

1.5.3 Vibration eliminator

(3 × 2) (6)

1.6 What determines the temperature at which a refrigerant will vaporise? (1)

[20]

QUESTION 2

2.1 SI units and symbols are used for electrical measurements. Redraw and complete the table below in your ANSWER BOOK.

COMPONENT		SI UNIT	SYMBOL
2.1.1	Energy		
2.1.2	Heat		
2.1.3	Resistance		
2.1.4	Current		

(4 × 1) (4)

2.2 Define the following terms:

2.2.1 Work

2.2.2 Ohms

2.2.3 Current electricity

2.2.4 Static electricity

(4 × 2) (8)

2.3 Name FOUR factors determining resistance of a conductor. (4)

2.4 What is the difference of a *single-phase* and *three-phase power*? (2)

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2.5 Two resistors of 2 Ω and 4 Ω are connected in parallel and two resistors of 3 Ω and 6 Ω in series with the parallel circuit.

2.5.1 Draw the circuit indicating all the resistors, switch and supply voltage of 230 V. (4)

2.5.2 Calculate the total resistance of parallel circuit. (2)
[24]

QUESTION 3

3.1 Briefly explain FIVE aspects of safe handling of refrigerant containers to ensure that no damage occurs and no refrigerant is released into the atmosphere unnecessarily when transporting them. (5)

3.2 Choose a/an item/word from COLUMN B that matches a/an word/item in COLUMN A. Write only the letter (A–F) next to the question number (3.2.1–3.2.6) in the ANSWER BOOK.

COLUMN A		COLUMN B	
3.2.1	Accurate dimension	A	hand/hacksaw
3.2.2	Cutting	B	files
3.2.3	Remove nut	C	punches
3.2.4	Shaping metal	D	steel brush
3.2.5	Marking centres	E	cold chisels
3.2.6	Cleaning	F	micrometer

(6)

3.3 Name FOUR parts of a bolt. (4)

3.4 What is the name of the blue dial gauge on the left of the service manifold? (1)

3.5 Name the TWO types of display of meters and explain the difference between the two display screens. (4)
[20]

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QUESTION 4

4.1 List FOUR appropriate safety equipment all workers should wear when working with refrigerants (particularly in the liquid phase). (4)

4.2 What do you call the following groups of refrigerants commonly used in South Africa:

4.2.1 R717

4.2.2 HCs

4.2.3 CFCs

4.2.4 HFCs

4.2.5 HCFCs

(5 × 1) (5)

4.3 Name FOUR types of oil used in refrigeration. (4)

4.4 Which type of a rod do we use when joining the following?

4.4.1 Copper to steel

4.4.2 Copper to copper

(2 × 1) (2)

[15]

QUESTION 5

5.1 Why is a hacksaw not a suitable tool to cut piping in the refrigeration system? (1)

5.2 How will you prevent moisture migration and heat transfer in refrigerant piping? (2)

5.3 Where are the access valves often used in a refrigeration system? (2)

5.4 Give FOUR precautions when soldering. (4 × 2) (8)

[13]

QUESTION 6

6.1 State THREE common used types of electronic leak detector. (3)

6.2 Name THREE possible hazards when handling refrigerants. (3)

6.3 Define *viscosity*. (1)

6.4 Describe the term *purging.* (1)

[8]

TOTAL: 100

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