higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

REFRIGERATION PRACTICE
NQF LEVEL 3

(6030053)

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

This question paper consists of 7 pages.

389Q1N2327

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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. Use only a black or blue pen.
5. Write neatly and legibly.

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QUESTION 1

Choose an item from COLUMN B that matches a description in COLUMN A. Write only the letter (A–O) next to the question number (1.1–1.8) in the ANSWER BOOK.

COLUMN A		COLUMN B	
1.1	Measure of the intensity of an object's hotness	A	power
1.2	Process of removing heat from a substance that results in a decrease in temperature or a change in state	B	work
1.3	Transfer of heat caused by the movement of a fluid set in motion by the difference in heat between different areas in the same volume of gas	C	radiation
1.4	Transfer of heat from a hot body to a cold one that it is in direct contact with	D	heating
1.5	Heat that changes the state of a substance but not its temperature	E	enthalpy
1.6	Thermal energy whose transfer to or from a substance is the result of a change in temperature	F	temperature
1.7	Process of increasing the internal energy of a body or substance, resulting in an increase in its temperature or a change in its state	G	density
1.8	Mass per unit volume of a substance	H	cooling
		I	exothermic reaction
		J	convection
		K	conduction
		L	latent heat
		M	sensible heat
		N	endothermic reaction

(8 × 1) **[8]**

QUESTION 2

2.1 Define the following terms:

2.1.1 Gauge pressure

2.1.2 Inductive load

2.1.3 First law of thermodynamics

(3 × 2) (6)

2.2 How much heat is needed to raise the temperature of 20,0 g of water by 10,6 °C? (The specific heat capacity of water is 4,184 J/g °C.) (3)

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2.3 What will the temperature change be if 947J of heat is added to 76,4 g of a material with a specific heat of 0,607 J/g °C? (2)

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

Calculate the following:

2.4.1 Work done to lift the mass

2.4.2 The power generated

(2 × 2) (4)
[15]

QUESTION 3

3.1 Define the following terms:

3.1.1 Single-phase connection

3.1.2 Three-phase connection

(2 × 2) (4)

3.2 Draw the symbols of each of the following electrical motors and three-phase motors:

3.2.1 Electric motor winding coil

3.2.2 Electric motor with terminals

3.2.3 DC electric motor

3.2.4 Three-phase electric motor

(4 × 2) (8)

3.3 What is the difference between *resistive* and *inductive* loads? (4)

3.4 Electricians must be well informed about the different types of wire ways that are available so that they can select the correct type for a specific installation.

State the THREE basic types of wire ways and discuss each. (3 × 2) (6)
[22]

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QUESTION 4

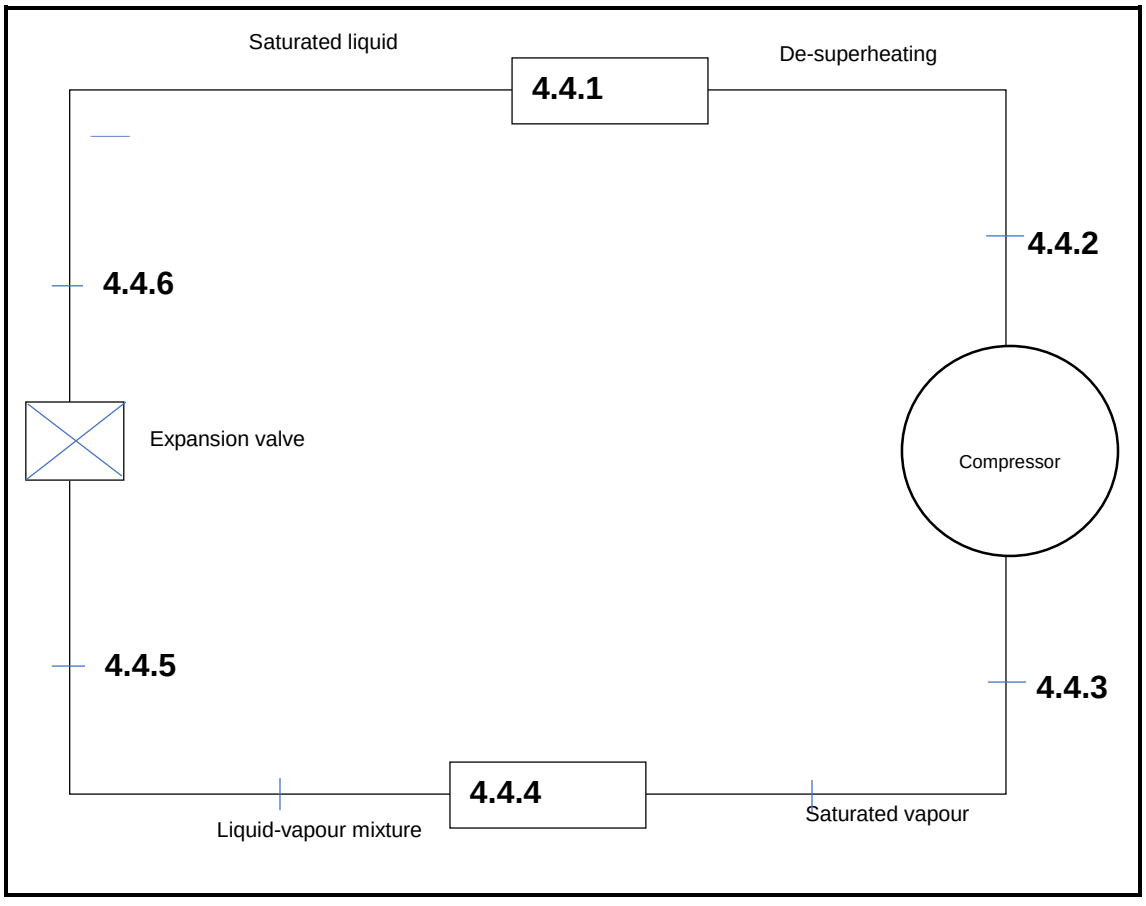
4.1 Name the THREE procedural steps in fault-finding. (3)

4.2 State the THREE consequences of dirt blocking a refrigeration plant evaporator. (3)

4.3 What is the difference between the terms *troubleshooting* and *maintenance* of a plant? (2 × 2) (4)

4.4 Give ONE word or term for each of the following descriptions by choosing a word or term from the list below. Write only the word or term next to the question number (4.4.1–4.4.6) in the ANSWER BOOK.

condenser; compressor; evaporator; expansion valve; liquid vapour mixture; de-superheating; saturated vapour, sub-cooled liquid; superheated low-pressure vapour; saturated liquid; high-pressure vapour; low-pressure liquid



(6)

4.5 Dismantling the parts of a refrigeration system, you notice that the crankshaft bearings are worn.

What could have caused this problem? (2)

4.6 Why should a refrigeration plant be ventilated? (2)

4.7 Explain the operation of the defrost system on a domestic refrigeration system. (5)
[25]

QUESTION 5

5.1 Give an appropriate name for each of the following refrigeration tools:

5.1.1



5.1.2



5.1.3



5.1.4



5.1.5



5.1.6



5.1.7



5.1.8



(8 × 1) (8)

5.2 What is the difference between *isometric* and *oblique* drawings? (4)

5.3 It is important to use the correct refrigeration oil in a refrigeration system.

Explain the consequences of using the incorrect type of refrigeration oil in a refrigeration system. (2)

5.4 A laboratory analysis of a refrigeration oil may be desired.

Explain how you would obtain refrigeration oil from a refrigeration system. (4)

5.5 Refrigeration compressor failure is a common problem in the refrigeration industry.

Name SEVEN causes of refrigeration compressor failure in the refrigeration industry. (7)
[25]

QUESTION 6

5.1 What is *water treatment*? (2)

5.2 Name any THREE common types of household water treatment systems. (3)
[5]

TOTAL: 100

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