higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

REFRIGERATION PRACTICE
NQF LEVEL 3

(6030053)

10 March 2020 (X-paper)
09:00–12:00

This question paper consists of 7 pages.

407Q1S2010

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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. 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

Choose a term from COLUMN B that matches a description in COLUMN A. Write only the letter (A–O) next to the question number (1.1–1.10) in the ANSWER BOOK.

COLUMN A		COLUMN B	
1.1	Measure of the quantity of a substance	A	pressure
1.2	Measure of internal energy content	B	force
1.3	Force per unit area	C	density
1.4	Volume per unit mass	D	liquid
1.5	Total heat in a substance	E	mass
1.6	Energy no longer available to do useful work	F	internal energy
1.7	Rate at which work is done	G	vacuum
1.8	Any interaction that, when unopposed, will change the motion of an object	H	temperature
1.9	Mass per unit volume	I	solid
1.10	All potential and kinetic energy of the atoms or molecules in a substance	J	enthalpy
		K	specific volume
		L	gauge
		M	entropy
		N	pot
		O	power

(10 × 1) **[10]**

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QUESTION 2

2.1 Define the term *mass flow*. (2)

2.2 How much heat transfer is needed to raise the temperature of 5,0 g of water from 25 °C to 75 °C if the specific heat capacity of water is 4,184 J/g.°C? (3)

2.3 2.3.1 What is the change in internal energy of a system which does $4{,}50 \times 10^5$ J of work while $3{,}00 \times 10^6$ J of heat transfer occurs into the system and $8{,}00 \times 10^6$ J of heat transfer occurs to the environment? (3)

2.3.2 Give ONE reason for the answer to QUESTION 2.3.1. (2)

2.4 120 kg of cooling water per minute flows through a condenser. The difference in temperature of the inlet and outlet water is 7 °C.

Take the specific heat capacity of water as 4,2 J/kg.°C, neglect all losses and calculate the heat energy absorbed by the water in MJ/min. (5)

[15]

QUESTION 3

3.1 List FIVE precautionary measures to minimise the risk of getting injured during the installation of a wiring system. (5)

3.2 List FIVE compulsory compliance tests to do after wiring an installation. (5)

3.3 What is the purpose of earthing? (2)

3.4 List SIX precautionary measures to consider when using a digital multimeter. (6)

3.5 The cable from the supplier's meter box must be connected to the distribution board in your home.

3.5.1 How can the PVC wire-armoured cable be secured to the metal distribution board? (3)

3.5.2 Which FOUR tools can be used to secure the cable to the distribution board? (4)

[25]

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QUESTION 4

4.1 List the SEVEN steps to follow when replacing a refrigerator thermostat. (7)

4.2 Explain how a refrigeration technician will use each of the following tools:

4.2.1 

Flaring tool

4.2.2 

Nut drivers

4.2.3 

Brazing torch

4.2.4 

Flat file

4.2.5 

Pipe wrench

(5 × 1) (5)

4.3 A refrigerator is leaking water.

4.3.1 What causes the refrigerator to leak water? (2)

4.3.2 How can this leak be fixed? (4)

4.4 All refrigerants have a global-warming potential and therefore contribute to the greenhouse effect when released into the atmosphere.

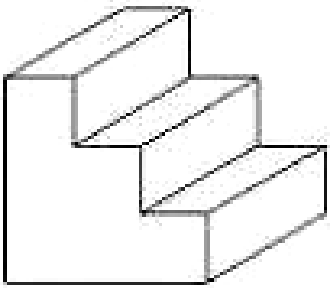
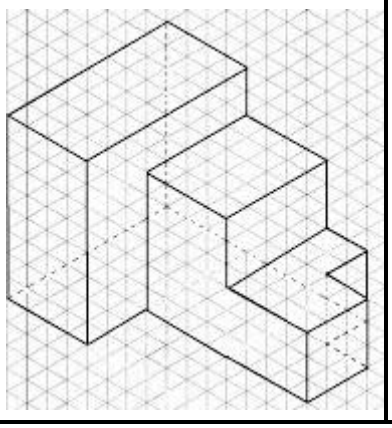
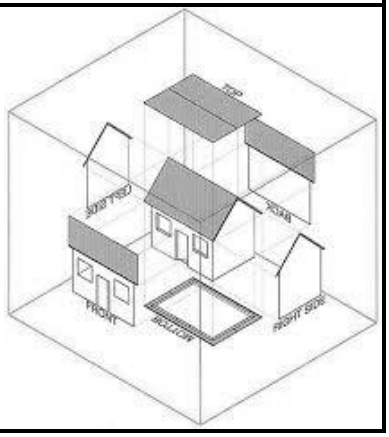
4.4.1 List FIVE precautionary measures to protect humans against exposed refrigerants. (5)

4.4.2 How can the environment be protected from harmful refrigerants? (2)

[25]

QUESTION 5

5.1 Study the pictures below and answer questions.

OBLIQUE DRAWING	ISOMETRIC DRAWING	ORTHOGRAPHIC DRAWING
		

5.1.1 Differentiate between oblique, isometric and orthographic drawings by describing each of the given drawings. (3 × 3) (9)

5.1.2 What is the purpose of an engineering drawing? (1)

5.2 It is important to adhere to the standards of South African National Standard 10147 (SABS 0147) when handling Group 1 refrigerants to prevent situations that could result in loss of life, injury to persons or damage to refrigeration plants operating with a Group 1 refrigerant as required by the OHS Act and the Mine Health and Safety Act.

5.2.1 List FIVE regulations regarding the personnel operating and maintaining a refrigeration plant. (5)

5.2.2 List the FIVE safety provisions incorporated in the construction of refrigerated chambers. (5)

[20]

QUESTION 6

Biocides are used to control or kill unwanted things such as insects, bacteria, fungi, animals and viruses by either biological or chemical means. If you work with biocides there are strict control measures in place when it comes to health and safety legislation which you must adhere to.

[Source: *https://www.uniassignment.com*]

6.1 What is a *biocide*? (2)

6.2 List THREE areas, besides industry and as anti-fouling agents, where biocides can be used. (3)

[5]

TOTAL: 100

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