higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

REFRIGERATION PRINCIPLES
NQF LEVEL 2

(6030052)

2 December 2020 (X-paper)
09:00–12:00

This question paper consists of 7 pages.

227Q1N2002

Copyright reserved

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 question on a new page.
5. Use only a black or blue pen.
6. Write neatly and legibly.

Copyright reserved

QUESTION 1

1.1 Explain the operation of a vapour compression system, starting at the compressor. (4)

1.2 Name FOUR basic components of a refrigeration cycle that interconnect with pipes to operate. (4)

1.3 What is the component in the refrigeration plant that is positioned in the liquid outlet line of the condenser? (1)

1.4 Name the components of the refrigeration system that perform the following duties.

1.4.1 It shows the flow of the refrigerant and its phase on a glass.

1.4.2 It traps unwanted particles and dirt from flowing to the other components to cause blockage.

(2 × 1) (2)

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

1.6 Briefly explain the purpose of a vibration eliminator. (2)

1.7 Which component in the refrigeration system is described below?

1.7.1 At the inlet of this component, the phase of refrigerant is vapour, which is heavy and superheated due to compression.

1.7.2 During normal operation, the phase of the refrigerant is the same at the inlet and outlet of the component.

(2 × 1) (2)

1.8 Indicate whether the following statement is TRUE or FALSE by writing only 'True' or 'False' next to the question number (1.8) in the ANSWER BOOK.

At the inlet of the expansion device, the phase of the refrigerant is liquid.

(1)
[17]

Copyright reserved

QUESTION 2

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

No.	Component	SI Unit	Symbol
2.1.1	Power		
2.1.2	Pressure		
2.1.3	Temperature		
2.1.4	Force		

(4)

2.2 Name TWO types of electric currents. (2)

2.3 Give the voltages that are used for the following buildings:

2.3.1 Large factory

2.3.2 Residential house

(2 × 1) (2)

2.4 Three resistors of 5 ohms, 8 ohms and 12 ohms are connected in series. The current drawn from the supply is 9,2 amperes.

Calculate:

2.4.1 The total resistance of the circuit.

2.4.2 The supply voltage.

(3 × 2) (6)

2.5 Explain the potential hazard when using electricity. (3)

[17]

Copyright reserved

QUESTION 3

3.1

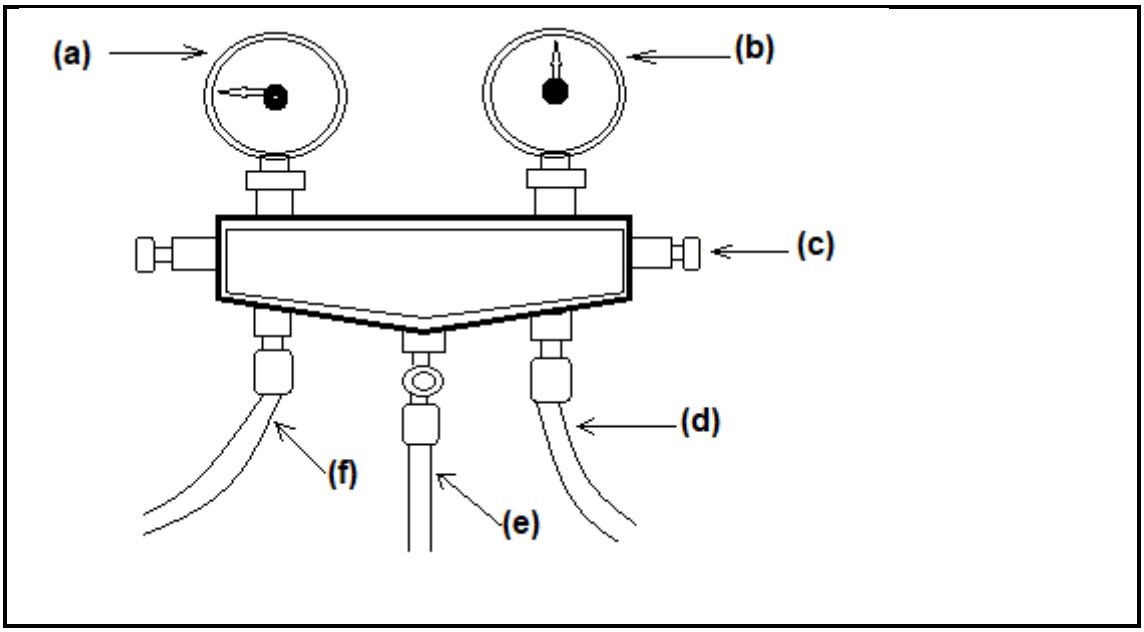

FIGURE 1

3.1.1 Identify and name the equipment in FIGURE 1. (2)

3.1.2 Label all parts on the equipment from (a) to (f). (6)

3.1.3 Which hose must be connected to the condenser when evacuating the system? (2)

3.2 Name the THREE main types of gases used for welding. (3)

[13]

QUESTION 4

4.1 State FOUR ways of identifying the type of refrigerant in a container. (4)

4.2 Choose the container colour from COLUMN B that matches the refrigerant in COLUMN A. Write only the letter (A–D) next to the question number (4.2.1–4.2.4) in the ANSWER BOOK.

COLUMN A		COLUMN B	
4.2.1	R22	A	light maroon
4.2.2	R134a	B	orange
4.2.3	R404A	C	light blue
4.2.4	R410A	D	light green

(4 × 1) (4)

4.3 Name FOUR restrictions placed by SABS 0147 on the use of refrigerants in South Africa according to the Montreal Protocol. (4)
[12]

QUESTION 5

5.1 Name FIVE types of pipe fittings. (5)

5.2 Identify FIVE different types of insulating material used for pipes and flat surfaces. (5)

5.3 Tubing sizes are given in fraction. What is the equivalent metric size of the following?

½ inch (1)

5.4 State the THREE advantages of brazed jointing methods. (3)

5.5 Between which TWO components does a filter drier fit in the refrigeration system? (2)

5.6 What is the purpose of the flux when soldering or brazing? (2)

5.7 Once a task has been carried out, what must be done with the tools and equipment used? (2)
[20]

QUESTION 6

Identify and name the type of screw head by writing down the correct answer next to the letter (A–E) in the ANSWER BOOK.

 A	 B	 C
 D	 E	

(5 × 2) **[10]**

QUESTION 7

7.1 Name the FIVE personal protective items that must be worn when working with liquid refrigerant. (5)

7.2 Explain the term *evacuation.* (2)

7.3 In refrigeration, when do we purge the system? (2)

7.4 State TWO methods used to transfer refrigerant. (2)
[11]

TOTAL: 100

Copyright reserved