higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

REFRIGERATION PRACTICE L3
NQF LEVEL 3

(6030053)

21 November 2019 (X-Paper)
09:00–12:00

This question paper consists of 7 pages.

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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. Use only blue or black ink.
5. 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 (1.1–1.10) in the ANSWER BOOK.

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

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

1.2 The motor used in household refrigerators is a …

A DC series motor.
B DC shunt motor.
C universal motor.
D single-phase induction motor.

1.3 The 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 under equilibrium conditions.
D solid and dry ice.

1.4 Ammonia is …

A highly toxic and inflammable.
B non-toxic.
C non-inflammable.
D toxic and non-inflammable.

1.5 Where does the lowest temperature occur in a vapour compression cycle?

A Condenser
B Evaporator
C Compressor
D Expansion valve

1.6 In a refrigeration cycle, the flow of the refrigerant is controlled by the …

A compressor.
B condenser.
C evaporator.
D expansion valve.

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1.7 At lower temperatures and pressures, the latent heat of vaporisation of a refrigerant occur in the …

A compressor.
B condenser.
C evaporator.
D expansion valve.

1.8 The refrigerant for a refrigerator should have …

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

1.9 The moisture in a refrigerant is removed by a …

A filter dryer.
B evaporator.
C safety relief valve.
D expansion valve.

1.10 The boiling point of ammonia is …

A −100 °C.
B −50 °C.
C −33,3 °C.
D 0 °C.

(10 × 1) **[10]**

QUESTION 2

2.1 State the first law of thermodynamics. (2)

2.2 What is the difference between *sensible heat* and *latent heat*? (4)

2.3 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.) (2)

2.4 What will the temperature change be if 947 J of heat is added to 76,4 g of a material with a specific heat of 0,607 J/g °C? (3)

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 11s at a constant velocity.

Calculate the following:

2.5.1 Work done to lift the mass in joules

2.5.2 The power generated in watts

(2 × 2) (4)

2.6 Define the term *airflow.* (2)

[17]

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QUESTION 3

3.1

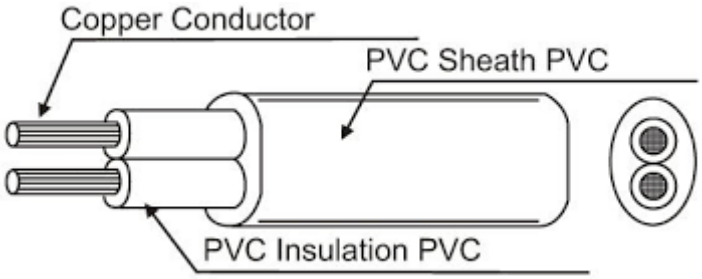

FIGURE 1: PVC CABLE

3.1.1 What is the function of PVC (polyvinyl chloride) in electrical cables?

3.1.2 How can PVC cables be joined?

(2 × 2) (4)

3.2 Describe trunking as a method used in electrical cable construction. (2)

3.3 Which FOUR basic steps would you follow to isolate an earth leakage problem? (4)

3.4

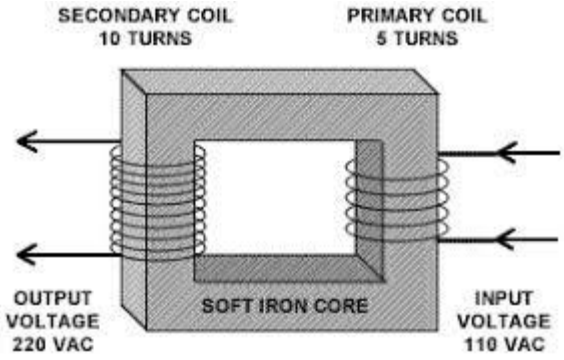

FIGURE 2: SIMPLE TRANSFORMER

3.4.1 Explain how a transformer works. (3)

3.4.2 State the function of a transformer. (2)

3.5 What is the function of a surge protection device? (2)

3.6 What is a *circuit breaker*? (2)

3.7 What is a *conduit*? (2)

3.8 Name TWO disadvantages of using a metal conduit. (2)

[23]

QUESTION 4

4.1 Laboratory analysis of the refrigeration oil may be desired.

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

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

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

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

4.3.1 

4.3.2 

4.3.3 

4.3.4 

4.3.5 

4.3.6 

(6 × 2) (12)

4.4 Refrigeration compressor failure is a big, expensive problem in the refrigeration industry.

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

QUESTION 5

5.1 What does the term *transfer switch* or *changeover switch* mean? (2)

5.2 List and describe the TWO requirements regarding refrigerant detectors according to SANS 10147. (4)

5.3 List and describe the SEVEN requirements of ventilating plant rooms in accordance with SANS 10147. (14)
[20]

QUESTION 6

Having access to clean water is vital for people, animals and plants. Water can be contaminated with pathogens, chemicals or other impurities that can cause illnesses and health problems.

There are many different ways in which water can be purified to remove sediment and contaminants.

6.1 Define *water treatment*. (2)

6.2 What is the effect of drinking non-treated water on human beings? (3)
[5]

TOTAL: 100

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