higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE

REFRIGERATION TRADE THEORY N2

(11041572)

20 November 2020 (X-paper)
09:00–12:00

This question paper consists of 5 pages and 1 formula sheet.

205Q1E2020

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DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE
REFRIGERATION TRADE THEORY N2
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

1.1 What is meant by the term open compressor? (2)

1.2 State FOUR advantages of an open type reciprocating compressor. (4)

1.3 Make a neat, labelled sketch of a rotating eccentric compressor. (7)

1.4 Explain the difference between the splash feed oil system and the force feed oil system, used in compressors. (4)

1.5 State the THREE most common types of shaft seals. (3)

[20]

QUESTION 2

2.1 State THREE most general types of evaporators. (3)

2.2 What is the purpose of an evaporator? (2)

2.3 Make a neat, labelled sketch of a flooded evaporator. (7)

2.4 What is the effect of:

2.4.1 Over sizing a compressor?

2.4.2 Under sizing of a compressor?

(2 × 2) (4)

2.5 FIGURE 2.1 below shows a shell- and-coil condenser. Complete the symbols (A–D) regarding the flowing of water and refrigerant. Write the answers next to the question number (A–D) in the ANSWER BOOK.

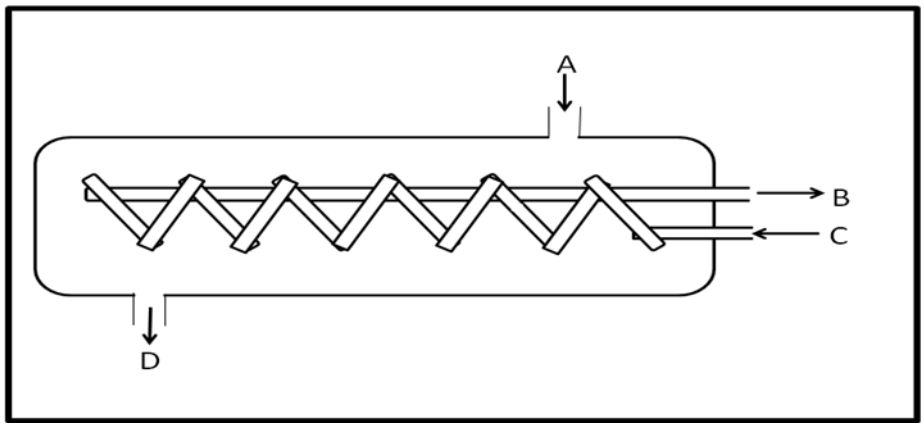


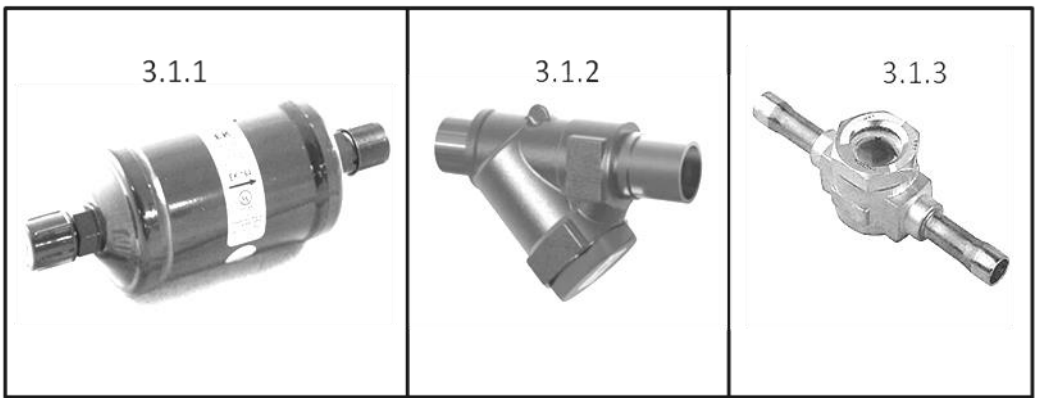
FIGURE 2.1: SHELL AND COIL CONDENSER

(4 × 1) (4)

[20]

QUESTION 3

3.1 Identify and explain the purpose of each of the following components below. Write only answer next to the number (3.1.1–3.1.3) in the ANSWER BOOK.



(3 × 2) (6)

3.2 State where in the refrigeration systems the above-mentioned components are usually installed (for example in the discharge, suction or liquid line). (3)

3.3 Make a neat, labelled sketch of bulb type temperature sensing element and mechanism. (6)

3.4 State TWO reasons why direct expansion evaporators are popular. (2)

3.5 State the THREE most important properties of refrigeration lubrication oils. (3)

[20]

QUESTION 4

4.1 Indicate whether the following statements are TRUE or FALSE by writing only 'True' or 'False' next to the question number (4.1.1–4.1.4) in the ANSWER BOOK.

4.1.1 Electricity is dangerous. If you are not competent to work with electricity, DON'T.

4.1.2 Shortage of refrigerant in the system will eventually result in the evaporator coil iced-up.

4.1.3 An over sizing of a plant will eventually result in frequent stopping and starting of a refrigeration plant.

4.1.4 Dirt in the system causes blockage of oil filter.

(4 × 1) (4)

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4.2 Define each of the following control terms:

4.2.1 Lag

4.2.2 Actuator

4.2.3 Sensor

4.2.4 Thermostat

(4 × 1) (8)

4.3 As a maintenance refrigeration mechanic, you are called out to a plant. You find that the cooling compressor runs continuously.

State FOUR possible causes and give the corrective actions. (4 × 2) (8)

[20]

QUESTION 5

5.1 Name THREE types of starting relays for single-phase motors. (3)

5.2 Name TWO adjustments to be found on a low-pressure switch. (2)

5.3 What is meant by balanced pressure in a refrigeration system and how can it be accomplished? (2)

5.4 State THREE factors which affect display case operations. (3)

5.5 If there is a little moisture in the refrigeration system, it should be absorbed by the drier. The drier can only absorb a limited volume of moisture before it becomes saturated.

Explain what will happen if any further moisture passes through the drier. (6)

5.6 Explain the corrective action that should follow if a leak is found on a brazed joint. (4)

[20]

TOTAL: 100

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FORMULA SHEET

1. OHM'S LAW /OHM SE WET

$I = \frac{V}{R}$ $V = R \times I$

$R_T = R_1 + R_2 + R_3$

$\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$

2. POWER /DRYWING

$P = V \times 1$

$P = I^2 R$

$P = \frac{V^2}{R}$

3. HEAT/HITTE

$Q = m \times c \times \Delta t$ $Q_T = Q_1 + Q_2$

$℃ = (℉ - 32) \times \frac{5}{9}$

$K = 273 + ℃$

4. AREAS AND VOLUMES/OPPERVLAKES EN VOLUMES

$A = \frac{\pi}{4} D^2$ $V = A \times L$

$A = L \times B$

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