higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE

REFRIGERATION TRADE THEORY N2

(11041572)

20 April 2021 (X-paper)
09:00–12:00

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

260Q1A2120

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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 question 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 List THREE types of rotating compressors used in refrigeration systems. (3)

1.2 Give FOUR characteristics of an effective valve-assembly unit. (4)

1.3 Choose a description from COLUMN B that matches a term in COLUMN A. Write only the letter (A–F) next the question number (1.3.1–1.3.6) in the ANSWER BOOK.

COLUMN A		COLUMN B	
1.3.1	Shaft seal	A	used mainly on big ammonia compressors running at low speeds and at low pressures
1.3.2	Oil sight glass	B	used to circulate the oil under pressure in the crankcase
1.3.3	Oil pump	C	leak-proof container that houses the complete mechanism of a compressor
1.3.4	Cylinder head	D	mainly used in high-speed compressors
1.3.5	Packing gland	E	used to observe the conditions of the refrigeration oil and oil level
1.3.6	Stationery bellows-type seal	F	serves as a pressure plate to support and hold the valves and valve plate in position

(6 × 1) (6)

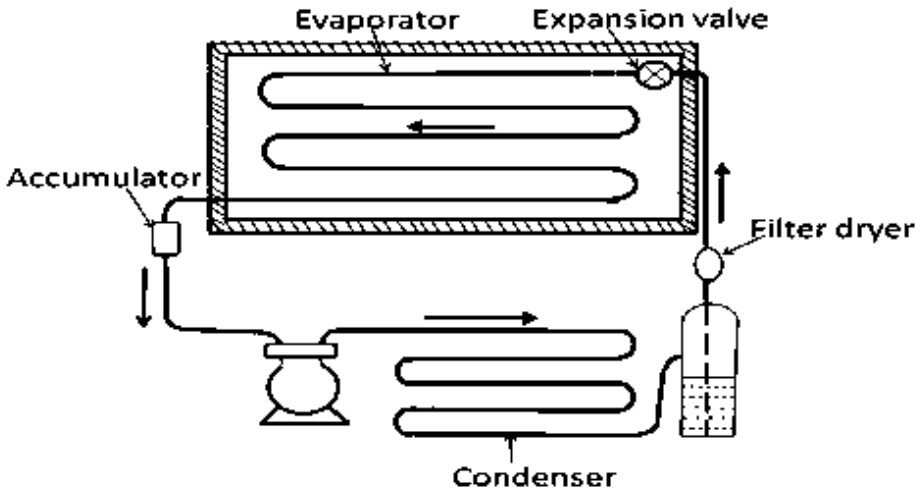
1.4 Make a neat, labelled sketch of a stationary bellows-type seal. (7)

[20]

QUESTION 2

2.1 Make a neat, labelled sketch of an evaporator condenser as used in refrigeration systems. (6)

2.2



REFRIGERATION CYCLE

FIGURE 1

2.2.1 Give the purpose of each labelled component in FIGURE 1. (5 × 2) (10)

2.2.2 How can dirt be prevented from entering the expansion valve as indicated in FIGURE 1? (2)

2.3 Which TWO factors should be considered when selecting an evaporator during the construction of a refrigeration plant? (2)

[20]

QUESTION 3

3.1 Name FOUR types of refrigerant control valves. (4)

3.2 Make a neat, labelled sketch of a thermostatic expansion valve. (6)

3.3 Give TWO advantages of a thermostatic expansion valve. (2 × 2) (4)

3.4 Explain the function and operation of each of the following control devices:

3.4.1 Remote bulb thermostats

3.4.2 LP/HP switch

(2 × 3) (6)

[20]

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QUESTION 4

4.1 State FIVE problems caused by wrong selection, miscalculation or incorrect usage of materials or equipment. (5)

4.2 Explain the relationship between the pressure and the temperature of a refrigerant. (2)

4.3

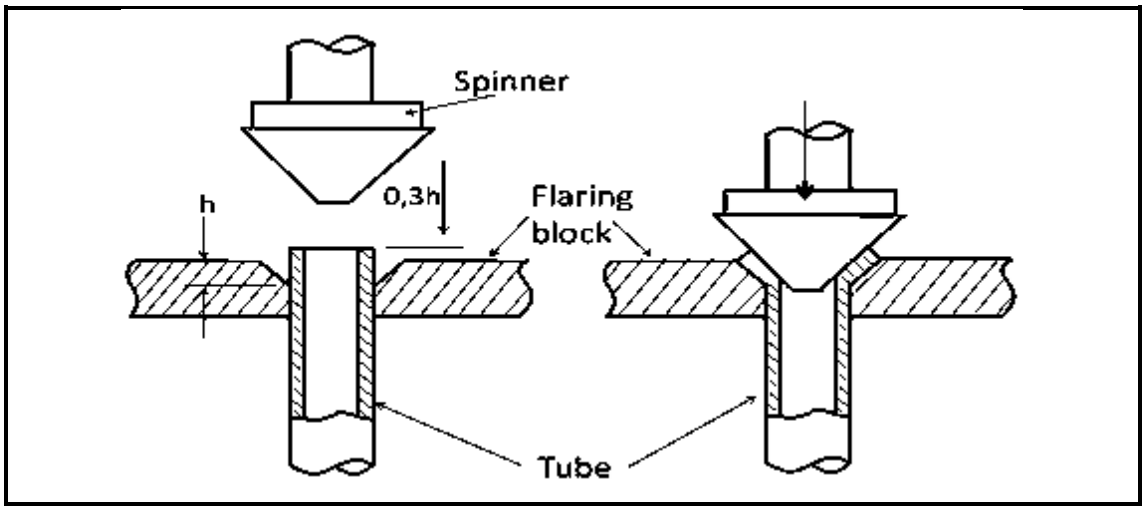


FIGURE 2

Explain how to make a flare at the end of a copper pipe. (8)

4.4 State FIVE precautions to consider when using flaring tools. (5)
[20]

QUESTION 5

5.1 What does the term purging mean as it relates to refrigeration systems? (2)

5.2 When should purging be done in a refrigeration system? (2)

5.3 Explain the functions of each of the following protection devices fitted to a compressor control circuit:

5.3.1 Oil-pressure safety switch

5.3.2 Time-delay relay

(2 × 3) (6)

5.4 Explain how to measure suction superheat temperature. (8)

5.5 Explain the term evacuation as it is used in refrigeration systems. (2)
[20]

TOTAL: 100

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FORMULA SHEET

1. OHM'S LAW

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

$$V = R \times I$$

$$R_T = R_1 + R_2 + R_3$$

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

2. POWER

$$P = V \times I$$

$$P = I^2 R$$

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

3. HEAT

$$Q = m \times c \times \Delta t$$

$$Q_T = Q_1 + Q_2$$

$$℃ = (℉ - 32) \times \frac{5}{9}$$

$$K = 273 + ℃$$

4. AREAS AND VOLUMES

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

$$V = A \times L$$

$$A = L \times B$$

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