higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

T1550**(E)**(A1)T

NATIONAL CERTIFICATE

REFRIGERATION TRADE THEORY N2

(11041572)

1 August 2018 (X-Paper)
09:00–12:00

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

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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. Write neatly and legibly.

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QUESTION 1

1.1 Indicate whether the following statements are TRUE or FALSE. Choose the answer and write only 'true' or 'false' next to the question number (1.1.1–1.1.5) in the ANSWER BOOK.

1.1.1 An open compressor has a crankshaft that extends through the compressor housing with a shaft seal.

1.1.2 The purpose of the oil pump in the reciprocating compressor is to circulate the oil under pressure in the crankcase.

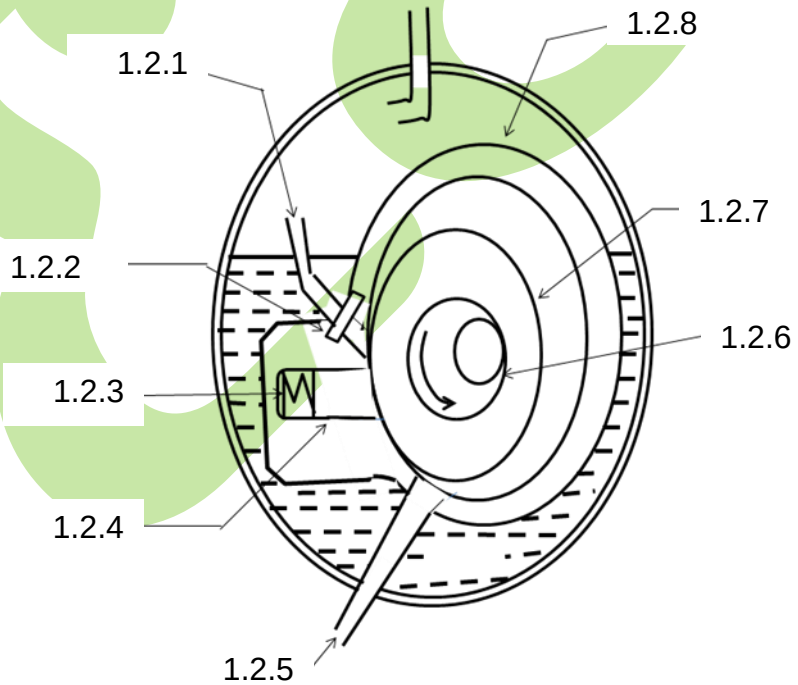
1.1.3 The main function of a compressor is to push the refrigerant in the evaporator at a low temperature.

1.1.4 In a hermetic compressor, the motor is sealed inside a dome.

1.1.5 The purpose of sight glass is to observe the condition of the oil and oil level.

(5 × 1) (5)

1.2 Study the picture of an eccentric rotating compressor below and identify the components numbered (1.2.1–1.2.8). Write only the answer next to the question number (1.2.1–1.2.8) in the ANSWER BOOK.



(8)

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

1.4 1.4.1 Briefly describe the packing gland seal.

1.4.2 State TWO disadvantages of the packing gland seal referred to in QUESTION 1.4.1.

(2 × 2) (4)

[20]

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QUESTION 2

2.1 Name THREE basic types of condensers. (3)

2.2 What is the purpose of a condenser? (2)

2.3 Briefly describe the operation of a flooded evaporator used to cool air with the refrigerant inside the tubes. (3)

2.4 Draw a neat, labelled diagram of the flooded evaporator mentioned in QUESTION 2.3. (8)

2.5 State FOUR advantages of the evaporative condenser. (4)
[20]

QUESTION 3

3.1 List THREE disadvantages of the capillary-tube expansion valve. (6)

3.2 Explain the operation of the constant-pressure expansion valve. (8)

3.3 What is another name for the constant-pressure expansion valve? (1)

3.4 State ONE disadvantage of the constant-pressure valve. (2)

3.5 Give THREE reasons why direct expansion evaporator coils are popular. (3)
[20]

QUESTION 4

4.1 Describe the air flow through the following:

4.1.1 An axial-flow fan

4.1.2 A centrifugal fan

(2 × 2) (4)

4.2 Name the THREE main components that make up a fan. (3)

4.3 Name THREE general categories refrigerated storage may be divided into and give the number of days applicable to each category. (6)

4.4 Briefly explain the following methods of food preservation:

4.4.1 Pickling

4.4.2 Smoking

(2 × 2) (4)

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4.5 Refrigerant hoses that are connected to the service manifold are usually colour-coded.

Where would the following colours be connected:

4.5.1 Yellow

4.5.2 Blue

4.5.3 Red

(3 × 1) (3)
[20]

QUESTION 5

5.1 State FOUR consequences of under-charging a system. (4)

5.2 If a leak is found on a brazed joint, what corrective action will be followed? (4)

5.3 What effect does a dirty condenser coil have on a refrigeration plant? (2)

5.4 State TWO main points which must be considered to avoid compressor damage when liquid charging is done. (2)

5.5 As a maintenance refrigeration mechanic, you are called out to a plant. You find that there is a low suction pressure.

Name FOUR possible causes and state the corrective action to be taken for each. (4 × 2) (8)
[20]

TOTAL: 100

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REFRIGERATION TRADE THEORY N2

FORMULA SHEET

1. OHM'S LAW

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

$$R_T = R_1 + R_2 + R_3$$

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

2. POWER

$$P = V \times I$$

$$P = I^2 R$$

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

3. HEAT

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

$$°C = (°F - 32) \times \frac{5}{9}$$

$$K = 273 + °C$$

4. AREAS AND VOLUMES

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

$$A = L \times B$$

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