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Department:  
Higher Education and Training  
**REPUBLIC OF SOUTH AFRICA**

**NATIONAL CERTIFICATE**

**REFRIGERATION TRADE THEORY N2**

(11041572)

**15 April 2020 (X-paper)**

**09:00–12:00**

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

260Q1A2015


**DEPARTMENT OF HIGHER EDUCATION AND TRAINING**  
**REPUBLIC OF SOUTH AFRICA**  
NATIONAL CERTIFICATE  
REFRIGERATION TRADE THEORY N2  
TIME: 3 HOURS  
MARKS: 100

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**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 Briefly explain TWO functions of a compressor as used in a refrigeration system. (2 × 2) (4)
- 1.2 List FIVE methods of controlling the capacity of a compressor. (5)
- 1.3 Make a neat, labelled sketch of a rotating-vane compressor.  (8)
- 1.4 Briefly explain why a check or reed valve is installed in the discharge port of a rotating-vane compressor. (1)
- 1.5 Why is dryness a desirable property of refrigerant oil? (2)
- [20]**

**QUESTION 2**



- 2.1 Draw a block diagram of a refrigeration cycle and indicate the following:
- Compressor
  - Condenser
  - Liquid receiver
  - Filter dryer
  - Expansion valve
  - Evaporator
  - Accumulator 
- (7)
- 2.2 What is the phase of the refrigerant at the inlet and outlet of an evaporator? (2)
- 2.3 State FIVE requirements of a good refrigerant. (5)
- 2.4 Make a neat, labelled sketch of a shell-and-tube condenser. (6)
- [20]**

**QUESTION 3**

- 3.1 Explain the purpose of each of the following and indicate where it is usually installed in systems:
- 3.1.1 Vibration eliminator
- 3.1.2 Crankcase heater
- 3.1.3 Strainer 
- (3 × 3) (9)

- 3.2 Make a neat, labelled sketch of a system analyser (manifold gauge set) and indicate the following:
- High-pressure gauge
  - High-pressure valve stem
  - Service hose
  - High-pressure side hose
  - Low-pressure side hose 
  - Low-pressure valve stem
  - Low-pressure gauge
- (7)
- 3.3 State the purpose of each of the following tools:
- 3.3.1 Pipe bender
- 3.3.2 Pipe cutter
- (2 × 1) (2)
- 3.4 Give ONE disadvantage of a constant-pressure valve. 
- (2)  
**[20]**

**QUESTION 4**

- 4.1 State FOUR precautions to follow when using a swaging tool. (4)
- 4.2 State FIVE safety precautions to apply when working with refrigerants. (5)
- 4.3 Define each of the following refrigeration-control terms:
- 4.3.1 Hunting
- 4.3.2 Cycling 
- (2 × 2) (4)
- 4.4 What is the result of liquid slugging in refrigeration systems? (2)
- 4.5 Name TWO types of oil used in refrigeration systems. 
- (2)
- 4.6 Which type of fan would be installed in a large air-conditioning plant? Give TWO reasons for the answer. (3)  
**[20]**

**QUESTION 5**

- 5.1 Which THREE facts should be kept in mind when designing refrigeration piping? (3)
- 5.2 Briefly explain why a muffler would be installed in a refrigeration system. (3)
- 5.3 Where is the muffler in a refrigeration system installed? (1)
- 5.4 Briefly explain the cause of each of the following malfunctions on a hermetically sealed unit:
  - 5.4.1 Motor humming when switched on
  - 5.4.2 Suction line frosted or sweating
  - 5.4.3 Thermostat switches on but motor fails to start (3 × 2) (6)
- 5.5 Briefly explain FIVE possible reasons why the suction superheat reading will be too high. (5)
- 5.6 Give TWO uses of a service manifold. (2)

**[20]**

**TOTAL: 100**

(11041572)

## 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

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

$$Q_T = Q_1 + Q_2$$

$$^{\circ}\text{C} = (^{\circ}\text{F} - 32) \times \frac{5}{9}$$

$$\text{K} = 273 + ^{\circ}\text{C}$$

### 4. AREAS AND VOLUMES

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

$$V = A \times L$$

$$A = L \times B$$