higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

REFRIGERATION TRADE THEORY N2

1 AUGUST 2018

This marking guideline consists of 5 pages.

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QUESTION 1

1.1
1.1.1 True
1.1.2 True
1.1.3 False
1.1.4 True
1.1.5 True

(5 × 1) (5)

1.2
1.2.1 Discharge port
1.2.2 Discharge valve
1.2.3 Spring
1.2.4 Blade
1.2.5 Suction port
1.2.6 Shaft
1.2.7 Roller
1.2.8 Cylinder

(8 × 1) (8)

1.3
- The packing gland
- The stationary bellows type
- The rotary mechanical seal (3)

1.4
1.4.1
- One of the oldest types of shaft seals
- Used mainly on big ammonia compressors running at low speed and low pressure

1.4.2
- Requires regular maintenance
- It can damage the shaft.

(2 x 2) (4)
[20]

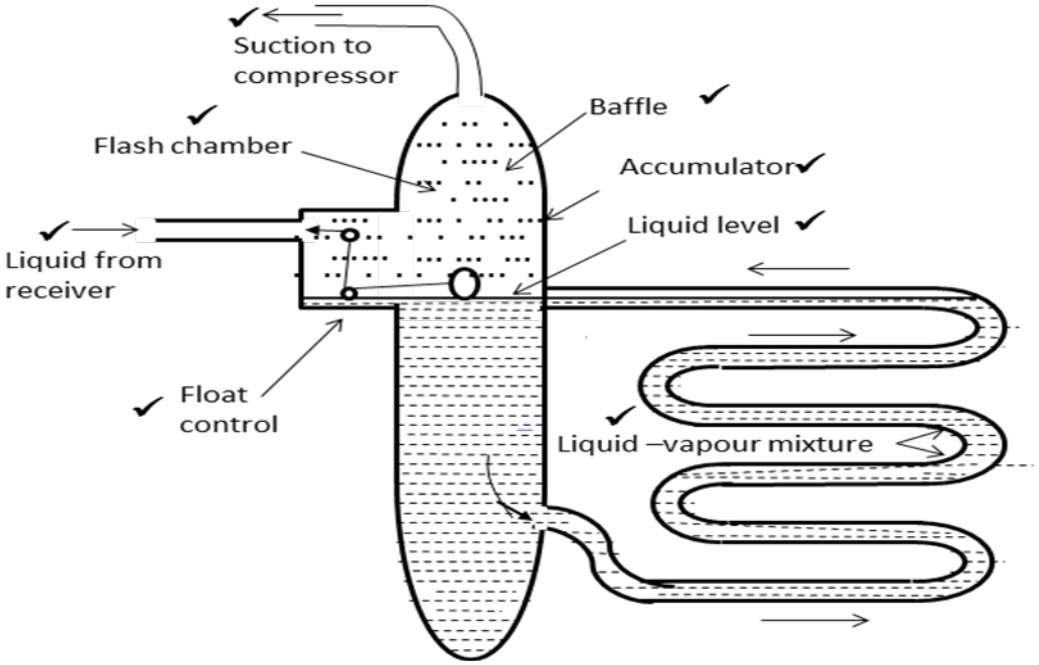
QUESTION 2

2.1
- Air-cooled condensers
- Water-cooled condensers
- Evaporator condensers (3)

2.2 To reject the heat from the refrigeration system (2)

2.2
- The flooded evaporator is designed to carry a constant level of liquid refrigerant within the evaporator.
- The level of the liquid refrigerant is maintained by a float valve.
- The flooded evaporator is used in medium to large industrial and some air conditioning systems. (3)

2.4



(8)

2.5
- The system operates very economically due to the low condensing temperature possible.
- Lower initial cost due to the illumination of the water-cooled condenser.
- Less space requirements
- Suitable for indoor location (4)

[20]

QUESTION 3

3.1
- It stops liquid carry-over to the compressor.
- It ensures that the entire evaporator is used at full-load and part-load conditions.
- It responds quickly to wide and frequent load variations. (3 × 2) (6)

3.2
- Constant-pressure expansion valves maintain a constant pressure in the evaporator.
- It is designed and constructed to maintain a constant evaporating pressure.
- The flow of the refrigerant into the evaporator is based on the pressure of the refrigerant in the evaporator.
- As the pressure increases, the valve closes and allows fewer refrigerants to flow through it. (4 × 2) (8)

3.3 Automatic expansion valve (1)

3.4 Inability to cope with suction; appreciable load changes (2)

3.5
- It's simplicity
- Low refrigerant charge
- Low installation costs
- No oil return problem if correctly installed (Any 3 × 1) (3)

[20]

QUESTION 4

4.1 4.1.1 The air flows straight through the impeller at a constant distance from the axis.

4.1.2 The air enters the impeller axially, turns 90° and is discharged radially into the scroll or casing.

(2 × 2) (4)

4.2
- Impeller
- Rotor
- Casing (3)

4.3
- Short-term storage✓ 1 to 15 days✓
- Long-term storage✓15 to 150 days✓
- Frozen storage✓ More than 150 days✓ (6)

4.4 4.4.1 Pickling is essentially a fermentation process which uses up all the substances which serve as food for the growth of the spoilage agents.

4.4.2 In smoking, preservation is achieved by the drying process and by the antiseptic which is absorbed from the smoke.

(2 × 2) (4)

4.5 4.5.1 Centre
4.5.3 Left
4.5.3 Right

(3 × 1) (3)

[20]

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QUESTION 5

5.1
- Loss of capacity due to insufficient refrigerant
- Increase of superheat leaving the evaporator
- Reduced suction pressure
- Insufficient oil return
- Icing up of the evaporator (Any 4 × 1) (4)

5.2
- The refrigerant must be recovered immediately using a recovery unit, or the system must be pumped down.
- The system must be evacuated, and dry nitrogen must flow through the pipes while brazing. (2 × 2) (4)

5.3
- Less heat transfer
- Working at a higher pressure
- Motor draws more current and could trip on overload (Any 2 × 1) (2)

5.4
- The compressor should not be running.
- The pressure in the bottle must be higher than the compressor discharge pressure. (2)

5.5

Possible causes	**Corrective action**
• Shortage of refrigerant✓	• Repair leak and recharge✓
• Evaporator under-loaded✓	• Clean or defrost evaporator, increase air flow✓
•	
• Strainer or filter dry✓	• Clean and/or replace✓
• Blocked expansion valve✓	• Clean and/or replace✓
• Lost charge on expansion valve	• Replace power assembly
• Space temperature too low	• Adjust or replace thermostat

(Any 4 x 2) (8)
[20]

TOTAL: 100

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