higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

REFRIGERATION PRACTICE
NQF LEVEL 3

27 November 2023

This marking guideline consists of 5 pages.

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QUESTION 1

1.1 F
1.2 E
1.3 H
1.4 K
1.5 L
1.6 M
1.7 D
1.8 G

(8 × 1) **[8]**

QUESTION 2

2.1 2.1.1 Gauge pressure is the pressure measured relative to atmospheric pressure.

2.1.2 An inductive load is a load that consumes only reactive power.

OR

An inductive load is a load that powers an electrical motor.

2.1.3 The first law of thermodynamics states that energy is not created and cannot be destroyed by any process;✓ its form, however, can be changed.✓

(3 × 2) (6)

2.2 Q = m × c × ∆t✓
= 20,0 g × 4,184 J/g °C × 10,6 °C✓
= 887 J✓ (3)

2.3 Q = m × c × ∆t

$$\Delta t = \frac{Q}{mc}$$

$$\Delta t = \frac{947J}{76{,}4g \times 06{,}607J/g^{O}C}$$✓

= 20,4 °C✓ (2)

2.4 2.4.1 Work Done = m × g × s
= 93 × 9.8 × 78✓
= 71089.20 J✓

2.4.2 Power = WD/t
= 71089/11✓
= 6462,65 W✓

(2 × 2) (4)
[15]

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QUESTION 3

3.1 3.1.1 In a single-phase connection, electricity flows through a single conductor.

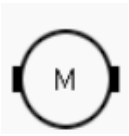
3.1.2 A three-phase connection is a connection in which three separate conductors are needed to transmit electricity.

(2 × 2) (4)

3.2 3.2.1



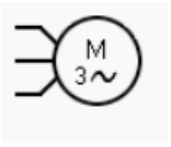
3.2.2



3.2.3



3.2.4



(4 × 2) (8)

3.3
- Inductive loads are motor loads (horsepower loads) and magnetic loads (coils, electromagnetic loads).
- Resistive loads are non-motor loads that have a resistance, like incandescent lighting or heating loads. (2 × 2) (4)

3.4
- Lay-in wire ways✓ − These types of wire ways can open on one side to allow a wire to be inserted without having to feed it through from one end.✓
- Feed-through/Sectional/Pull-through wire ways✓ − With these wire ways, a wire must be pulled or fed through from one end to the other.✓
- Wiring/cable troughs✓ − These wire ways are fully enclosed boxes.✓

(3 × 2) (6)

[22]

QUESTION 4

4.1
- Detection
- Isolation
- Estimation (3)

4.2
- Water moisture along the coil will then freeze.
- This ice also impedes the evaporator coil from doing its job.
- The ice will continue to build up until heat absorption is completely blocked.
- The ice can also damage the fins and coil because they will begin to warp.

(Any 3 × 1) (3)

4.3
- Troubleshooting is the systematic location of the cause of a fault.
- Maintenance is carried out to prevent problems, correct faults and ensure that equipment works effectively. (2 × 2) (4)

4.4
4.4.1 Condenser
4.4.2 High-pressure vapour
4.4.3 Superheated low-pressure vapour
4.4.4 Evaporator
4.4.5 Low-pressure liquid
4.4.6 Sub-cooled liquid

(6 × 1) (6)

4.5 Mixed lubrication with direct metal-to-metal contact between the bearing and crankshaft surfaces. (2)

4.6 To control indoor temperature, humidity and air motion for thermal comfort. (2)

4.7 The defrost mechanism in a refrigerator heats the cooling element (evaporator coil)✓ for a short period and melts the frost that has formed on it.✓ The resulting water drains through a duct at the back of the unit.✓ Defrosting is controlled by an electric or electronic timer.✓ For every 6, 8, 10, 12 or 24 hours of compressor operation, it turns on a defrost heater for 15 minutes to half an hour.✓ (5)

[25]

QUESTION 5

5.1
5.1.1 Socket tester
5.1.2 Insulation tester
5.1.3 Adjustable wrench
5.1.4 Long-nose plier
5.1.5 Gauge manifold
5.1.6 Flaring tool
5.1.7 Flat-edge screw driver
5.1.8 Digital clamp meter

(8 × 1) (8)

5.2
- An oblique sketch focuses more on the face or front of an object,✓✓ whereas an isometric sketch focuses more on the edge of an object.✓✓
- Oblique sketches are drawn at a 45-degree angle to render the third dimension,✓✓ whereas isometric sketches are drawn at a 30-degree angle.✓✓ (Any 2 × 2) (4)

5.3
- Oil that is too heavy will not flow smoothly to all working parts.
- Oil that is too light will not adhere properly and will result in inadequate lubrication. (2)

5.4
- By installing an accessible sample system.
- By installing a small oil trap in the suction line of the refrigeration system.
- The oil trap has an oil sample tube long enough to hold approximately 30 grams of oil and an adaptor installed in the suction line ahead of the shell.
- Be sure to purge the remaining oil in the trap so that the next oil sample is representative of the oil circulating in the system. (Any 4 × 1) (4)

5.5
- Slugging
- Flood-back
- Flooded starts
- Loss or lack of lubrication
- Contamination
- Overheating
- Electrical problems (7)

[25]

QUESTION 6

6.1 Water treatment is any process that makes water more acceptable for a specific end-use. (2)

6.2
- Using the iodine-based method
- Using the chlorine-based method
- Using a water filter to purify water
- Using the boiling method
- Using the distillation method (Any 3 × 1) (3)

[5]

TOTAL: 100

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