higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

PLANT OPERATION THEORY N1

2 AUGUST 2019

This marking guideline consists of 6 pages.

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QUESTION 1: CHEMISTRY

1.1 1.1.1 Number of protons in nucleus of atom which is unique for each element

1.1.2 Smallest natural particle of covalent compound that still possesses characteristics of that compound

1.1.3 Smallest particle of a matter that cannot be broken into simple substances

1.1.4 Sum of protons and neutrons in nucleus of atom

1.1.5 Negatively charged ions

(5 × 2) (10)

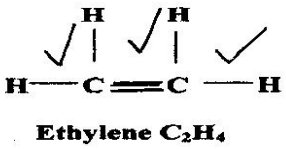
1.2 1.2.1 $2K+2H_2O \rightarrow 2KOH_{(aq)}+H_{2(g)}$

1.2.2 $Zn+H_2SO_4 \rightarrow ZnSO_4+H_2$

1.2.3 $2NH_3+H_2SO_4 \rightarrow (NH_4)_2SO_4$

(3 × 2) (6)

1.3



Ethylene C_2H_4

(3 marks for structure + 1 mark for formula) (4)
[20]

QUESTION 2: VALVES AND PIPES

2.1 2.1.1
- It shuts off flow of gate valves or gets full flow out
- Little pressure loss over the valve

2.1.2
- Regulates flow
- Big pressure loss over the valve

2.1.3
- Flow only in one direction
- Little pressure loss over the valve

(3 × 2) (6)

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2.2
- Valve casing
- Cap
- Yoke or collar
- Valve road or shaft
- Stopper or keeper
- Valve bed or seating
- Rotating mechanism (Any 6 × 1) (6)

2.3 2.3.1 Measure of heat energy of a body or substance and is measured by means of thermometer

2.3.2 Force exacted per unit area

2.3.3 A vacuum is caused by removal of air or liquid from a closed container or is supplied to any system that has a tower pressure when compared to any system that has a lower pressure when compared to atmospheric pressure

2.3.4 Flow is the quantity or volume of fluid flowing in a pipe and measured by a rotameter

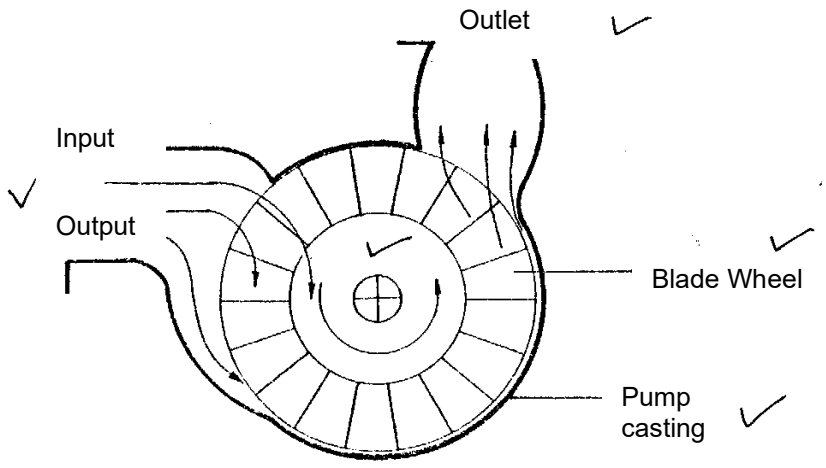
(4 × 2) (8)
[20]

QUESTION 3: PUMPS AND INSTRUMENTATION

3.1 3.1.1 True
3.1.2 False
3.1.3 True
3.1.4 True
3.1.5 False

(5 × 1) (5)

3.2



Neatness✓

SECTIONAL VIEW OF TURBINE PUMP (6)

3.3
- Water container must not become empty
- Screen must not become clogged
- Food valve must not jam
- Flanges on the suction pipe must not leak
- Pressure meter must indicate correct pressure throughout
- Stuffing boxes should not leak excessively
- Lubricating oil must circulate
- Bearing and packing box should not become overheated (7)

3.4
- Volute
- Turbine (2)

[20]

QUESTION 4: DISTILLATION AND WATER TREATMENT

4.1
- Conduction
- Convection
- Radiation (3)

4.2 4.2.1 Energy cannot be destroyed or created but it can be converted from one form to another (3)

4.2.2 Energy is received or given up in return for similar energy (2)

4.2.3 Effort to reduce consumption of energy (2)

4.3
- Soft water

Water like rainwater or distilled water, free of salt of any kind.✓ soap foams freely and it feels like it cannot be rinsed off.✓ It is used in low pressure boilers, laundries✓

- Distilled water

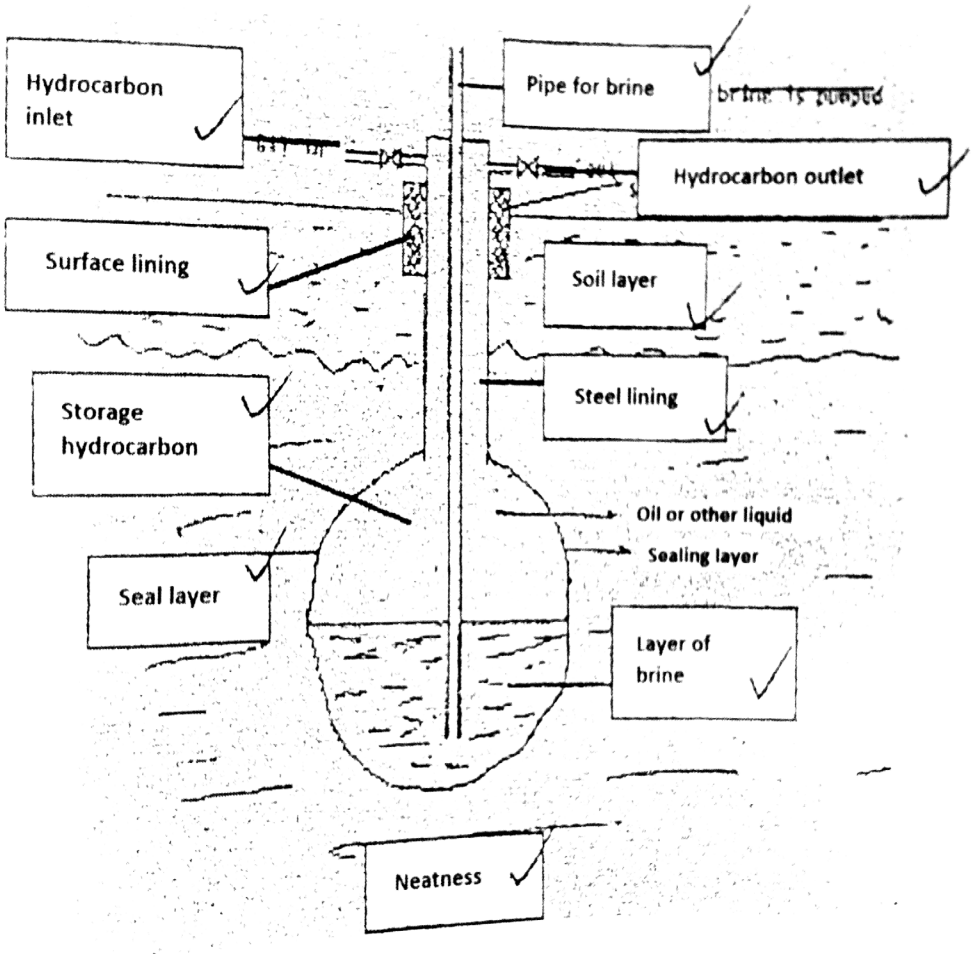
This is the purist form of water✓ and is made by boiling the water with steam emanating condensed without making contact with metals.✓ It is also free from gases and is used in pure chemical reactions and laboratories due to its purity.✓ (6)

4.4
- $MgSO_4$ Magnesium sulphate
- $CaSO_4$ Calcium sulphate
- $MgCl_2$ Magnesium chloride
- $CaCl_2$ Calcium chlorine (4)

[20]

QUESTION 5: SAFETY AND STORAGE

5.1



(10)

5.2
- Reducing agent (fuel)
- Heat
- Oxidising agent (oxygen) (Any 2 × 1) (2)

5.3
- Class A: Solid material, for example burning wood, extinguished with water
- Class B: Gases and fumes of liquids, for example oil extinguished by smothering, cutting off air fuel supply
- Class C: Electrical equipment, for example transformer burning, preferably extinguished with carbon dioxide
- Class D: Burning materials, for example finely distributed iron, extinguished with a dry powder (4 × 2) (8)

[20]

TOTAL: 100

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