higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

PULP AND PAPERMAKING TECHNOLOGY
NQF LEVEL 4

12 November 2024

This marking guideline consists of 6 pages.

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SECTION A

QUESTION 1

1.1 B
1.2 A
1.3 D
1.4 D
1.5 C

(5 × 1) **[5]**

QUESTION 2

2.1 Heat transfer efficiency
2.2 Reel/Jumbo/Parent roll
2.3 Spent/Black liquor
2.4 Partition
2.5 Kiln

(5 × 1) **[5]**

QUESTION 3

3.1 True
3.2 True
3.3 True
3.4 False
3.5 False

(5 × 1) **[5]**

TOTAL SECTION A: 15

SECTION B

QUESTION 4

4.1
- Temperature
- Wetting time
- Chemicals interacting with fibres
- Mechanical forces impacting on the fibres
- Type and consistency of material to be repulped (Any 3 × 1) (3)

4.2
- Vertical pulpers
- Drum pulpers
- Horizontal pulpers
- Low-consistency pulpers
- High-consistency pulpers (Any 2 × 1) (2)

4.3 Disc deflakers are like high-speed refiners as they operate with a wide gap clearance✓ that ensures that fibres are not flaked but flakes are disintegrated into individual fibres.✓ The rotor is rotated by an electric motor✓ so that the paper stock is deflaked between the two fillings.✓ Axial adjustment is not efficient✓ as the gap between the horizontal surfaces of the fillings is not compensated for the equipment.✓ (6)

4.4 Brightness refers to how much light is reflected by the surface of a sheet of paper,✓✓ while lightness has become a broad indicator of pulp quality.✓✓ (2 + 2) (4)

4.5
- Phase 1: Entry
- Phase 2: Sheet formation
- Phase 3: Induced drainage (static)
- Phase 4: Vacuum drainage (4)

4.6
- Slice geometry:✓ Whether the position of the slice is set for pressure or velocity forming✓
- Forming board position:✓ Less critical under pressure-forming conditions as pressure forming can reduce the effects of poor head-box delivery and set the sheet rapidly✓
- Velocity forming:✓ This will give a shallow angle jet that travels more parallel to the fabric and lands just about on the edge of the leading forming board strip to peel off a small jet of water.✓ (3 × 2) (6)

4.7
- To remove water
- To consolidate the sheet
- To improve sheet surface quality (3)

4.8 It is the mass of a specific size of paper measured in g/m^2. (2)

[30]

QUESTION 5

5.1 To remove the remaining water in the sheet through evaporation (2)

5.2
- As part of process control during the manufacture of the product
- As part of quality control to meet customer specifications
- To investigate customer complaints
- To confirm the results for product research and development (4)

5.3 The sheet is wound around a drum and onto a reel.✓ An adjustable set of secondary arms located on the sides of the paper machine holds the reel in place.✓ When the parent roll has been wound to a specified diameter,✓✓ a set of primary arms that holds the next reel to be wound moves the new reel down to form a nip with the reel drum and parent roll.✓ This enables the sheet to be transferred to the new reel without stopping the operation of the new reel or without stopping the operation of the paper machine.✓ The parent roll is removed from the paper machine after the remaining processes or prepared for shipment to customers.✓ (7)

5.4
- Visual inspection
- Stretch measurements
- Schmidt hammer
- Smith tester (Any 2 × 1) (2)

[15]

QUESTION 6

6.1
- Lowers lime consumption
- Improves combustion in the recovery furnace
- Reduces the generation of hydrogen sulphide
- Reduces corrosion in multiple-effect evaporators
- Large reduction of sulphur losses in the direct-contact evaporator (5)

6.2 The heating value of black liquor solids comes from the organic content.✓ Liquors that have greater heating values tend to have a higher amount of carbon and less oxygen and sodium.✓ The higher the heating value, the more energy the liquor✓ has and the more energy it can generate.✓ A high heating value means that the liquor has a high quality.✓ (5)

6.3 A sample of the black liquor is dried in an oven at a temperature of 105 °C for about 30 minutes.✓ This is not a precise test for solids content✓ because change in mass depends on both the temperature and duration of drying. (3)

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6.4 A: Steam
B: Gas stack
C: Strong black liquor
D: Make-up chemical
E: Black liquor mixing tank
F: Dust recycle
G: Black liquor heater
H: Liquor guns
I: Smelt dissolving tank (9 × 1) (9)

6.5
- Evaporator shell
- Compressor
- Vapour outlet (3)

[25]

QUESTION 7

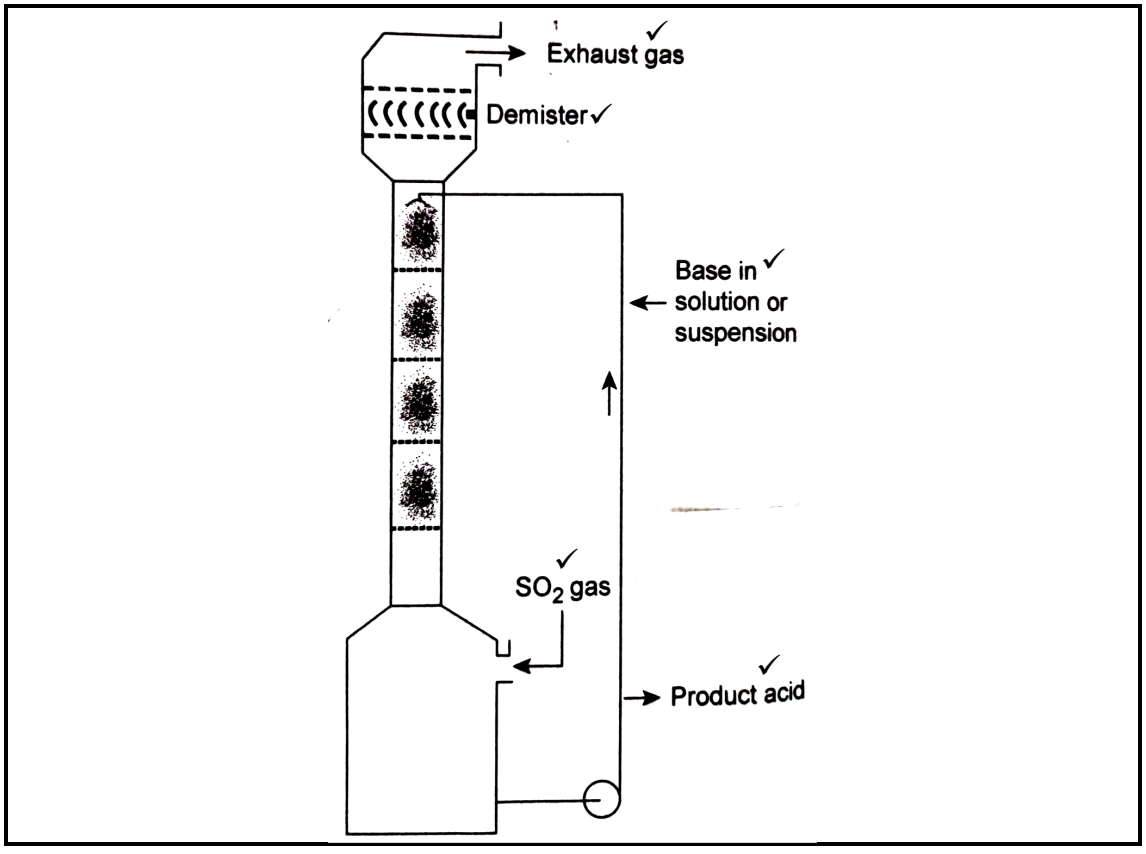
7.1 7.1.1 It is the process of mixing green liquor with lime to form slurry.

7.1.2 It is the process of heating a substance to a high temperature but below the melting or fusion point.

7.1.3 It is a measure of the strength of the cooking liquor.

(3 × 2) (6)

7.2



(5)

7.3 Pale yellow (1)

7.4
- Operating the burner at the highest possible temperature and gas strength
- Avoiding a high air-to-gas ratio
- Using refractory lined piping (3)

[15]

TOTAL SECTION B: 85
GRAND TOTAL: 100

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