higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

PULP AND PAPERMAKING TECHNOLOGY
NQF LEVEL 3

7 December 2020

This marking guideline consists of 6 pages.

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SECTION A

QUESTION 1

1.1 True
1.2 False
1.3 False
1.4 True
1.5 True

(5 × 1) **[5]**

QUESTION 2

2.1 D
2.2 E
2.3 F
2.4 A
2.5 B

(5 × 1) **[5]**

QUESTION 3

3.1 Bagasse washer
3.2 Ink flotation
3.3 Pulpstone
3.4 Freeness
3.5 Agitator

(5 × 1) **[5]**

TOTAL SECTION A: 15

SECTION B

QUESTION 4

4.1 4.1.1
- Shape of the log to be debarked
- Difficulty to take the bark off the wood
- Difficulty to break the bark itself

(Any 2 × 1) (2)

4.1.2
- Drum debarker
- Ring debarker
- Rosser head debarker
- Hydraulic jet debarker

(Any 3 × 1) (3)

4.1.3
- Landfills
- Refuse boilers

(2)

4.2 4.2.1
- Removing wrong-sized chips from the process before the pulp is made
- Removing unwanted materials such as bark, dirt or plastic from the chips (2)

4.2.2 Chip screens pass chips over two types of screen plates.✓ The first screen has holes big enough for chips of the right size or smaller sizes to fall through onto the second screen below the first screen.✓ Chips that are too big are left behind on top of the screen.✓ The second screen has smaller holes than the chip of the right size.✓ Only chips that are too small fall through these holes and chips of the right size stay behind on top of the second screen.✓ Any unwanted materials such as bark and small stones fall through the holes in the second screen.✓ The chips that do not pass through the first screen are either rechipped or disposed of.✓ Chips that are too small are thrown into landfill or used as fuel.✓ (8)

[17]

QUESTION 5

5.1 Flotation is a process in which particles separate because of their ability to float on a particular liquid. (2)

5.2
- Process control during the papermaking
- Quality control to meet paper standards
- Investigation of customer complaints
- Monitoring the performance of new products and research (4)

5.3 5.3.1 Too low airflow

5.3.2 Too little shower water in the washing process or incorrect de-inking process used

(2 × 1) (2)

5.4 5.4.1 To wash fibre off the pulpstone

5.4.2 To control the water level in the pit

(2 × 1) (2)

5.5 5.5.1 Logs must be screened for stones and metal before entering the process.

5.5.2 Temperature of water in the pit must be constant to avoid temperature of the stone changing rapidly.

5.5.3 Stone sharpening must be monitored.

(3 × 1) (3)

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5.6
- Freeness
- Tear
- Burst
- Brightness
- Opacity (Any 4 × 1) (4)

[17]

QUESTION 6

6.1 Chips are cooked in a digester until almost all lignin is removed.✓ The contents of the digester are blown into the blow tank to break the chips into fibres.✓ Pulp is washed to remove the used cooking liquor.✓ (3)

6.2 170 °C✓ and 8 bars or 800 kPa✓ (2)

6.3
- Low yield
- Discoloured pulp
- Large amounts of unfiberised wood (3)

6.4
6.4.1 Allows the cooked bagasse to discharge

6.4.2 Compresses bagasse as it moves into the tee pipe

6.4.3 Feeds bagasse to the digester

6.4.4 Controls the rate at which bagasse travels through the process or pipe

6.4.5 Point where steam, bagasse and cooking liquor mix

(5 × 1) (5)

6.5
6.5.1 Acid sulphite pulping or Sulphite pulping
6.5.2 magnesium bisulphate
6.5.3 blow
6.5.4 digester

(4 × 1) (4)

[17]

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QUESTION 7

7.1
- Oxygen can be used to increase the delignification rate before chemicals are added.
- During the oxidation stage, chemicals are added when acidic conditions are reached.
- After the reaction the pulp is washed.
- Sodium hydroxide is used in the extraction stage to increase the solubility of the pulp which increases the solubility of the lignin.
- Oxygen and sodium hydroxide can be used in the extraction phase to decrease damage to the fibres. (5)

7.2
- The pulp is mixed with steam.
- Chemicals are mixed with the pulp.
- A reaction takes place in the bleaching tower.
- The washers wash the pulp to remove chemicals and lignin. (4)

7.3
- Brightness
- Strength
- Yellowing
- Free from contaminants
- Viscosity (5)

7.4
- Prevents chemicals from carrying over to the next stage of the process
- Recovers expensive chemicals used during pulping (2)

7.5 pH meter (1)
[17]

QUESTION 8

8.1
8.1.1 unwind stand
8.1.2 press roll
8.1.3 glue pan
8.1.4 applicator roll
8.1.5 tension controller
(5 × 1) (5)

8.2 During the first step of threading, the end of the paper roll is fed through rolls and nips.✓ The paper is then fed into the calender so that the surface to be polished touches the metal roll.✓ The rubbing action on the paper passing through the rolls smoothes and polishes the surface of the paper.✓ (3)

8.3 Air can cause creasing✓ and shake the rolls.✓ (2)

8.4 A fly roll holds the web away from the rolls. (1)

8.5
- Stop the binders from dissolving in water
- Cause less foaming
- Make paper sheets whiter and brighter
- Stop bacteria from spoiling the coating mixture (4)

8.6
- Dispersers
- Agitators
- De-aerators
- Mixers (Any 2 × 1) (2)

[17]

TOTAL SECTION B: 85
GRAND TOTAL: 100

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