higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

PULP AND PAPERMAKING TECHNOLOGY
NQF LEVEL 3

8 November 2022

This marking guideline consists of 6 pages.

Copyright reserved

SECTION A

QUESTION 1

1.1 Silo
1.2 Flotation
1.3 Slurry/Stock
1.4 Ramping
1.5 Winding

(5 × 1) **[5]**

QUESTION 2

2.1 True
2.2 True
2.3 False
2.4 False
2.5 True
2.6 True
2.7 False
2.8 True
2.9 True
2.10 False

(10 × 1) **[10]**

QUESTION 3

3.1 H
3.2 B
3.3 M
3.4 A
3.5 C
3.6 F
3.7 G
3.8 E
3.9 J
3.10 D

(10 × 1) **[10]**

TOTAL SECTION A : 25

Copyright reserved

SECTION B

QUESTION 4

4.1
- Dumped in a landfill site
- Burned in a refuse boiler (2)

4.2 Logs are continuously fed into one end of a rotating drum.✓ Log lifters mounted on the inside of the drum shell cause the logs to tumble and roll inside the drum.✓ While tumbling and rolling, the logs hit and rub against each other, loosening the bark and scraping it from the log surface.✓ The bark falls out of the drum through the slots in the drum shell.✓ The debarked logs are forced out of the out-feed end by the continuous stream of fresh wood being fed into the debarker.✓ (4)

4.3
- Use the chips in the order they were put into storage.
- Do not make piles very high.
- Often check the temperature of the chip piles.
- Avoid tractors from driving over chip piles.
- Use rubber tyres on tractors as they do less damage on chips. (Any 3 × 1**)** (3)

[9]

QUESTION 5

5.1
- Bagasse washer
- Pin drum feeder
- Depither
- Dewatering press (4)

5.2
- The feed to the press is too high.
- The screens are blocked and do not allow the water to pass through. (2)

[6]

QUESTION 6

6.1 In a deflaker fibre bundles are broken down into loose stretchy fibres.✓ This happens between two metal deflaker plates with grooves called fillings.✓ Between these plates, the fibres rub against the plates and each other. The rotor turns the stator to which the plates are attached.✓ (3)

6.2 It creates a vacuum inside the drum. (1)

6.3 Softwood trees produce a stronger pulp than hardwood trees. (1)

6.4
- Not enough shower reaching the stone
- Hard particles like rocks and metal present in the grinding zone (2)

6.5 It ensures that high uniform grinding temperature is maintained and it lowers energy consumption. (2)

Copyright reserved

6.6 During the first part of the process, woodchips are steamed to soften.✓ Thereafter, the softened chips are sent to the primary and secondary refiners to be broken up into individual fibres.✓ (2)

[11]

QUESTION 7

7.1
- A wad of fibre is gathered as the fillings of the plates facing each other are about to touch.
- Pressure starts to build up and water is removed from the fibre wad when the fibre is trapped between the teeth.
- Fibres are under complete pressure.
- Pressure is released and water is reabsorbed. (4)

7.2 7.2.1 A stream of steam is blown in at the top of the digester to blow the chips and spread them evenly✓ to allow the cooking liquor to be distributed evenly throughout the chips.✓

7.2.2 During pre-steaming, low pressure steam is added to the digester for a short time allowing the cooking liquor to seep into the chips quicker.✓ This in turn causes faster delignification.✓

7.2.3 If there is too much wood, the contents of the digester will be too dry to blow out and less chips will be cooked.✓ If there is too much liquor, there will not be enough chips in the digester, which means there will be a low production capacity.✓

(3 × 2) (6)

7.3
- Too little alkali in the process causes lignin condensation, where lignin reattaches itself to the fibres.
- There could be bark present on the chips, which causes the discolouring. (2)

[12]

QUESTION 8

8.1
- Stainless-steel digester
- Refiner (2)

8.2 Direct contact with the atmosphere will damage the bagasse fibres because of exposure to bacteria. This is why the fibres are blown into an atmospheric blow tank. (2)

[4]

Copyright reserved

QUESTION 9

9.1 Soda pulping does not produce a foul smell. (1)

9.2 9.2.1 The screw feeder turns too quickly, not allowing the bagasse enough time to cook.

9.2.2 Change the screw feeder rotation speed so that the retention time is correct.

9.2.3 Cooking temperature is too low, because steam supply is too little.

9.2.4 Increase the steam supply to the digester.

(4 × 1) (4)

9.3 Calcium or magnesium reacts with sulphurous acid and forms salt which decreases the pH of the cooking liquor making lignin more soluble in the cooking liquor.✓ This allows the lignin to dissolve in the cooking liquor thus making the colour of the pulp lighter.✓ (2)

[7]

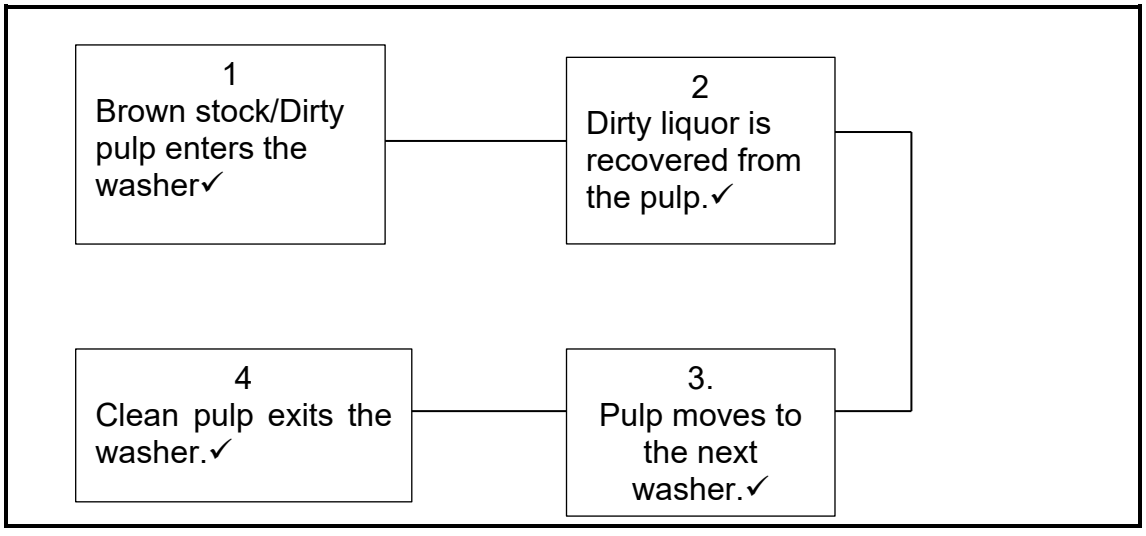
QUESTION 10

10.1 A - Downflow tower
B – Upflow tower
C – Upflow-downflow tower (3 × 1) (3)

10.2
- The time the pulp stays in the tower cannot be changed.
- All stages in the tower must be started at the same time.
- When the tower is shut down, the remaining pulp must be flushed out with water. (3)

10.3 Caustic extraction and hypochlorite brightening (1)

10.4



(4)

[11]

QUESTION 11

11.1 A – Wind-up roll
B – Squeeze rolls
C – Embossed roll
D – Support roll
E – Unwinding roll (5 × 1) (5)

11.2
- Wax and hot melt
- Extrusion
- Wet
- Solventless (Any 2 × 1) (2)

[7]

QUESTION 12

12.1
- Pigments
- Binders
- Additives (3)

12.2
- Additives stop binders from dissolving in water.
- Additives cause less foaming.
- Additives make paper sheets whiter and brighter.
- Additives stop bacteria from spoiling the coating mixture. (Any 3 × 1) (3)

12.3 When printing on a piece of paper, you do not want pictures or text to show through on the other side of the paper. The more opaque the paper is, the less likely it is that this will happen. (2)

[8]

TOTAL SECTION B : 75
GRAND TOTAL : 100

Copyright reserved