higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

PULP AND PAPERMAKING TECHNOLOGY
NQF LEVEL 4

16 November 2023

This marking guideline consists of 6 pages.

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SECTION A

QUESTION 1

1.1 D
1.2 C
1.3 B
1.4 B
1.5 A

(5 × 1) **[5]**

QUESTION 2

2.1 H
2.2 F
2.3 A
2.4 G
2.5 C

(5 × 1) **[5]**

QUESTION 3

3.1 True
3.2 True
3.3 False
3.4 False
3.5 True
3.6 True
3.7 False
3.8 False
3.9 True
3.10 False

(10 × 2) **[20]**

TOTAL SECTION A: 30

SECTION B

QUESTION 4

4.1 To produce a uniform furnish and to consistently produce high-quality paper (2)

4.2 A: Water
B: Pulper
C: Pulper dump chest
D: Deflaker
E: Refiner feed chest (5)

4.3
- Energy input
- Deflaker gap clearance
- Deflaker and filing design (3)

4.4
- Pinholes
- Two-sidedness
- Loss of fines and fillers
- Premature fabric and suction box wear
- High drag on the forming fabric and at worst fabric freezing
- Excessive wet-end breaks especially on open draw machines (Any 5 × 1) (5)

4.5 Wet paper enters the nip press and water is squeezed out.✓ The remaining water is evaporated in the dryer section. The energy requirements and costs for removing the water by evaporation are more expensive than the pressing process itself.✓ It is cheaper to remove water by mechanical means in the pressing section than through evaporation in the dryer section.✓ Wet pressing reduces the risk of the paper being damaged or breaking in the dryer section.✓ A good running press section will ease off on the heat energy required to evaporate water through the dryers.✓ (5)

[20]

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QUESTION 5

5.1 5.1.1 Kraft paper
5.1.2 Carton board
5.1.3 Tissue
5.1.4 Newsprint

(4 × 1) (4)

5.2
- Tensile strength
- Tearing strength
- Burst strength
- Stretch
- Stiffness
- Compressibility
- Curling tendency

(Any 3 × 1) (3)

5.3 A: Roll removal assembly/lowerator
B: Tension drums
C: Rider roll
D: Lead-in roll
E: Parent roll
F: Backstand
G: Slitters
H: Spreader roll (8)

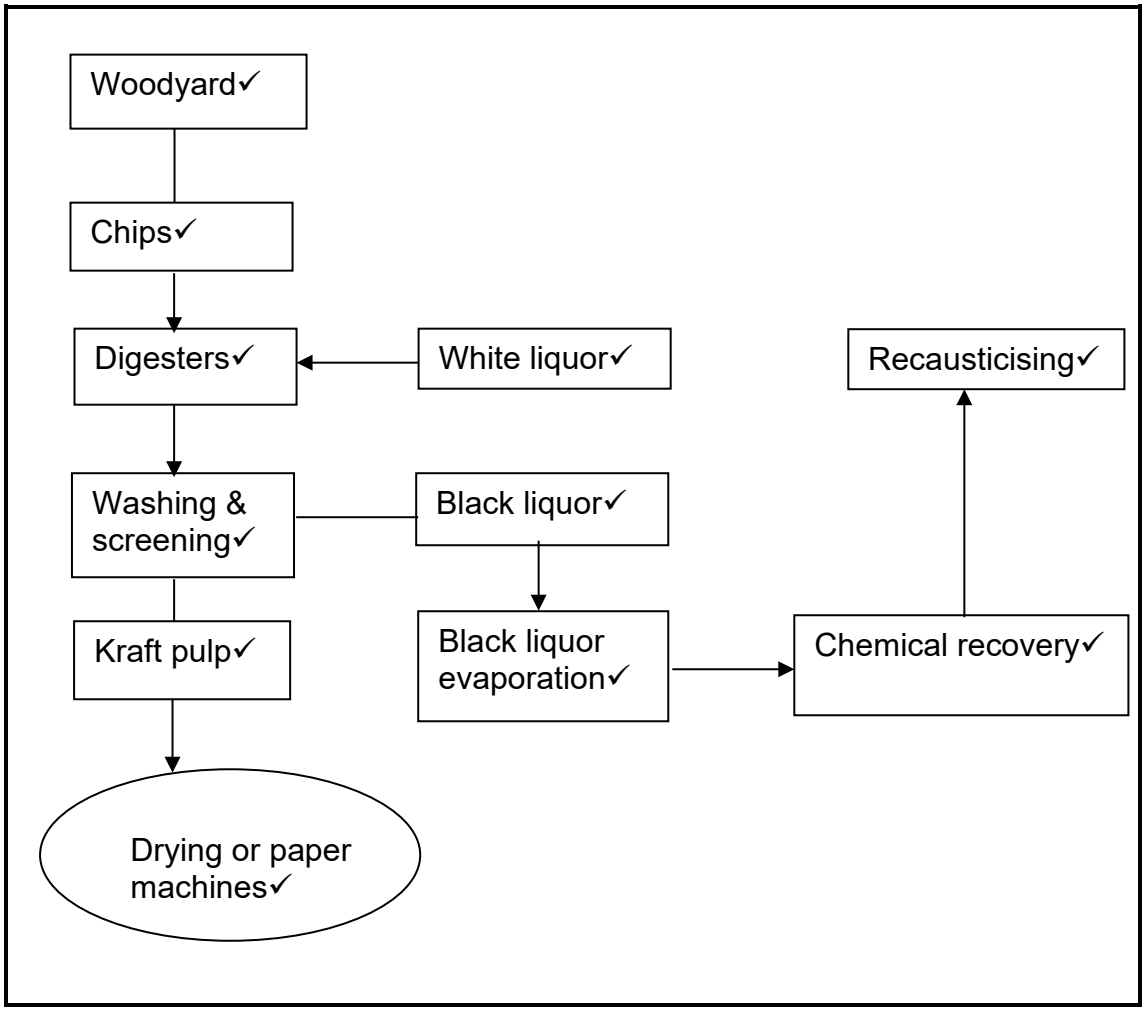
[15]

QUESTION 6

6.1 It is the mixture of chemicals used in chemical pulping process for digestion or cooking of woodchips. (2)

6.2
- It has large quantities of combustible organic compounds.
- It has the valuable reacted products of the inorganic cooking liquid. (2)

6.3



(11)

6.4
- Chemical composition
- Concentration
- Heating value (3)

6.5
- Carbon dioxide (CO_2)
- Water (H_2O) (2)

[20]

QUESTION 7

7.1 To convert the used sodium compound, i.e. sodium carbonate and sodium sulphite, into active sodium hydroxide plus sodium sulphide (2)

7.2 $CaO + H_2O \rightarrow Ca(OH)_2$✓ + heat✓ (2)

7.3 The process of mixing green liquor with lime to form slurry (2)

7.4 7.4.1 A sample is dried at 105 °C for about 60 minutes.✓ It is weighed before and after drying.✓ (2)

7.4.2 The burnt lime sludge is firstly ground into powder form.✓ It is then slaked with distilled water before being titrated with hydrochloric acid.✓ The amount of available lime is calculated using the amount of acid consumed. ✓ (3)

7.5
- Storage
- Sulphur melter
- Sulphur burner
- Waste heat boiler
- Humidifying tower
- Gas cooler
- Hägglund's hydraulic drive system (Any 2 × 1) (2)

7.6
- Operating the burner at the highest possible temperature and gas strength
- Avoiding a high air-to-gas ratio
- Using refractory lined piping (Any 2 × 1) (2)

[15]

TOTAL SECTION B: 70
GRAND TOTAL: 100

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