higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

PULP AND PAPERMAKING TECHNOLOGY
NQF LEVEL 4

(6050394)

12 November 2018 (Y-Paper)
13:00–16:00

This question paper consists of 6 pages.

NCV

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TIME: 3 HOURS
MARKS: 100

INSTRUCTIONS AND INFORMATION

1. Answer ALL the questions.
2. Read ALL the questions carefully.
3. Number the answers according to the numbering system used in this question paper.
4. Write neatly and legibly.

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SECTION A

QUESTION 1

Indicate whether the following statements are TRUE or FALSE. Choose the answer and write only 'True' or 'False' next to the question number (1.1–1.5) in the ANSWER BOOK. Correct a statement if it is FALSE.

1.1 A cylindrical rotor is more favourable because it ensures a uniform flow in the axial direction relative to the pressure screen.

1.2 The sheet leaving the forming section contains about 20% water.

1.3 Drying takes place in four stages namely the warm-up stage, cooling stage, falling-rate stage and bond-water stage.

1.4 Spent liquor produced from the soda process is called weak black liquor.

1.5 To obtain maximum thermal efficiency, the length-to-diameter ratio of a large kiln should be over 30:1.

(5 × 1) **[5]**

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QUESTION 2

Choose a description from COLUMN B that matches a word or words in COLUMN A. Write only the letter (A–J) next to the question number (2.1–2.10) in the ANSWER BOOK.

COLUMN A		COLUMN B	
2.1	Brightness	A	important property of wound paper
2.2	Steam heater	B	determined by the organic content
2.3	Heating value	C	only used in Fourdrinier machines
2.4	Vacuum	D	component of a deflaker
2.5	Water-soluble sodium	E	begins the moment that free water becomes scarce and the evaporation rate drops
2.6	Falling-rate drying	F	content is determined by using atomic absorption spectroscopy
2.7	Total sulphur		
2.8	Rotor	G	poor control can result in formation problems
2.9	Web control	H	sometimes used to vaporise liquid oxygen
2.10	Pickup press	I	may be significantly lower when using secondary fibre
		J	sample is titrated with a lead perchlorate solution

(10 × ½) **[5]**

QUESTION 3

Complete the following sentences by writing only the missing word/words next to the question number (3.1–3.5) in the ANSWER BOOK.

The retention time is controlled by the (3.1) ... and (3.2) … of the kiln. The slope is usually designed between (3.3) … and 36 mm per metre of length. The speed varies from 0,5 to (3.4) … r/min. Retention time should fall in the range of (3.5) … hours. **[5]**

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QUESTION 4

Give the definition of the following papermaking terms:

4.1 Orifice plate

4.2 Kappa number

4.3 Scale

4.4 Wet strength

4.5 Streaking

(5 × 2) **[10]**

TOTAL SECTION A: 25

SECTION B

QUESTION 5: STOCK PREPARATION

5.1 During refining the paper's properties change.

State FIVE ways in which the individual fibres are affected by refining. (5)

5.2 Explain the principle of operation of a pressure screen. (6)

5.3 When would the thickening process be classified as functioning poorly? (3)

5.4 Why is freeness an important factor during thickening? (2)

[16]

QUESTION 6: WET-END PROCESSES

6.1 State the advantages of forming fabrics made from polyester monofilaments. (3)

6.2 Describe FOUR consequences of uneven formation. (4)

6.3 Name and discuss THREE factors that affect drainage at the forming board. (6)

6.4 How does increased pressure at the press section affect sheet opacity? (2)

[15]

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QUESTION 7: DRY-END PROCESSES

7.1 State FIVE quality requirements for carton boxes. (5)

7.2 Name TWO types of radiant heaters. (2)

7.3 Give FOUR reasons for testing paper. (4)

7.4 State SIX characteristics of the winder. (6)
[17]

QUESTION 8: CHEMICAL RECOVERY

8.1 Name THREE main factors that affect the quality of liquor. (3)

8.2 Name the most expensive and important unit in a Kraft chemical recovery plant and state TWO of its functions. (3)

8.3 The most common cause of explosions in furnaces is tube failure.

State FOUR conditions that cause tube failure. (4)

8.4 How is the magnesium oxide recovery furnace different from the soda recovery furnace? (4)
[14]

QUESTION 9: PRODUCTION OF PULPING CHEMICALS

9.1 Give the chemical equation of each of the following reactions:

9.1.1 Causticising

9.1.2 Slaking

9.1.3 Calcining

(3 × 2) (6)

9.2 What problems occur as a result of a high sodium content during unslaked lime production and how can it be avoided? (3)

9.3 Briefly explain the operating principle of a waste-heat boiler. (4)
[13]

TOTAL SECTION B: 75
GRAND TOTAL: 100

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