higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

PULP AND PAPERMAKING TECHNOLOGY L3
NQF LEVEL 3

(6050383)

13 November 2024 (X-paper)
09:00–12:00

This question paper consists of 9 pages.

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DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)
PULP AND PAPERMAKING TECHNOLOGY
NQF LEVEL 3
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. Start each section on a new page.
5. Use only a black or blue pen.
6. Write neatly and legibly.

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SECTION A

QUESTION 1

Various options are given as possible answers to the following questions. Choose the answer and write only the letter (A–D) next to the question number (1.1–1.10) in the ANSWER BOOK.

1.1 Clean cooking liquor in the Kraft pulping process that has not been used before:

A White liquor
B Black liquor
C Green liquor
D Red liquor

1.2 A machine that is used to create patterns or decorations on paper:

A Digester
B Embosser
C Rotary vacuum washer
D Air-flotation cell

1.3 A process where particles separate because of their ability to float on a particular liquid:

A Washing
B Pressing
C Flotation
D Forming

1.4 A shiny and very smooth paper that is used for magazines and brochures:

A Embossed
B Screen printing
C Letter printing
D Glossy

1.5 A large hole in the ground where waste materials are discarded:

A Pit
B Trough
C Channelling
D Delignification

1.6 A process in which bark is removed from wood logs:

A Slashing
B Debarking
C Harvesting
D Tree fell

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1.7 A process in which green liquor is converted into white liquor:

A Cooking
B Bleaching
C Caustising
D Evaporation

1.8 The removal of water from the sheet to consolidate the sheet:

A Forming
B Drying
C Approach-flow system
D Pressing

1.9 One of the reasons for using softwood trees in the mechanical pulping process is:

A Longer fibres
B Consume less chemicals
C Produce higher yield
D Available everywhere

1.10 The purpose of super calendering is to …

A remove dirt.
B polish paper.
C decorate paper.
D hide defects.

(10 × 1) **[10]**

QUESTION 2

Indicate whether the following statements are TRUE or FALSE by writing only 'True' or 'False' next to the question number (2.1–2.5) in the ANSWER BOOK.

2.1 During counter current washing, the wash water flows in the same direction as the pulp.

2.2 Lignin gives pulp a dark colour.

2.3 The type of de-inking process used depends on the amount of ink that needs to be removed.

2.4 Bark and plastics can strengthen the quality of paper.

2.5 Chips that are stored for a long time become stronger and produce pulp of good quality.

(5 × 1) **[5]**

QUESTION 3

Choose a term from COLUMN B that matches a description in COLUMN A. Write only the letter (A–J) next to the question number (3.1–3.5) in the ANSWER BOOK.

COLUMN A		COLUMN B	
3.1	Process of removing lignin from pulp	A	pith
3.2	Material that is used to make sure that components of the coating mixture stick together	B	deflaker
		C	weighbridge
3.3	A machine onto which trucks drive that is used to measure how much wood is coming into the woodyard as logs	D	binder
		E	delignification
3.4	Equipment used to break down fibre bundles into loose, stretchy fibres	F	blister
		G	ground wood pulping
3.5	Soft, spongy, white centre of a sugar cane	H	chips
		I	latency
		J	ramping

(5 × 1) **[5]**

QUESTION 4

Complete the following sentences by writing only the missing word or words next to the question number (4.1–4.5) in the ANSWER BOOK.

4.1 The papermaking process begins in the …

4.2 … refers to anything that cannot be used as pulp.

4.3 A glue-like substance that binds fibres together in wood is known as …

4.4 … is the quality of a material that prevents light from penetrating it.

4.5 A metal disc with small holes in it to separate big particles from small ones is called a …

(5 × 1) **[5]**

TOTAL SECTION A: 25

SECTION B

QUESTION 5

5.1 The words given below are steps to follow for turning logs into chips at a woodyard. Write them down in the correct sequence. (7)

debarking; sorting; chipping; slashing; chip screening; storing; re-chipping

5.2 The weight of a truck without logs when measured on a weighbridge is 10 000 kg. After the truck has picked up the logs, the weighbridge shows that it now weighs 15 000 kg.

Calculate the weight of the logs. (3)

5.3 Name TWO types of debarkers used for debarking wood logs. (2)

5.4 Define *bagasse.* (2)

5.5 Give THREE factors that affect the quality of bagasse. (3)

[17]

QUESTION 6

6.1 There are many reasons for using secondary fibre to make paper instead of using virgin fibre all the time.

6.1.1 What is a *secondary* fibre? (1)

6.1.2 Name TWO contraries that are associated with secondary fibre. (2)

6.2 What are the main components of the following re-pulping equipment?

6.2.1 Pulper (4)

6.2.2 Deflaker (3)

6.3 List THREE types of surfactants commonly used in the de-inking process. (3)

6.4 Explain the THREE steps that are involved in the ink flotation process. (3)

6.5 Mention THREE types of mechanical pulping processes. (3)

6.6 Give THREE types of digesters. (3)

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6.7 Describe the processes below as they occur in the digester during Kraft pulping:

6.7.1 Digester loading

6.7.2 Cooking liquor charging

(2 × 2) (4)

6.8 NSSC is a pulping process that uses a combination of chemical and mechanical methods to produce pulp.

6.8.1 What does NSSC stand for? (1)

6.8.2 Write the names down of the cooking chemicals that are used in NSSC. (2)

6.8.3 State ONE advantage of NSSC. (1)

6.9 The soda (caustic) pulping process uses bagasse instead of wood as a raw material to make paper.

6.9.1 Write down a chemical formula for soda (caustic). (1)

6.9.2 What are the TWO types of equipment used in the soda (caustic) pulping process? (2)

6.10 The acid-sulphite pulping process is a chemical process in which wood chips are cooked in acidic cooking liquor. Describe the typical operational conditions for this process under the following headings:

6.10.1 Temperature

6.10.2 Pressure

6.10.3 Cooking time

(3 × 1) (3)

[36]

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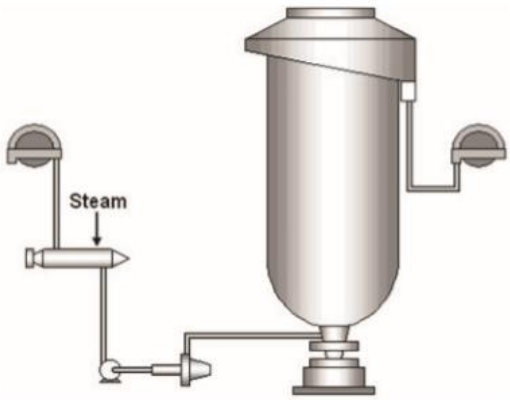
QUESTION 7

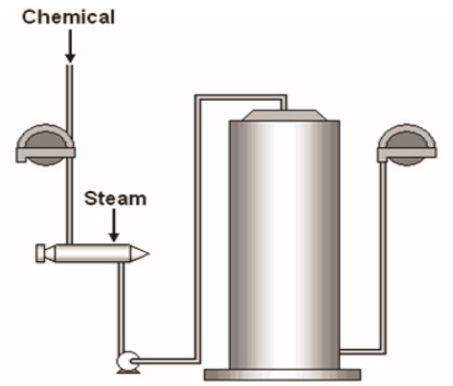
7.1 Bleaching refers to the chemical treatment of brown pulp stock to change it into whiter pulp.

Name the following bleaching towers. Write only the word or words next to the question number (7.1.1–7.1.3) in the ANSWER BOOK.

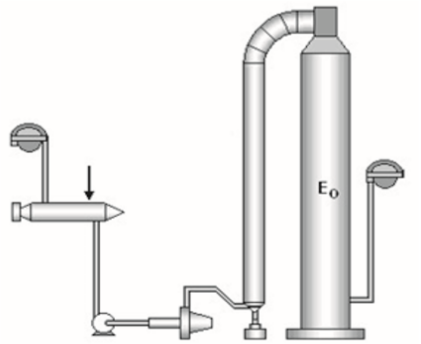
7.1.1



7.1.2



7.1. 3



(3 × 1) (3)

7.2 Give TWO examples of bleaching chemicals used in the paper industry. (2)

7.3 Draw a counter-current washing system with TWO washing stages used to wash pulp. (5)

7.4 Why must spent liquor not be diluted? (1)

[11]

QUESTION 8

8.1 Embossing is a finishing process that produces decorations or patterns on the surface of paper.

8.1.1 Give TWO examples of embossed papers. (2)

8.1.2 Give THREE examples of commonly used embossing machines. (3)

8.2 Complete the questions below based on the supercalendering process by filling in the missing words. Write only the missing word next to the question number (8.2.1–8.2.3) in the ANSWER BOOK.

8.2.1 The paper that moves between the rolls is called a …

8.2.2 The space between the two rolls is called a …

8.2.3 The … holds the web away from the rolls.

(3 × 1) (3)

8.3 Define *lamination process*. (1)

8.4 Provide TWO benefits of laminating paper. (2)

[11]

TOTAL SECTION B: 75
GRAND TOTAL: 100

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