higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

PULP AND PAPERMAKING TECHNOLOGY
NQF LEVEL 3

(6050383)

7 December 2020 (X-paper)
09:00–12:00

This question paper consists of 7 pages.

377Q1N2007

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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. 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

Indicate whether the following statements are TRUE or FALSE by writing only 'True' or 'False' next to the question number (1.1–1.5) in the ANSWER BOOK.

1.1 Drum debarkers work best when the debarking drums are half full.

1.2 Groundwood pulping can be used to produce paper that will be stored for a long time.

1.3 Chips in a digester should form a pyramid to fill the digester properly.

1.4 During pulp drying, dirty water can contain ink and deinking chemicals.

1.5 Delamination can occur if not enough glue was applied to the sheet.

(5 × 1) **[5]**

QUESTION 2

Choose a term from COLUMN B that matches a description in COLUMN A. Write only the letter (A–I) next to the question number (2.1–2.5) in the ANSWER BOOK.

COLUMN A		COLUMN B	
2.1	Process to remove wrong-sized chips and unwanted materials such as bark, dirt or plastic	A	rotary vacuum washer
		B	sheeting
2.2	Thick mixture of fibre and water	C	horizontal belt washer
2.3	Test that assesses the general strength of paper	D	screening
		E	slurry
2.4	Pulp washing equipment consisting of a drum covered with mesh wire	F	burst
2.5	Web of paper cut into equal lengths	G	cleaning
		H	freeness
		I	trimming

(5 × 1) **[5]**

QUESTION 3

Give ONE term for each of the following descriptions by writing it next to the question number (3.1–3.5) in the ANSWER BOOK.

3.1 Equipment used to clean the bagasse before it enters the depither

3.2 Separation process in which air is used to remove ink from the slurry

3.3 Artificial stone, made from hard gravel and stones of different sizes called grit, used in groundwood pulping

3.4 Test to measure how fast water drains from pulp

3.5 Device in tanks that keeps the slurry well mixed and ensures that solids do not settle on the bottom of the tank

(5 × 1) **[5]**

TOTAL SECTION A: 15

SECTION B

QUESTION 4

4.1 It is important for the paper mill to debark logs in order to produce quality paper and find suitable ways to use or get rid of the bark.

4.1.1 State TWO factors that affect debarking. (2)

4.1.2 Name THREE types of debarkers. (3)

4.1.3 Give TWO ways of disposing of bark. (2)

4.2 Chip screening ensures that the chips used are all of the same size.

4.2.1 Give TWO purposes of chip screening. (2)

4.2.2 Explain the working principles of chip screening. (8)

[17]

QUESTION 5

5.1 Define the term *flotation*. (2)

5.2 State FOUR ways to manage the quality of pulp and paper. (4)

5.3 Give ONE reason for each of the following problems during deinking:

5.3.1 Very little air bubbles forming in the flotation cell

5.3.2 Not enough ink washed away

(2 × 1) (2)

5.4 Explain the function of each of the following in ground pulping:

5.4.1 Shower water

5.4.2 Weir

(2 × 1) (2)

5.5 Explain how to remedy each of the following problems during poor pulpstone operation:

5.5.1 Grinder grinding hard particles like rocks and metal

5.5.2 Temperature change across the stone is too rapid

5.5.3 Poor sharpening techniques or faulty equipment

(3 × 1) (3)

5.6 List FOUR physical tests to perform on thermomechanical pulp. (4)
[17]

QUESTION 6

6.1 Explain the THREE steps of the Kraft pulping process. (3)

6.2 What is the required temperature and pressure inside the digester during Kraft pulping? (2)

6.3 List THREE indicators of poor Kraft pulping performance. (3)

6.4 State the function of each of the following digester components:

6.4.1 Blow valve

6.4.2 Screw feeder

6.4.3 Pin drum feeder

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6.4.4 Internal screw conveyor

6.4.5 Tee pipe with blowback damper

(5 × 1) (5)

6.5 Complete the following paragraph by writing only the missing word or words next to the question number (6.5.1–6.5.4) in the ANSWER BOOK.

(6.5.1) … is a chemical pulping process in which woodchips are cooked in acidic cooking liquor. The liquor is made from calcium or (6.5.2) … and sulphurous acid. The process takes place in a batch digester and a (6.5.3) … tank. The process starts by cooking the chips with cooking liquor in a (6.5.4) … (4 × 1) (4)

[17]

QUESTION 7

7.1 Explain FIVE aspects to consider when chlorine and chlorine dioxide are used as oxidants. (5)

7.2 State the FOUR steps in bleaching. (4)

7.3 List FIVE quality requirements for bleached pulp. (5)

7.4 Give TWO reasons why it is important to wash cooking liquor out of the pulp. (2)

7.5 Name the tool used to measure the acidity or alkalinity of the pulp. (1)

[17]

QUESTION 8

8.1 Choose ONE term from the list below for each of the following descriptions and write it next to the question number (8.1.1–8.1.5) in the ANSWER BOOK.

glue pan; tension controller; press roll; unwind stand; applicator roll

8.1.1 Keeps the reel in its place and controls the tightness of the paper that goes through the gluing area

8.1.2 Smoothes the paper after lamination and controls the thickness of the paper

8.1.3 Holds the glue at a specific height

8.1.4 Puts a layer of glue onto the web of paper

8.1.5 Ensures that the glue spreads evenly on the web

(5 × 1) (5)

8.2 Explain the working principles of supercalendering. (3)

8.3 Why is it important to adjust the fly rolls to prevent air from collecting under a sheet? (2)

8.4 Give the purpose of a fly roll. (1)

8.5 State FOUR benefits of using additives. (4)

8.6 Give TWO types of equipment that produce coating slurry. (2)
[17]

TOTAL SECTION B: 85
GRAND TOTAL: 100

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