higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

PULP AND PAPERMAKING TECHNOLOGY
NQF LEVEL 2

(6050372)

1 March 2018 (X-Paper)
09:00–12:00

This question paper consists of 6 pages.

NCV

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.

NCV

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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.

1.1 Kraft paper is used to make paper bags.

1.2 A continuous digester cooks one load of chips at a time.

1.3 The waste heat boiler consists of tubes on the outside of the gas discharge pipe from the furnace.

1.4 The purpose of the silo in an approach flow system is to provide bubble-free water to the fan pump.

1.5 The dry lamination technique allows the adhesive combination of two nonporous substrates.

(5 × 1) **[5]**

QUESTION 2

Give ONE term for each of the following descriptions. Write only the term next to the question number (2.1–2.5) in the ANSWER BOOK.

2.1 Ability of paper to obstruct the passage of light

2.2 Pulping process that relies on heat in the form of steam

2.3 Used cooking liquor

2.4 Process that involves the melting of plastic granules to form them into a film

2.5 Type of machine that applies a pattern to paper by running it between engraved rolls

(5 × 1) **[5]**

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QUESTION 3

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

COLUMN A		COLUMN B	
3.1	Section of a Fourdrinier paper machine where slurry is poured into	A	evaporation
3.2	Process of reducing a vegetable source of fibre to its component parts with the use of chemicals	B	calcium bisulphite
3.3	Used as a cooking liquor	C	gravure
3.4	Transformation of water liquid to gas by energy from heat or air movement	D	wet end
3.5	Machine that applies a pattern to paper by running it between engraved rolls	E	chemical pulping
		F	drying
		G	lithography
		H	press section
		I	sodium sulphite

(5 × 1) **[5]**

QUESTION 4

4.1 Dry forming is a process in which a nonwoven web is produced from dry textile and human-made fibres.

Name FOUR phases of the dry forming process. (4)

4.2 Give ONE example of a product that can be produced by Kimberly-Clark. (1)

4.3 Secondary fibres are cellulose fibres that come from waste paper collected for recycling.

4.3.1 Name TWO types of recycled paper. (2)

4.3.2 List THREE types of contraries found in secondary fibre bales and give an example of each. (3 + 3) (6)

4.4 Why are plant fibres important in making paper and paperboard? (3)

4.5 How do the following factors impact the quality of bagasse:

4.5.1 Pith content

4.5.2 Contraries

(2 × 2) (4)

4.6 What is the main cause of wood decay? (1)

[21]

QUESTION 5

5.1 Define the following:

5.1.1 Porosity

5.1.2 Bursting strength

(2 × 2) (4)

5.2 The uses and applications of paper and paper products are virtually limitless.

Give TWO uses of paper. (2)

5.3 Briefly explain the super calendering process. (3)

5.4 Wood preparation consists of a series of operations to convert pulp logs into a form suitable for subsequent pulping operations.

Explain the process of converting logs into chips. (8)

5.5 Define a *pith*. (2)

[19]

QUESTION 6

6.1 Mechanical pulping refers to the production of pulp by using mechanical methods.

6.1.1 Describe the TWO methods of mechanical pulping. (2 × 2) (4)

6.1.2 What is the main advantage of mechanical pulping? (2)

6.1.3 Does mechanical pulping produce better quality paper than chemical pulping? Substantiate the answer. (3)

6.2 Explain THREE differences between Kraft and an acid sulphite digester. (3)

6.3 During spent liquor treatment, fluidised bed is used as a controlled dispersion spray.

Give TWO advantages of a fluidised bed reactor. (2)

6.4 Pulp slurry produced by the grinder during ground wood pulping falls into a pit before overflowing into a flume channel.

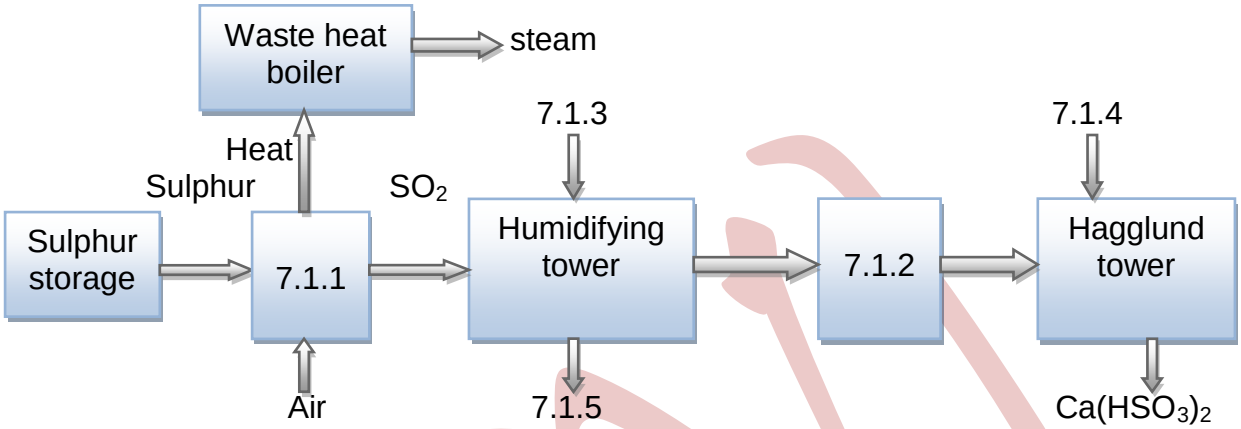
Describe the TWO purposes of the grinder pit. (2)

[16]

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QUESTION 7

7.1 The flow diagram below represents the production process of calcium bisulphate. Label the diagram and write only the answer next to the question number (7.1.1–7.1.5) in the ANSWER BOOK.



(5 × 1) (5)

7.2 The chemical recovery process converts chemicals produced by the digestion process back into cooking liquor.

7.2.1 List THREE benefits of the chemical recovery process. (3)

7.2.2 Which process is used in a chemical recovery system to remove excessive water from black liquor to increase the concentration of valuable combustible organic and inorganic chemicals in the liquor? (2)

7.3 The function of a Copeland reactor is to convert spent liquor into saleable sodium carbonate (Na_2CO_3) during the NSSC process.

Give THREE advantages of a Copeland reactor. (3)

[13]

QUESTION 8

8.1 Define the following terms associated with papermaking:

8.1.1 Pressing

8.1.2 Forming

(2 × 2) (4)

8.2 List FIVE processes in sequence that is involved in papermaking. (5)

8.3 Sketch a diagram of a Fourdrinier table including FOUR distinct phases. (4)

8.4 List THREE techniques used in the lamination process. (3)

[16]

TOTAL: 100

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