higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

T1260(**E**)(A9)T

NATIONAL CERTIFICATE

PAPERMAKING N4

(11022114)

9 April 2018 (X-Paper)
09:00–12:00

Nonprogrammable calculators may be used.

This question paper consists of 6 pages.

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DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE
PAPERMAKING 4
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 'True' or 'False' next to the question number (1.1–1.5) in the ANSWER BOOK. Correct the statement if it is FALSE.

1.1 Linerboard has at least two plies and is usually made on a Yankee with 100% virgin pulp.

1.2 Pressing can be considered an extension of the water removal process.

1.3 Two sidedness on a sheet is caused by a difference in fibre composition.

1.4 Surface sizing decreases the smoothness of the paper.

1.5 Roll crowning counters the effects of deflection.

(5 × 1) **[5]**

QUESTION 2

Define each of the following papermaking terms. Write only the definition next to the question number (2.1–2.10) in the ANSWER BOOK.

2.1 Caliper

2.2 Deculator

2.3 Biocides

2.4 Defalking

2.5 Filler

2.6 Calendering

2.7 Printability

2.8 Evaporation

2.9 Net specific energy

2.10 Blow through steam

(10 × 2) **[20]**

TOTAL SECTION A: 25

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SECTION B

QUESTION 3: STOCK PREPARATION AND DE-INKING

3.1 The paper machine you work at produces uncoated wood free paper.

3.1.1 What does the term *uncoated wood free paper* mean? (2)

3.1.2 Give an example of this type of paper. (1)

3.1.3 What is furnish composed of? (2)

3.1.4 Give reasons for your selection of fibre in the furnish. (3)

3.2 A recovered fibre plant uses flotation cells in its process.

Explain how the ink is removed from the waste paper in the flotation cells. (2)
[10]

QUESTION 4: HEADBOX AND DRAINAGE, FOURDRINIER AND TWIN WIRE MACHINES

4.1 Give a detailed discussion on the design philosophy of the approach flow system. (5)

4.2 Explain what adjustments you would make in order to correct variations in the cross machine basis mass profile in an air cushioned headbox. (5)

4.3 The various factors involved in sheet formation in air padded headboxes are: jet to wire ratio, jet angle, L/b ratio, and forming board position.

Describe how each factor affects formation and other properties. (5)
[15]

QUESTION 5: WET END ADDITIVES

5.1 List FOUR problems caused by slime on a paper machine. (4)

5.2 Propose a strategy to control slime on your paper machine. (3)

5.3 Most modern paper mills have changed from acid sizing to neutral or alkaline sizing.

Give FOUR reasons why they have opted for this change. (4)

5.4 Describe the role of cationic starch in ASA emulsification systems. (3)
[14]

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QUESTION 6: PRESSING AND DRYING OF PAPER, BOARD AND TISSUE

6.1 Significant savings in energy costs can be made if the amount of water removed at the press section is increased. Explain how the following factors influence water removal in the press section:

6.1.1 Nip impulse (3)

6.1.2 Basis mass (2)

6.1.3 Temperature (1)

6.2 The effective removal of condensate by the use of siphons is crucial for efficient dryer performance.

Describe THREE types of siphons which are commonly used in dryer cylinders and explain their principles of operation. (3 × 2) (6)

[12]

QUESTION 7: SURFACE TREATMENT OF PAPER AND MACHINE CLOTHING

7.1 List the factors that influence starch pick up at the size press (10)

7.2 Name TWO methods of cleaning machine fabrics. (2)

[12]

QUESTION 8: PAPER PHYSICS AND PROPERTIES

8.1 How does refining affect the following paper properties:

8.1.1 Burst strength

8.1.2 Ring crush

8.1.3 Opacity

8.1.4 Tensile

8.1.5 Brightness

8.1.6 Formation

(6 × 1) (6)

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8.2 The appearance or optical properties of paper are of considerable importance to the end user. Explain the factors that influence the following paper properties:

8.2.1 Opacity

8.2.2 Brightness

8.2.3 Gloss

(3 × 2) (6)
[12]

TOTAL SECTION B: 75
GRAND TOTAL: 100

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