higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

PAPERMAKING N4

9 APRIL 2018

This marking guideline consists of 5 pages.

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SECTION A

QUESTION 1

1.1 False. Linerboard is made on a Fourdrinier from virgin or recycled fibre.

1.2 True

1.3 True

1.4 False. Sizing increases smoothness

1.5 True

(5 × 1) **[5]**

QUESTION 2

2.1 Paper thickness, determined by measuring the distance between smooth, flat plates at a defined pressure

2.2 Removes entrained and dissolved air from thin stock by applying vacuum as the stock is sprayed into an open chamber

2.3 Chemical additives to kill slime forming bacteria or fungi

2.4 The breaking down of fibre bundles and flakes.

2.5 Inorganic fine solid particles added to papermaking furnish to improve the optical and physical properties of the sheet

2.6 Pressing paper with a roll in order to enhance the smoothness of the sheet

2.7 A measure of the print quality obtained under normal conditions on a sheet.

2.8 The process of removing water from the paper using hot cylinders

2.9 The amount of effective energy applied per unit weight of pulp in a refiner

2.10 Steam which does not condense in the dryer but passes straight through as steam

(10 × 2) **[20]**

TOTAL SECTION A: 25

SECTION B

QUESTION 3: STOCK PREPARATION AND DE-INKING

3.1 3.1.1
- Paper made from chemical pulp
- No mechanical pulp used and it's not coated. (2)

3.1.2 Bond paper/Kraft paper/Newsprint (1)

3.1.3 Bleached SF chemical pulp, bleached recycled pulp, clay or calcium carbonate (2)

3.1.4 Paper requires good tensile, brightness, opacity (3)

3.2
- Chemical addition
- Collector chemicals are added
- Soaps extracts ink particles, ink attaches to air bubbles and is skimmed off

(Any 2 × 1) (2)
[10]

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

4.1 Must liberate air; full silo; low downward velocity; piping pitched upward; introduction of thick stock and dilution water critical – through wall of silo and toward eye of fan pump; control valves below liquid level; best system uses a variable speed fan pump (5)

4.2
- Adjust the slice
- Maintain slice screws
- Operate side bleeds correctly
- Replace distorted slice lips
- Balance the distribution
- Correct seating of rectifier rolls
- Operate headbox showers correctly
- Minimum cross waves
- Automate the slice screws

(Any 5 × 1) (5)

4.3
- Jet to wire ratio should be equal
- Jet angle determines velocity forming or pressure forming
- L/b ratio determines jet angle
- Forming board positioned according to speed
- Breast roll diameter and required drainage (5)

[15]

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QUESTION 5: WET END ADDITIVES

5.1
- Loss of production
- Poor quality and corrosion
- Loss of additives
- Dangerous gases. (4)

5.2 Keep system clean with wash ups, and proper boil outs. Use of caustic during boil out. Frequency of boil outs related to slimicide use. (3)

5.3
- Can use CaCO3 for a brighter sheet
- Improved permanence
- More closure of water systems
- Lower furnish costs (4)

5.4
- Acts as activator surface
- Functions as emulsion stabiliser
- Acts as promoter of dispersed system for max coverage of fibres. (3)

[14]

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

6.1 6.1.1 Increase in load or dwell time increases water removal. (3)

6.1.2 Higher basis mass results in lower water removal (2)

6.1.3 Higher temperature results in better water removal (1)

6.2 Rotating syphons – Used in paper machines for all speeds, with good condensate removal. The mixture of blow-through steam and entrained condensate droplets is lifted against centrifugal force to the exit central pipe.

Stationary siphons – Sits in a bearing outside the dryer cylinder and enters through the cylinder bearing. The dynamic energy of the rimming condensate is enough to remove the condensate and no pressure drop is needed.

Bucket siphons – Used in low speed machines up to 300 m/min. When the cylinder steam pressure is lower than that needed to force the condensate through the syphon pipes, then bucket water lifters are the only practical means of keeping the cylinders free from condensate, other than running the exhaust main under vacuum.

(3 × 2) (6)

[12]

QUESTION 7: SURFACE TREATMENT OF PAPER AND MACHINE CLOTHING

7.1
- Furnish
- Freeness
- Sheet moisture
- Basis mass
- Sheet density
- Smoothness
- Porosity
- Sheet temperature
- Internal sizing
- Size press factors (10)

7.3
- Mechanical – showers
- Chemical – chemical washes (2)

[12]

QUESTION 8: PAPER PHYSICS AND PROPERTIES

8.1
8.2.1 Increases
8.2.2 Increase
8.2.3 Decrease
8.2.4 Increase
8.2.5 Decrease
8.2.6 Increase

(6 × 1) (6)

8.2
8.2.1 Filler, refining , calendaring
8.2.2 Optical brightening agents, bleaching
8.2.3 Calendering

(3 × 2) (6)

[12]

TOTAL SECTION B: 75
GRAND TOTAL: 100

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