higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE

FOUNDRY THEORY N1

(11020221)

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09:00–12:00

This question paper consists of 10 pages.

132Q1E2222

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DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE
FOUNDRY THEORY N1
TIME: 3 HOURS
MARKS: 150

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 question on a new page.
5. Use only a blue or black pen.
6. Write neatly and legibly.

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QUESTION 1

Various options are given as possible answers to the following questions. Choose the answer and write only the letter (A–B or A–D) next to the question number (1.1–1.20) in the ANSWER BOOK.

1.1 Which of the following is not a source of moulding sand?

A Sea
B Lakes
C Desert
D Forests

1.2 Which of the following is not a type of moulding sand?

A Red sand
B Natural sand
C Synthetic sand
D Loam

1.3 What is the percentage composition of clay in natural sand?

A 22–31%
B 3–10%
C 5–20%
D 18–29%

1.4 What is the percentage composition of water in natural sand?

A 2–4%
B 5–8%
C 6–9%
D 10–13%

1.5 What is mixed with natural sand to make it semisynthetic sand?

A Bentonite
B Barelelne
C Cubane
D Prismane

1.6 Which sand is used for casting cast irons and non-ferrous metals?

A Loam
B Natural sand
C Synthetic sand
D Refractory sand grain

1.7 Natural sands are more economical than synthetic sands.

A True
B False

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1.8 What is the clay content in loam?

A 30%
B 40%
C 50%
D 60%

1.9 Which sand is used for making ferrous and non-ferrous alloys?

A Natural sand
B Synthetic sand
C Loam
D Refractory sand grain

1.10 The volumes of silica a general loam mixture contains:

A 10
B 20
C 30
D 40

1.11 What sand grain shape is shown in the figure below?



A Rounded
B Subangular
C Angular
D Compound

1.12 What sand grain shape is shown in the figure below?



A Round
B Subangular
C Angular
D Compound

1.13 Round grain has higher permeability than angular grains.

A True
B False

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1.14 What sand grain shape is shown in the figure below?



A Rounded
B Subangular
C Angular
D Compound

1.15 On increasing the binder content, what in the moulding sand gets reduced?

A Hardenability
B Strength
C Permeability
D Brittleness

1.16 Which of the following is bentonite?

A Kaolinite
B Sodium montmorillonite
C Illite
D Limonite

1.17 Which of the following is not a clay binder?

A Kaolinite
B Illite
C Limonite
D Carsil

1.18 What type of binders are clays?

A Organic
B Patented
C Inorganic
D Other binders

1.19 At what temperature does clay dead burning take place?

A 400 °C–500 °C
B 500 °C–600 °C
C 600 °C–700 °C
D 700 °C–800 °C

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1.20 What is the breadth size range of a clay particle?

A 0,01–1 micrometres
B 0,02–2 micrometres
C 0,03–3 micrometres
D 0,04–4 micrometres

(20 × 1) **[20]**

QUESTION 2

Various options are given as possible answers to the following questions. Choose the answer and write only the letter (A–B or A–D) next to the question number (2.1–2.10) in the ANSWER BOOK.

2.1 Which of the following is not a characteristic property of any moulding sand?

A Flowability
B Hardenability
C Green strength
D Dry strength

2.2 What does a mould having adequate green strength not have?

A Ability to retain its shape
B Ability not to get distorted
C Ability not to collapse
D Ability to retain hardness

2.3 For what function does dry sand not have the required strength ?

A To withstand corrosion forces
B To withstand pressure of molten metal
C To be able to retain its shape
D To be able to retain its hardenability

2.4 Hot strength is seen at what temperature?

A Above 212 °F
B Above 312 °F
C Above 412 °F
D Above 512 °F

2.5 Which of the following would not happen if hot strength is not enough?

A The mould may get hardened
B The mould may get enlarged
C The mould may get eroded
D The mould may crack

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2.6 Why should moulding sand be porous?

A For gases to enter
B For gases to escape
C For water to enter
D For water to escape

2.7 Which of the following is not a defect if permeability is not enough?

A Brittleness
B Gas holes
C Mould blast
D Surface blows

2.8 In green sand, what is the amount of water used?

A 5%
B 10%
C 15%
D 20%

2.9 What is the amount of clay needed in green sand?

A 5–10%
B 5–15%
C 15–30%
D 25–40%

2.10 Parting sand is a type of moulding sand.

A True
B False

(10 × 1) **[10]**

QUESTION 3

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 (3.1–3.5) in the ANSWER BOOK.

3.1 Loose piece patterns are …

A a sort of piece pattern.
B used when the pattern cannot be drawn from the mould.
C similar to core prints.
D never used in foundry works.

3.2 Which type of patterns are used for mounting several patterns at a time?

A Combined pattern
B Loose piece pattern
C Sweep pattern
D Match plate pattern

3.3 Wood for patterns is considered dry when the moisture content is …

A 0%.
B 5%.
C less than 15%.
D less than 25%.

3.4 The draft allowance on a metallic pattern in comparison to a wooden pattern …

A is the same.
B is more.
C is less.
D depends on size.

3.5 Match plate patterns are used in ...

A green sand moulding.
B bench moulding.
C pit moulding.
D machine moulding.

(5 × 2) **[10]**

QUESTION 4

4.1 When working in the foundry, the risk of getting injuries is inversely proportional to the frequency of exposure of the worker. Choose an answer below and explain your choice.

A True
B False (6)

4.2 Improper controlling of hazards in the foundry can lead to the occurrence of serious health problems to the workers. Choose an answer below and explain your choice.

A True
B False (6)

4.3 Explain why dust in the foundry can lead to lung disease for workers. (6)

4.4 Name FOUR types of PPE in foundry. (2)
[20]

QUESTION 5

Various options are given as possible answers to the following questions. Choose the answer and write only the letter (A–E) next to the question number (5.1–5.5) in the ANSWER BOOK.

5.1 A trowel is …

A a round sieve.
B a long, flat metal plate fitted with an offset handle.
C used to mark or repair corners in a mould.
D used to scoop sand deep in the mould.
E None of the above.

5.2 A lifter is …

A a round sieve
B a long, flat metal plate fitted with an offset handle
C used to mark or repair corners in a mould
D used to scoop sand deep in the mould
E None of the above.

5.3 A slick is …

A a round sieve.
B a long, flat metal plate fitted with an offset handle.
C used to mark or repair corners in a mould.
D used to scoop sand deep in the mould.
E None of the above.

5.4 A slick is used in a foundry shop to …

A mark and repair corners in a mould.
B thoroughly mix up moulding sand.
C make venting holes in the mould.
D prepare gates.
E swab the edges of the mould cavity.

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5.5 Hot tear refers to the …

A casting defect.
B process of fabrication.
C process of heat treatment.
D strengthening of alloys.
E None of the above.

(5 × 1) **[5]**

QUESTION 6

Casting is the process of producing metal parts by pouring molten metal into the mould cavity of the required shape and allowing the metal to solidify. The solidified metal piece is called the *casting*.

Draw and label a flow diagram of the process. **[20]**

QUESTION 7

7.1 In order the get a smooth casting, the sand particles should be fine.

Describe grain particles. (5)

7.2 A core is a disposable item, but cannot be reused. Explain why. (5)

7.3 Explain the process of solidification of metal in foundry. (5)

[15]

TOTAL: 100

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