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

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DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE
FOUNDRY THEORY N1
TIME: 3 HOURS
MARKS: 105

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 blue or black pen.
6. Write neatly and legibly.

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SECTION A

QUESTION 1: CASTING DEFECTS

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 (1.1–1.10) in the ANSWER BOOK.

1.1 … is a defect caused by loose dowels.

A Mould shift
B Scab
C Drop
D Blow holes

1.2 Variation in wall thickness occurs because of … core boxes.

A rigid
B flexible
C surface-finished
D worn out

1.3 … usually occurs at the parting line and results in an excess of metal.

A Fins
B Fash
C Strain
D All of the above

1.4 Patterns having insufficient taper results in …

A fins
B blow holes
C drop
D scab

1.5 … occurs in the casting because of quality variation.

A Defects
B Melting
C Stress relieving
D Solidification

1.6 Defective casting accounts for most losses incurred in the foundry industry.

A True
B False

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1.7 Defects by … are discovered by means of mechanical testing.

A heat treatment
B moulding
C material
D patterns

1.8 Surface defects are discovered by means of radiography.

A True
B False

1.9 The best defence against defects in castings is visual examination and machining.

A True
B False

1.10 … is the displacement of a mould while closing it.

A Drop
B Blowholes
C Crush
D Mould Shift

(10 × 1) **[10]**

QUESTION 2: MOULDING MACHINES

Various options are given as possible answers to the following question number. Choose the answer and write the letter (A–D) next to the question (2.1–2.5) in the ANSWER BOOK. Give ONE reason for each answer.

2.1 A … machine is used to ram sand in a mould box.

A Jolt
B Sand slinger
C Coremaking
D Squeezing

2.2 In a sand slinger machine, the density of sand is the result of …

A inertia
B acceleration
C velocity
D mass

2.3 … machines are used for shallow patterns.

A Core-making
B Sand slinger
C Squeeze
D Jolt

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2.4 Which ONE of the following mediums is not used for power-operated moulding machines?

A Electromagnets
B Hydraulic power
C Compressed air
D Sand inertia

2.5 In a squeeze moulding machine, the sand is rammed on the mould edge as well.

A True
B False

(5 × 3) **[15]**

QUESTION 3: REQUIREMENTS OF THE BASE SAND

Choose a term from COLUMN B that matches a description in COLUMN A. Write only the letter (A–L) next to the question number (3.1–3.10) in the ANSWER BOOK.

COLUMN A		COLUMN A	
3.1	To form castings, virgin material is always used	A	heat treatment
3.2	Tuyeres are responsible for the supply of air for combustion in the …	B	shake-outs
3.3	Method to prepare a casting by imparting high stress to the walls of a casting	C	high
3.4	Energy consumption of foundries is …	D	melting process
3.5	Most parts in transport vehicles are made by means of the foundry process	E	true
3.6	These defects in castings cannot be identified easily	F	gravity
3.7	Not included in the scrap used for melting	G	false
3.8	Easiest way to remove sand from a casting after it has solidified	H	internal
3.9	When refining is done to metal	I	drag
3.10	Metal is poured by means of this force	J	cupola
		K	billets
		L	cope

(10 × 1) **[10]**

QUESTION 4: PRINCIPLES OF GATING AND RISERING

Complete the following sentences by filling in the missing word or words. Write only the answer next to the question number (4.1–4.5) in the ANSWER BOOK.

4.1 When the … are trapped in a box, they are unable to escape.

4.2 … is not a component of the gating system.

4.3 If the gating system is part of the …, it avoids cutting a runner and gates.

4.4 A …cannot allow sudden or right angles.

4.5 … prevents erosion and the washing away of sand.

(5 × 1) **[5]**

TOTAL SECTION A: 40

SECTION B

QUESTION 5: GREEN SAND MOULDING

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 (5.1–5.5) in the ANSWER BOOK.

5.1 The sand used in green-sand moulding is green because it contains:

A Additives
B Moisture
C Binders
D Colours

5.2 The sand has to undergo the … process before it is green and ready for moulding.

A Mulling
B Cooling
C Heating
D Drying

5.3 Which ONE of the following is not used in green sand?

A Clay
B Water
C Oil
D Chemicals

5.4 Green-sand moulding cannot be used for … moulds.

A Simple
B Small
C Medium
D Complex

5.5 Green sand is widely used for hand moulding purposes.

A True
B False

(5 × 1) **[5]**

QUESTION 6: CARBON DIOXIDE MOULDING

Choose the answer and write only 'True' or 'False' next to the question number (6.1–6.10) in the ANSWER BOOK. Give ONE reason for each answer.

6.1 The purpose of CO_2 is to … a sand mould.

A harden
B soften
C dry
D clean

6.2 … serves as a binder in CO_2 moulding.

A Silica sand
B Sodium silicate
C Sodium carbonate
D Alumina

6.3 The CO_2 used in CO_2 moulding is under high pressure.

A True
B False

6.4 If gas is passed longer than required, the bond becomes …

A impaired
B stronger
C weaker
D does not affect much

6.5 Clay is used in the CO_2 moulding process.

A True
B False

6.6 … increases the SiO_2-Na_2O ratio that increases the bond.

A Sulphuric acid
B Acetic acid
C Carbonic acid
D Hydrochloric acid

6.7 The additive in sodium silicate is …

A Sugar
B Dextrin
C Molasses
D Zircon

6.8 Overgrazing increases the core strength.

A True
B False

6.9 Rough patterns are difficult to withdraw from CO_2 moulding.

A True
B False

6.10 A short gassing time is highly effective in CO_2 moulding.

A True
B False

(10 × 3) **[30]**

QUESTION 7: PRINCIPLES OF FOUNDRY

Choose the answer and write only the letter (A-D) next to the question number (7.1–7.10) in the ANSWER BOOK. Give ONE reason for each answer.

7.1 … is the process of preparing a casting.

A Founding
B Forging
C Melting
D Pouring

7.2 Which ONE of the following is prepared by using a pattern in foundry?

A Mould
B Sand
C Core
D Mould, sand and core

7.3 Fettling is the last step of the foundry.

A True
B False

7.4 Which ONE of the following is used to make a casting?

A Brass
B Aluminium
C Iron
D Brass, aluminium and iron

7.5 To form castings, only virgin metal is used in foundries.

A True
B False

7.6 … tuyeres increase the melting efficiency.

A Single
B Double
C Auxiliary
D Blast

7.7 The … process relieves stresses in castings.

A Reforming
B Heat treatment
C Water treatment
D Cooling

7.8 The product of the foundry process is …

A Binders
B Patterns
C Casting
D Metal

7.9 Casting is the most versatile process in manufacturing.

A True
B False

7.10 Foundry processes cannot be mechanised.

A True
B False

(10 × 3) **[30]**

TOTAL SECTION B: 65
GRAND TOTAL: 105

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