higher education & training

Department:
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REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE

PATTERNMAKERS' THEORY N2

(11020532)

1 December 2023 (X-paper)
09:00–12:00

This question paper consists of 7 pages.

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DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE
PATTERNMAKERS' THEORY N2
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. Start each section on a new page.
5. Use only a black or blue pen.
6. Write neatly and legibly.

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SECTION A

QUESTION 1: CASTING DEFECTS AND TYPE OF SAND MOULDS

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 (1.1–1.15) in the ANSWER BOOK.

1.1 Defective casting normally accounts for higher losses than any other losses incurred by the foundry industry.

A True
B False

1.2 Defects by … are discovered by mechanical testing.

A heat-treatment
B moulding
C material
D pattern

1.3 Surface defects are discovered by radiography.

A True
B False

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

A True
B False

1.5 … is the displacement of the mould while closing a mould.

A Drop
B Blowholes
C Crush
D Mould Shift

1.6 … is a container which, when poured with molten metal, produces a casting of the shape of the mould.

A Mould
B Pattern
C Core
D Sprue

1.7 In green sand moulding, the molten metal is poured while it is in a wet state.

A True
B False

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1.8 Dry sand moulds are used for small and medium sized castings.

A True
B False

1.9 … binders are used to harden the skin in dried moulds.

A Linseed oil
B Marine oil
C Vegetable oil
D Synthetic resins

1.10 … is made by assembling a number of cores made individually in separate core boxes and baked.

A Dry sand mould
B Air dried mould
C Skin dried mould
D Core sand mould

1.11 Metal moulds provide high dimensional accuracy.

A True
B False

1.12 … is used to make a metallic die in investment moulding.

A Sweep pattern
B Master pattern
C Single piece pattern
D Skeleton pattern

1.13 … is produced with the help of heated iron/steel patterns.

A Loam mould
B Shell mould
C Ceramic mould
D Metal mould

1.14 A ceramic mould is used to produce thin sections of metals and alloys with the high melting point metals and alloys.

A True
B False

1.15 IC engine pistons are cast in …

A investment moulds.
B shell moulds.
C metal moulds.
D ceramic moulds.

(15 × 1) **[15]**

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QUESTION 2: TYPES OF PATTERNS

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 (2.1–2.10) in the ANSWER BOOK. Give ONE reason for the answer.

2.1 … pattern could fit entirely in the cope or in the drag.

A Single piece
B Match plate
C Two piece
D Gated pattern

2.2 The … pattern could have the entire assembly of runner and gates integrated in it.

A single piece
B match plate
C two piece
D gated pattern

2.3 Two-piece patterns are used for manufacturing of intricate castings.

A True
B False

2.4 Dowel pins, jigs and fixtures are all used to join this pattern.

A Single piece
B Match plate
C Two piece
D Gated pattern

2.5 In cope and drag patterns separate wooden plates and alignment pins are used.

A True
B False

2.6 Manual or machine cutting of runners and gates is eliminated in …

A split pattern.
B single piece pattern.
C gated pattern.
D match plate pattern.

2.7 Structurally weak castings are made using …

A loose piece patterns.
B sweep patterns.
C skeleton patterns.
D follow board patterns.

2.8 … are used to make large castings of axis-symmetrical shapes.

A Loose piece patterns
B Skeleton patterns
C Sweep patterns
D Match plate patterns

2.9 During the preparation of cope using the follow board pattern, the follow board is not necessary.

A True
B False

2.10 A match plate pattern is made of wood.

A True
B False

(10 × 3) **[30]**

QUESTION 3: GENERAL FOUNDRY

3.1	What is cope and drag?		(2)
3.2	What is the function of a riser?		(2)
3.3	What are tap holes and tuyeres in a cupola furnace used for?		(2)
3.4	Name three furnaces used to melting steel.		(3)
3.5	List FOUR casting processes.	(4 × 2)	(8)
3.6	List TEN casting defects.		(10)
3.7	What are causes of blow holes?		(2)
3.8	What are swells and shift?		(2)
3.9	What are cold shuts and hot tears?		(2)
3.10	What are fins and run out?		(2)

[35]

TOTAL SECTION A: 80

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SECTION B

QUESTION 4

FIGURE 1 below shows a half sectional front and top view of a belt pulley in first-angle orthographic projection.

Draw to scale 1:1 and in first-angle orthographic projection the following views of the belt pulley:

4.1 A full-sectional front view (10)

4.2 An outside left view with NO hidden detail (6)

4.3 An outside top view WITH hidden detail (4)

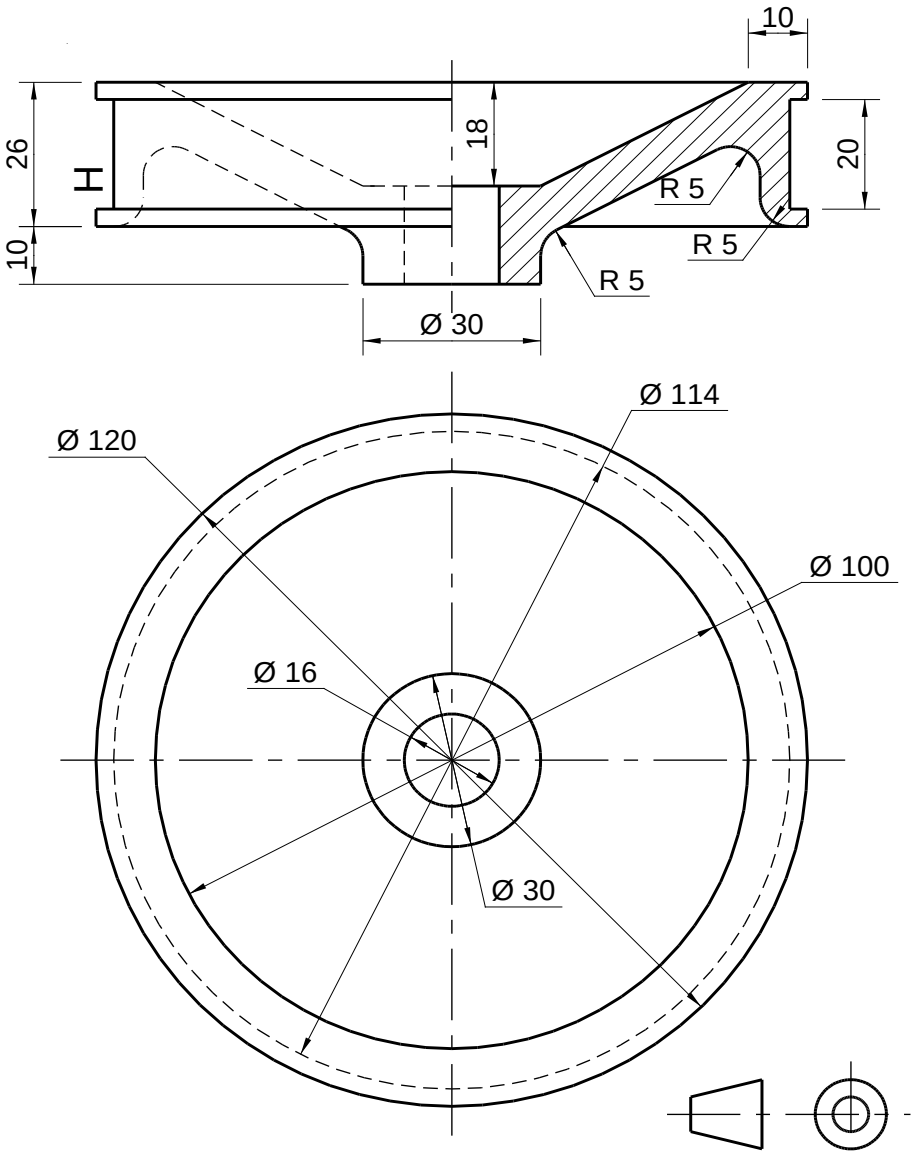


FIGURE 1

[20]

TOTAL SECTION B: 20
GRAND TOTAL: 100

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