higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

PATTERNMAKERS' THEORY N2

1 December 2023

This marking guideline consists of 5 pages.

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NOTE TO MARKERS: The marking guideline is simply that – a guide. Answers will be in the students' own words and do not have to be word-for-word as in the marking guideline.

SECTION A

QUESTION 1

1.1 B
1.2 C
1.3 B
1.4 B
1.5 C
1.6 A
1.7 A
1.8 B
1.9 A
1.10 D
1.11 A
1.12 B
1.13 B
1.14 A
1.15 A

(15 × 1) **[15]**

QUESTION 2

2.1 Single piece✓
The single piece pattern is made up of a single piece as its name suggests. One of the faces is expected to be a parting plane. Hence, it can be said that it could fit entirely in the drag.✓✓

2.2 Gated pattern✓
A gated pattern is an improvement of the single piece pattern where the gating and the runner system are integral with the pattern. This eliminates the hand cutting of runners and gates and helps in improving the productivity of the moulder.✓✓

2.3 True✓
Two-piece patterns are used for the production of large castings. The patterns are used when it is not possible to form a casting in one piece and where it is difficult to removing a casting without contour.✓✓

2.4 Two-piece✓
Two-piece patterns are made using one a single pattern cut in two halves. One is placed in the cope and other in the drag. To facilitate proper alignment of the halves in the cope and the drag, they are joined with jigs, fixtures and dowel pins.✓✓

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2.5 True✓
The cope and drag pattern are similar to a split pattern. In addition to splitting the pattern, the cope and drag halves of the pattern along with the gating and risering systems are attached separately to the metal or wooden plates along with the alignment pins. Hence, they are called cope and drag patterns.✓✓

2.6 Gated pattern✓
A gated pattern is a pattern where the gating and runner system is integral to the pattern. A gated pattern consists of the moulding and control patterns, jigs, drying plates and stripping place all embedded in it. Once the pattern is removed, it is removed automatically.✓✓

2.7 Follow board pattern✓
A follow board pattern is adopted for those castings with some portions that are structurally weak and if not supported properly, are likely to break under the force of ramming.✓✓

2.8 Sweep pattern✓
A sweep pattern is used to complete the casting by means of a pattern. These are used for generating large shapes which are axis-symmetrical or prismatic in nature such as bell shaped or cylindrical. This greatly reduces the cost of three dimensional patterns.✓✓

2.9 True✓
During the preparation of the cope, no follow board is necessary because the sand which is compacted in the drag will support the fragile pattern.✓✓

2.10 False✓
The complete pattern with the match plate is consists entirely of metal, usually aluminium for its light weight and machinability. But when the dimensions are critical, the match plate may be made up of steel with necessary case hardening of the critical wear points.✓✓

(10 × 3) **[30]**

QUESTION 3

3.1 If the moulding is done with two boxes, the upper box✓ is called the cope and the lower box is called the drag.✓ (2)

3.2 After the mould is filled, the molten metal rises into the riser.✓ It supplies molten metal to the mould during shrinkage of casting and thus a casting with a correct size can be obtained.✓ (2)

3.3
- A tap hole is provided for taking out molten metal.
- Air for the combustion of fuel is sent through the openings called tuyeres. (2)

3.4
- Direct arc furnace
- Indirect arc furnace
- Induction furnace (3)

3.5
- Sand casting
- Centrifugal casting
- Gravity die casting
- Continuous casting
- Pressure die casting
- Chilled casting
- Malleable casting (8)

3.6
- Blow holes
- Slabs
- Honey combing
- Swells
- Shifts
- Cold shuts
- Hot tears
- Fins
- Internal air pockets
- Runout (10)

3.7
- Excessive moisture in the sand
- Hard ramming
- Fewer vent holes (Any 2 × 1) (2)

3.8
- Swells – enlargement of casting surface.
- Shifts – misalignment of casting sections. (2)

3.9
- Cold shuts – incomplete filling of mould cavity.
- Hot tears – internal or external discontinuity in the casting. (2)

3.10
- Fins – thin projections on the parting line.
- Run out – leakage of metal from the mould. (2)

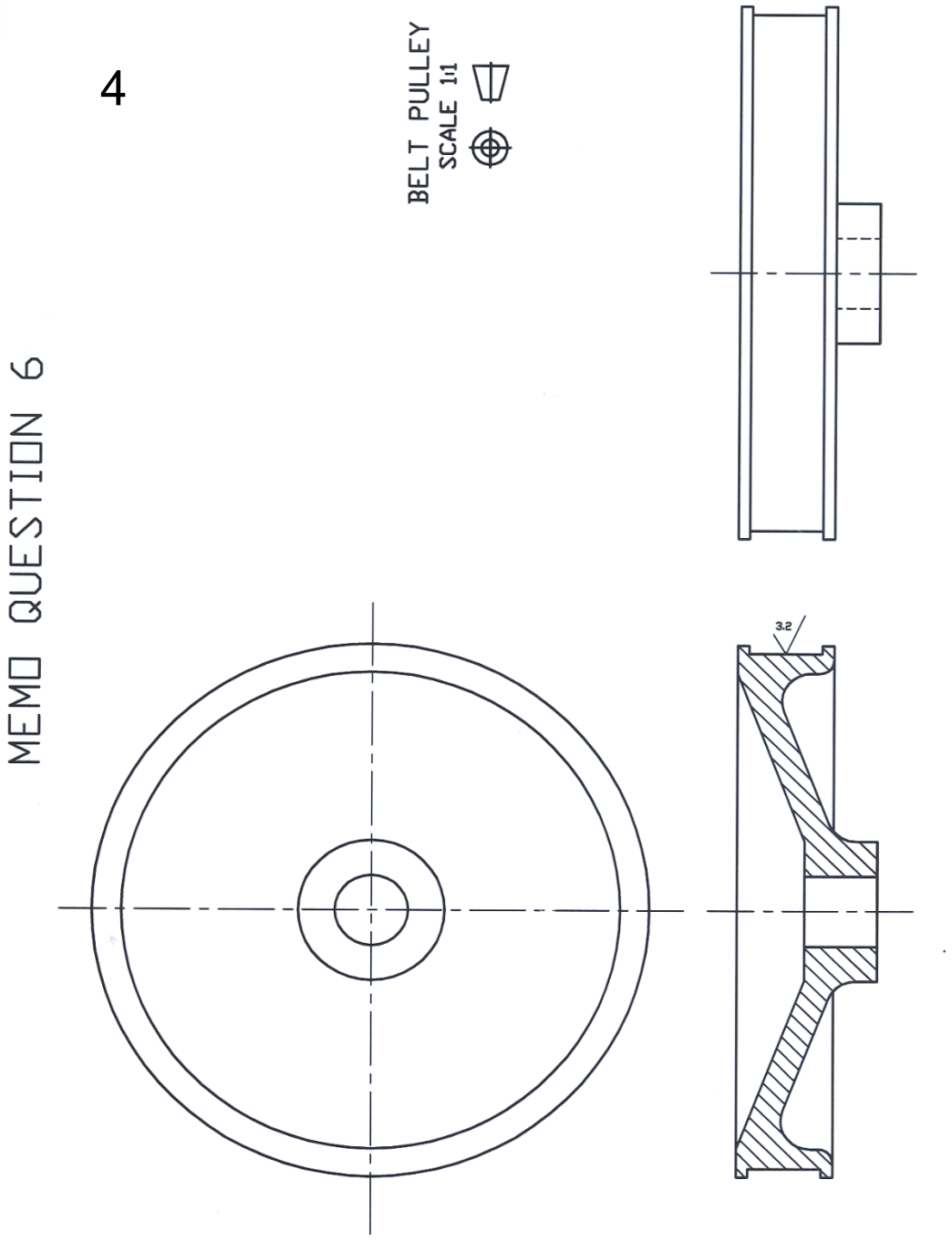
[35]

TOTAL SECTION A: 80

SECTION B

QUESTION 4

4



[20]

TOTAL SECTION B: 20
GRAND TOTAL: 100

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