



UNIVERSITY
OF
JOHANNESBURG

<u>FACULTY</u>	: FEBE
<u>DEPARTMENT</u>	: Metallurgy
<u>CAMPUS</u>	: DFC
<u>MODULE</u>	: FTY 302 FOUNDRY TECHNOLOGY 3 – MAIN EXAM
<u>SEMESTER</u>	: Second
<u>EXAM</u>	: November 2019

<u>DATE</u>	: 23 Nov 2019	<u>SESSION</u>	: AFTERNOON
<u>ASSESSOR(S)</u>	: MR KKC KYALU		
<u>MODERATOR</u>	: MR I KILONGOZI		
<u>DURATION</u>	: 3 HOURS	<u>MARKS</u>	: 85 (FM)

NUMBER OF PAGES: 7 PAGES

INSTRUCTIONS:

1. Answer ALL THE QUESTIONS.
 2. Return the question paper
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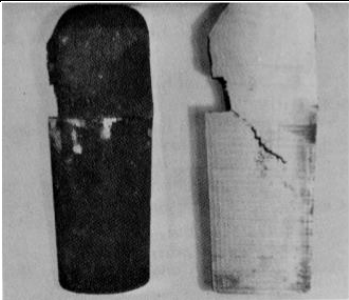
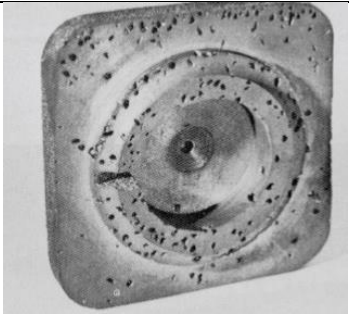

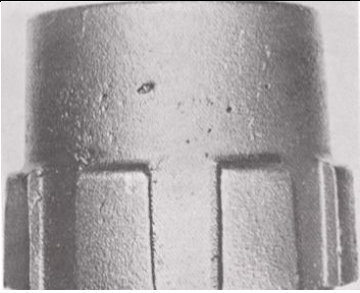
QUESTION 1

As a foundry consultant, you have been presented with 5 different defects that your client experienced in the last financial year as presented in table 1. These defects have cost the company lots of money, with your expertise:

- 1.1 Identify and give a cause for each defect (10)
- 1.2 Fully explain the mechanism of defect formation in the case of silica sand used as refractory material for the mould (10)
- 1.3 For defect N° 5, fully explain possible effects (if any) of the following changes to the Methoding system in alleviating the casting defect problem:
 - 1.3.1 Bottom gate pouring (2)
 - 1.3.2 Increase number of feeders (2)
 - 1.3.3 Increase of metal superheat (2)
 - 1.3.4 Casting filtration using ceramic filters (2)
 - 1.3.5 Increase filling rate (2)

[30]

Table 1. Defects

Nº 1	
Nº 2	
Nº 3	
Nº 4	

N° 5	
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QUESTION 2

The quality control plan (QCP) of FL Smidth who's one of your biggest client always requests for an Ultrasonic (UTS) Test for low alloy steel hammers. For sometimes now, you have been relying on the service of a subcontractor for these tests. In order to cut costs and after conducting a thorough costs analysis, you have decided to motivate for the purchase of a UTS testing equipment.

Include in your motivation the following aspect:

- 2.1 The functioning principle of the above-mentioned technologies (5)
- 2.2 What casting defects could be detected by the above analysis/ testing technologies? (10)
- 2.3 The implementation and integration of these technologies in the existing quality assessment and control system in place in the foundry (in relation to a ductile iron foundry) in order to improve the casting quality. (10)

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QUESTION 3

Question 3 refers to the Manganese casting shown in figure 1 below. The Methoding data used to produce this casting are provided in Table 2.

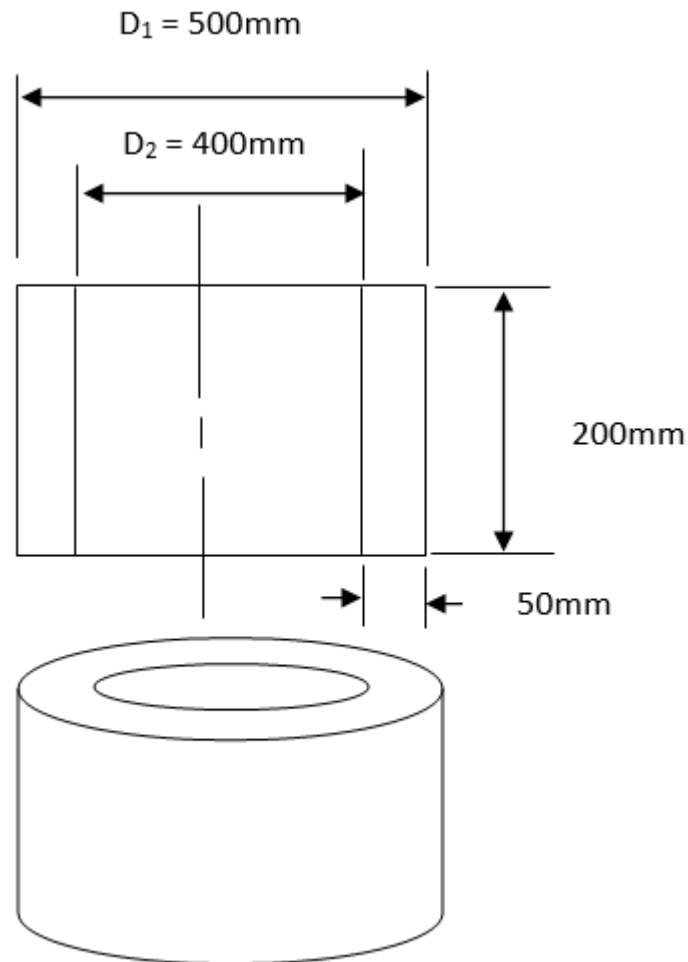


Figure 1 Technical drawing of Manganese casting

Table 2 Data related to the Methoding system of the casting

Casting	
Casting net weight	400kg
Speed Factor	1.5
% Shrinkage	6%
Alloy density	7.85 kg/dm ³
Moulding	Greensand moulding (silica sand based) Vertical moulding
Feeding system	
Aided feeding	Foseco sleeves
Dimensions (h, d)	$h = d$
Modulus Extension factor	m.e.f: 1.5
Pouring temperature	1460 °C

- 3.1 Based on your calculations, is this casting a plate or a bar? (5)
- 3.2 Calculate the modulus of the casting (5)
- 3.3 With $D=H$, for a Foseco cylindrical sleeve with a m.e.f of 1.5, calculate the sizes of the sleeve (5)
- 3.4 How many sleeves will you require if no chills are used? (5)
- 3.5 Calculate the sleeve efficiency (5)
- 3.6 If the pouring weight is 450kg for the above casting
- 3.6.1 Will your running system be pressurised or not? (2)

- 3.6.2 Calculate the sizes of your Down gate, the Runner Bar and the Ingates if 2 Ingates will be used (9)
- 3.6.3 What will the mould filling or pouring time be? (4)

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