UNIVERSITY OF JOHANNESBURG

PROGRAM	:	NATIONAL DIPLOMA *ENGINEERING METALLURGY*
SUBJECT	:	**FOUNDRY TECHNOLOGY II**
CODE	:	**FTY21-1**
DATE	:	WINTER EXAMINATION 1 JUNE 2016
DURATION	:	(Y-PAPER) 12:30 - 15:30
WEIGHT	:	40 : 60
TOTAL MARKS	:	108
FULL MARKS	:	90

ASSESSOR	:	MR JW DE BEER
MODERATOR	:	DR K NYEMBWE
NUMBER OF PAGES	:	5 PAGES

5095

INSTRUCTIONS	:	QUESTION PAPERS MUST BE HANDED IN.
REQUIREMENTS	:	POCKET CALCULATORS MAY BE USED.

2/...

INSTRUCTIONS TO CANDIDATES:

PLEASE ANSWER ALL THE QUESTIONS.

QUESTION 1

1.1 You need to produce 10 000 of the same metal part. Rank the four manufacturing methods, from **highest to lowest** according to the following characteristics:

a. Cost
b. Dimensional Accuracy
c. Waste Production (12)

[12]

QUESTION 2

2.1 You perform daily quality control tests in the foundry laboratory. Explain what the following tests will measure in the moulding sand: (3)

a) Loss on Ignition
b) Sieve Grading
c) Visual (Microscopic) Examination

2.2 Provide one moulding sand property affected by each of the above measurements. (3)

2.3 Chemical purity of silica affects the performance as moulding material. Indicate impurities common to silica sand and how they affect the moulding sand. (6)

[12]

QUESTION 3

3.1 Answer the following questions relating to triggered hardening binders

3.1.1 The binder systems can be divided into two systems according to the type of catalyst. What two types of catalysts are used? (2)
3.1.2 Which of the two above systems produces cores and moulds the fastest? (1)
3.1.3 Which of the two systems consumes the most energy? (1)
3.1.4 Name two binders from each system? (4)

3.2 List the disadvantages and advantages of Furan binder systems. (8)

[16]

QUESTION 4

4.1 Clay and coal dust may be added to greensand to improve various moulding properties. Answer the following related questions:

4.1.1 Discuss the primary purpose of the additive. (4)

4.1.2 Name two varieties of each material. (2)

4.1.3 When is coal dust not used? (1)

4.1.4 What defect would be associated with the use of coal dust in the above question? (1)

4.1.5 What material is added to assist the clay as a binder, particularly in steel foundries? (1)

4.2 Describe the "Reducing Atmosphere" theory as it relates to the use of coal dust in greensand. (4)

[13]

QUESTION 5

5.1 Mould and core coatings are used to reduce metal penetration. What four factors influence the potential degree of metal penetration? (4)

5.2 Which considerations must be made when choosing a coating for moulds and cores? (5)

5.3 What function do the following mould coating components play:

5.3.1 Binder (2)

5.3.2 Rheology Control System (2)

5.3.3 Liquid Carrier (2)

[15]

QUESTION 6

6.1 Name four ferrous metal groups commonly used to produce metal castings. (4)

6.2 Oxygen enrichment and hot blast cupolas are two methods of improving the efficiency of cupola furnaces. Discuss these two methods. (12)

6.3 Discuss the operating principles of induction furnaces. (5)

[21]

QUESTION 7

7.1 Discuss volumetric shrinkage of castings. (6)

7.2 Differentiate between ladle and mould inoculation. (10)
[16]

QUESTION 8

8.1 What are the three common types of pouring ladles. (3)
[3]