UNIVERSITY OF JOHANNESBURG

PROGRAM	:	NATIONAL DIPLOMA *ENGINEERING / EXTRACTION METALLURGY*
SUBJECT	:	**METALLURGY 1 (PHYSICAL METALLURGY)**
DATE	:	14 JUNE 2016
VENUE	:	
DURATION	:	(SESSION 2) 12:30 - 15:30
TOTAL MARKS	:	61
LECTURER	:	MR T MADZIVHANDILA
NUMBER OF PAGES	:	3

INSTRUCTIONS	:	ONE CALCULATOR ALLOWED PER STUDENT
	:	PLEASE ANSWER ALL THE QUESTIONS.

Good Luck: *Good fruit comes from good seed*

QUESTION 1

1.1 Solid Materials are classified in different classes, list FOUR classes of materials and give one example and their corresponding properties. (8)

1.2 Material science and material properties (the right material for the right job) Explain the 3 stages of material selection process Casting and manufacturing processes (6)

1.3 What is Heat Treatment? (2)

1.4 List and explain different heat treatment processes. (8)

[24]

QUESTION 2

2.1 materials are classed based on atomic/ionic arrangements, what is the difference between Sort Range Order and Long Range order (LRO)? (4)

2.2. Define the following Terms.

2.2.1 Lattice. (2)

2.2.2 Unit cell. (2)

2.2.3 Heat treatment. (2)

2.3 Determine the relationship between the atomic radius and the lattice parameter in FCC structures when one atom is located at each lattice point (5)

[15]

QUESTION 3

3.1 Draw the Miller indices directions of A [111], B [101], and C [011] (6)

3.2 Draw the Miller indices planes of A (111), B (101), and C (011) (6)

[12]

QUESTION 4

4.1 From material properties, the construction of bridges depends upon the strength of material. What type of metal is suitable for bridges? Brittle or ductile. (2)

4.2 Draw and label a stress strain curve for a brittle material (7)

[12]