

**THE UNIVERSITY OF ZAMBIA
SCHOOL OF ENGINEERING
DEPARTMENT OF MECHANICAL ENGINEERING**

UNIVERSITY EXAMINATIONS

**MID-SEMESTER II EXAMINATIONS
SEPTEMBER 2005**

ME 232 – PROPERTIES ENGINEERING MATERIALS I

QUESTION PAPER

Read the following instructions carefully before you start writing:

1. *This examination is Closed Book*
 2. *Time allowed is Two (2) Hours*
 3. *Answer All Questions*
 4. *All Questions carry equal marks*
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- Q1. (a) Sketch and fully label the Iron-Carbon phase (equilibrium) diagram, particularly indicating all the relevant phases, important compositions, and temperatures on it. [15 marks]
- (b) What is
- (i) Austenite? [05 marks]
- (ii) Cementite? [05 marks]
- Q2. (a) Describe three possible forms in which a material may solidify from the liquid state. [18 marks]
- (b) What is the curie temperature? [07 marks]
- Q3. (a) Describe the main properties that are typical of metallic crystals. [10 marks]
- (b) Discuss Bragg's law and derive a relationship for it. [15 marks]
- Q4. (a) What is a dislocation? [05 marks]
- (b) Using suitable diagrams, discuss the differences between
- (i) Edge dislocations. [10 marks]
- (ii) Screw dislocations. [10 marks]
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**END OF ME 232 TEST
Dr C K Wamukwamba / G M Munakaampe**