NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF COMMERCE

DEPARTMENT OF INDUSTRIAL AND MANUFACTURING ENGINEERING

BACHELOR OF ENGINEERING (HONS) DEGREE INDUSTRIAL AND MANUFACTURING ENGINEERING

MATERIALS TECHNOLOGY I

TIE 2104

First Semester Supplementary Examination Paper

August 2015

This examination paper consists of 2 pages

Time Allowed: 3 hours

Total Marks: 100

INSTRUCTIONS

1. Answer any five (5) questions
2. Each question carries 20 marks
3. This paper contains seven (7) questions

MARK ALLOCATION

QUESTION	MARKS
1.	**20**
2.	**20**
3.	**20**
4.	**20**
5.	**20**
6	**20**
7	**20**
TOTAL	**100**

Question 1

Discuss the classification of engineering materials. [20]

Question 2

(a) With the aid of neat sketches, describe the following imperfections in solids

(i) Substitutional atom, [4]

(ii) Interstitial , [5]

(iii) Vacancy. [4]

(b) What is work hardening? [7]

Question 3

(a) Under what conditions is fatigue failure likely? [6]

(b) Describe the stages in creep failure. [14]

Question 4

Explain the mechanisms of:

(a) Steady state diffusion, [9]

(b) Non steady state diffusion. [11]

Question 5

(a) Make a comparison of brittle and ductile failure. [5]

(b) How best would you contain further growth of a crack in an engineering material such as a metallic cover-plate? [5]

(c) For the same chemical composition, the densities of forged and cast steel are different. Explain. [10]

Question 6

State and describe one method that can be used to test the thickness of a boiler shell. [20]

Question 7

Describe and explain how the following methods are used to measure toughness of a material

(a) Izod method [11]

(b) Stress-strain graph method [9]

End of Examination