TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF APPLIED AND HEALTH SCIENCES

DEPARTMENT OF PURE & APPLIED SCIENCES

UNIVERSITY EXAMINATION FOR:

BTAC

ACH 4307 : MATERIAL CHEMISTRY

SPECIAL/ SUPPLIMENTARY EXAMINATIONS

SERIES: SEPTEMBER 2018

TIME: 2 HOURS

DATE: Pick Date Sep 2018

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of **FIVE** questions. Attempt question ONE (Compulsory) and any other TWO questions.

Do not write on the question paper.

Question ONE

(a) Tabulate the seven crystal systems giving the restrictions of axes and angles (9 marks)

(b) What is:

(i) A biomaterial (1 mark)

(ii) Biocompatibility (1 mark)

(c) What is a laser? (1 Mark)

What is the structure of semiconducting laser? (1 mark)

(d) How does the Band Theory help us understand what makes conductor, insulator, or semiconductor? (4 marks)

(e) What is :

(i) A Superconductor? (2 marks)

(ii) The critical temperature for Superconductors (3 marks)

(f) Define the following terms associated with material properties:

(i) Hardness

(ii) Melleability

(iii) Toughness

(iv) Ductility
(v) Brittleness
(vi) Elasticity
(vii) Plasticity
(viii) Stiffness
(1 mark each)

Question TWO

With the aid of diagrams, describe the 14 Bravais lattices (20 marks)

Question THREE

With the aid of diagrams, describe the following types of BULK magnetism: Diamagnetism; Paramagnetism; Antiferromagnetism; Ferromagnetism; Ferrimagnetism (20 marks)

Question FOUR

(a) Write notes on Zeolites with reference to:
(i) Mineralogy (5 marks)
(ii) Common properties (7 marks)

(b) What kind of information do the following analytical techniques give:
(i) X-Ray Diffraction
(ii) Neutron Diffraction
(iii) Solid State NMR
(iv) Scanning Electron Microscopy
(v) Transmission Electron Microscopy
(vi) Elemental dispersion analyzer – using X-rays
(vii) IR Spectroscopy
(viii) X-ray fluorescence spectroscopy

(1 mark each)

Question FIVE

Tabulate the physical and structural properties associated with : Ionic ; Covalent; Metallic ; and van der Waals bonds (20 marks)