JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

SCHOOL OF BIOLOGICAL AND PHYSICAL SCIENCES

UNIVERSITY EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN RENEWABLE ENERGY, CONSTRUCTION AND MANAGEMENT AND WATER RESOURCE ENGINEERING

1ST YEAR 1ST SEMESTER 2020/2021 ACADEMIC YEAR

MAIN REGULAR

COURSE CODE: SPB 9104

COURSE TITLE: INORGANIC CHEMISTRY

EXAM VENUE: **STREAM: (BEd. Science)**

DATE:

TIME: **EXAM SESSION:**

INSTRUCTIONS:

1. **Answer question 1 (Compulsory) in section A and ANY other 2 questions in Section B.**
2. **Candidates are advised not to write on the question paper.**
3. **Candidates must hand in their answer booklets to the invigilator while in the examination room.**
4. **Some important information/formulas are found on the last page of this question paper**

SECTION A

Question 1

a) An increase in the principal quantum number from n = 1 to n = ∞ corresponds to the ionization of the atom and the ionization energy can be determined. Given that one mole of a substance contains $6.022 \times 10^{23} mol^{-1}$ particles, determine the first ionization energy for H. (6 marks)

b) Briefly discuss the four quantum numbers that fully describes the electronic configuration of an atom. (8 marks)

c) Describe the electronic configurations (*spdf*) of the following atoms. (8 marks)

i. Zinc (Z = 30)

ii. Chromium (Z = 24)

iii. Copper (Z = 29)

iv. Platinum (Z = 78)

d) Briefly discuss the following principles: The aufbau principle, The Pauli exclusion principle, degenerate orbitals, and The hands rule. (8 marks)

SECTION B answer any two questions

Question 2

a) Use the Bohr equation to determine the Bohr radius of H atom at n = 1. (4 marks)

b) Describe the shapes of atomic orbitals in an *s* orbital, *p* orbital and *d* orbital (16 marks)

Question 3

a) Brifly dscibe the following concpts using illustrations where possible

b) Atomic orbitals (5 marks)

c) Molcular orbitals (5 marks)

d) Bond order (5 marks)

b. Given that the principal quantum number, n, is 3, and using the rules that govern quantum numbers *n* and *l*, write down the allowed values of *l* and m_l, and determine the number of atomic orbitals possible for n = 4. (5 marks)

Question 4

a) Brirfly discuss electron transitions that make up the Lyman and Balmer series in the emission spectrum of atomic hydrogen (use of a diagram is prefered). (10 marks)

b) Use the first 30 elements in the periodic table to demonstrate why they are lebelled as *s* block, *d* block, and *p* block elements. (10 marks)