KISII UNIVERSITY

UNIVERSITY EXAMINATIONS

SPECIAL EXAMINATION

SECOND YEAR EXAMINATION FOR THE AWARD OF THE DEGREE OF BACHELOR OF SCIENCE GEOPHYSICS & RENEWABLE ENERGY

FIRST SEMESTER 2021/2022

(JULY, 2022)

BSMN 218: METALLIC AND INDUSTRIAL MINERAL DEPOSITS

STREAM: Y2 S1 **TIME: 2 HOURS**

DAY: FRIDAY, 3:00 PM – 5:00 PM **DATE: 22/07/2022**

INSTRUCTIONS:

1. ***Do not write anything on this question paper.***
2. ***Answer Question ONE (Compulsory) and any other TWO questions.***

QUESTION ONE

a) Define magmatic ore deposits. (2 marks)

b) List the three ore deposit environments/classes (3 marks)

c) State the three major deposit types under magmatic ore deposits. (3 marks)

d) Write down four causes of hydrothermal ore deposits (4 marks)

e) Briefly describe the three classes of hydrothermal deposits according to Lindgren (6 marks)

f) Give the two groups of hydrothermal deposits based on mode of formation (2 marks)

g) What does the term porphyry copper refer to (2 marks)

h) Classify carbonatites based on whole rock analysis (4 marks)

i) Name the three types of sedimentary mineral deposits (3 marks)

j) Define Taconites (1 mark)

QUESTION TWO

(a) What distinguishes metallic from nonmetallic luster? (2 marks)

(b) What is meant by diagenesis? (1 marks)

(c) Metallic and nonmetallic minerals respond very differently to a hardness test. What are these differences? (2 marks)

(d) What mineral groups tend to have high values of specific gravity? (3 marks)

(e) What are three common igneous pyroxenes? (2 marks)

(f) Explain with a diagram the Bowens reaction theory. (8 marks)

g) How do the structures of pyroxenes and amphiboles differ from Bowen's reaction Theory? (2 marks)

QUESTION THREE

a) What is geophysical prospecting? (2 marks)

b) Discuss **five** major geophysical methods which are utilized in mineral exploration (10 marks)

c) Plate tectonics, which is driven by the cooling of the planet, sets up the conditions necessary for the formation of igneous, sedimentary, and metamorphic rocks. Explain with an aid of a diagram the three plate tectonic boundaries. (6 marks)

d) Outline the important physical properties that characterize minerals and allow us to separate one from the other. (2 marks)

QUESTION FOUR

(a) Describe the formation and occurrences of the following. (10 marks)

i. Hydrocarbons

ii. Coal

iii. Gemstones

iv. Gold

v. Manganese deposits

vi. Veins

vii. Radioactive Minerals

viii. Salt

ix. Hydrothermal solutions

(b) Igneous rocks are classified using three different criteria, Discuss (3 marks)

(c) What is the importance of the earth Material in the construction Industry and as energy resources? (6 marks)

(d) What are some of the commercial uses of these minerals? (1 mark)

QUESTION FIVE

a) Define carbonatites (2 marks)
b) What is a Fenite (2 marks)
c) List four mineralogical components of carbonatites (4 marks)
d) Where do the carbonatites originate (3 marks)
e) State two conditions for metasomatic deposition (2 marks)
f) Briefly describe metamorphic deposition (7 marks)