



JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

SCHOOL OF BIOLOGICAL AND PHYSICAL SCIENCES

UNIVERSITY EXAMINATION FOR THE DEGREE OF BACHELOR OF SOIL SCIENCE

4TH YEAR 1ST SEMESTER 2017/2018 ACADEMIC YEAR

REGULAR

COURSE CODE: ALS 3412

COURSE TITLE: SOIL MINERALOGY AND SURFACE CHEMISTRY

EXAM VENUE:

STREAM: (B Sc. Agric.)

DATE:

EXAM SESSION:

TIME: 2.00 HOURS

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.**

INSTRUCTIONS

SECTION A: ATTEMPT ALL QUESTION (30 MARKS)

QUESTION 1

- a) (i) Most of the mineral occurrences in soil environment are due to the inheritance from parent materials. Why is this? (6 Marks)
- (ii) Calculate d in relation to NaCl crystal with fcc class and four atoms in a unit cell. Its density is 2.18g/cc and its molecular weight is 58.5. The Avogadro's NUMBER is 6.02×10^{23} (3 Marks)
- b) Differentiate between adsorption and absorption in surface Chemistry (4 Marks)
- (i) Show how Freundlich adsorption isotherm is applicable to solutions. (4 Marks)
- (ii). What are the main effects of pressure and temperature to adsorption (4 Marks.)
- c) Compare and contrast the differences between physical adsorption and chemical adsorption. (8 marks.)
- d) Discuss the eight known classes of the soil minerals. (7Marks)

SECTION B: ATTEMPT ANY TWO QUESTIONS (40 MARKS)

QUESTION TWO

- (a) Write notes on each of the following
- (i) Thermal Diffusivity (6 Marks.)
- (ii) Powder method of analysis (4 Marks)
- (iii). Types of clay soil mineralogy (8 Marks)

QUESTION THREE

- (a) What is X-ray diffraction method of Analysis? Describe its importance to a soil scientist. 10 Marks
- (b) Discuss the Primary and secondary minerals of importance to agriculture. 10 Marks

QUESTION FOUR

- (a) Compare and contrast how DTA method of Analysis and X-ray diffraction methods can be used in the study of clays mineral. (10 marks)
- (b) Discuss how the Bragg's method of x-ray diffraction method of analysis can be used to achieve a soil sample analysis. 10 Marks

QUESTION FIVE

- (a) What are factors affecting DTA curve in the DTA method of analysis. (8marks)
- (b) Describe the importance of the minerals to the soil texture and color.
 - (i) Sulfides
 - (ii) Oxides and hydroxides
 - (iii) Halides, sulfates and carbonates. 12 marks