



(Knowledge for Development)

KIBABII UNIVERSITY
UNIVERSITY EXAMINATIONS
2015/2016 ACADEMIC YEAR

SECOND YEAR 2ND SEMESTER
MAIN EXAMINATION

**FOR THE DEGREE OF BACHELOR OF SCIENCE AGRICULTURE AND
BIOTECHNOLOGY & BACHELOR OF EDUCATION SCIENCE**

COURSE CODE: SAB 210
COURSE TITLE: SOIL PHYSICS

DATE: 9TH MAY 2016

TIME: 9AM – 11AM

INSTRUCTIONS TO CANDIDATES

Answer all Questions in section A and any other two (2) Questions in section B.

TIME: 2 Hours

This paper consists of 3 printed pages. Please Turn Over



KIBU observes ZERO tolerance to examination cheating

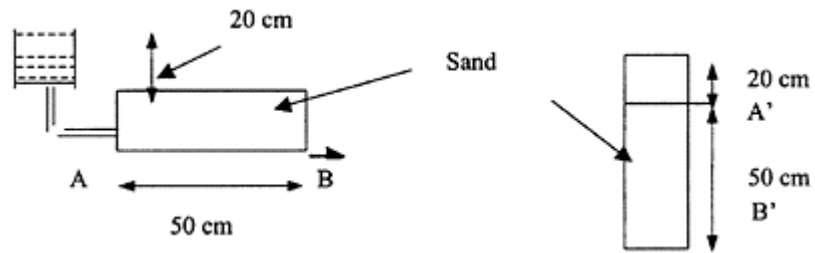
SECTION A = 30ARKS

1. a) Define the following terms:
 - i) Soil Physics (2 Marks)
 - ii) Secondary Particles (2 Marks)
 - iii) Hygroscopic Coefficient (2 Marks)
 - iv) Soil Rheology (2 Marks)
 - v) Upper Limit of Viscous Flow (2 Marks)
- b) Describe the soil water regimes. (6 Marks)
- c) A soil has a true density of 2.8 g/cm^3 and apparent density of 1.8 g/cm^3 . Calculate
 - i) Porosity of the Soil (2 Marks)
 - ii) Dry Specific Volume (2 Marks)
 - iii) Specific Gravity (2 Marks)
- d) Describe Stoke's Law and Settling Velocity Assumptions. (7 Marks)
- e) Define Swelling Index. (1 Mark)

SECTION B = 40 MARKS

2. a) One liter of Soil has a wet weight of 1500g, dry weight of 1200g and the volume of the soil solids is 450cm^3 . Compute ALL the 13 soil physical properties. (13 Marks)
- b) Classify the Particle Size fractions based on the USDA system (7 Marks)
3. a) Describe the Swelling process in the soil. (6 Marks)
- b) Calculate the Aggregate Stability of a soil weighing 2kg with the sand fraction weighing 800g and the weight retained after sieving is 1.3kg. (3 Marks)
- c) Describe Atterberg's Soil consistence forms. (5 Marks)
- d) Describe the Evaporation process of water from the soil. (6 Marks)
4. a) State the Darcy Law. (2 Marks)
- b) Describe the Limitations of the Darcy Law. (3 Marks)
- c) Under what condition is Darcy Law valid? (1 Mark)

d) Using the diagram below, calculate Darcy Flux through both soil columns. Use the data shown in the figures. Make necessary Assumptions. (7 Marks)



e) Define the water infiltration rate in the soil. (1 Mark)

f) Using a Graph, describe the infiltration of water in a dry soil (6 Marks)