

1203

(Knowledge for Development)

KIBABII UNIVERSITY
UNIVERSITY EXAMINATIONS
2017/2018 ACADEMIC YEAR

SECOND YEAR 2ND SEMESTER
MAIN EXAMINATION

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

COURSE CODE: SAB 210
COURSE TITLE: SOIL PHYSICS

DATE: 6TH AUGUST 2018

TIME: 2 PM – 4 PM

INSTRUCTIONS TO CANDIDATES

Answer Question 1 and any other TWO questions.

TIME: 2 Hours

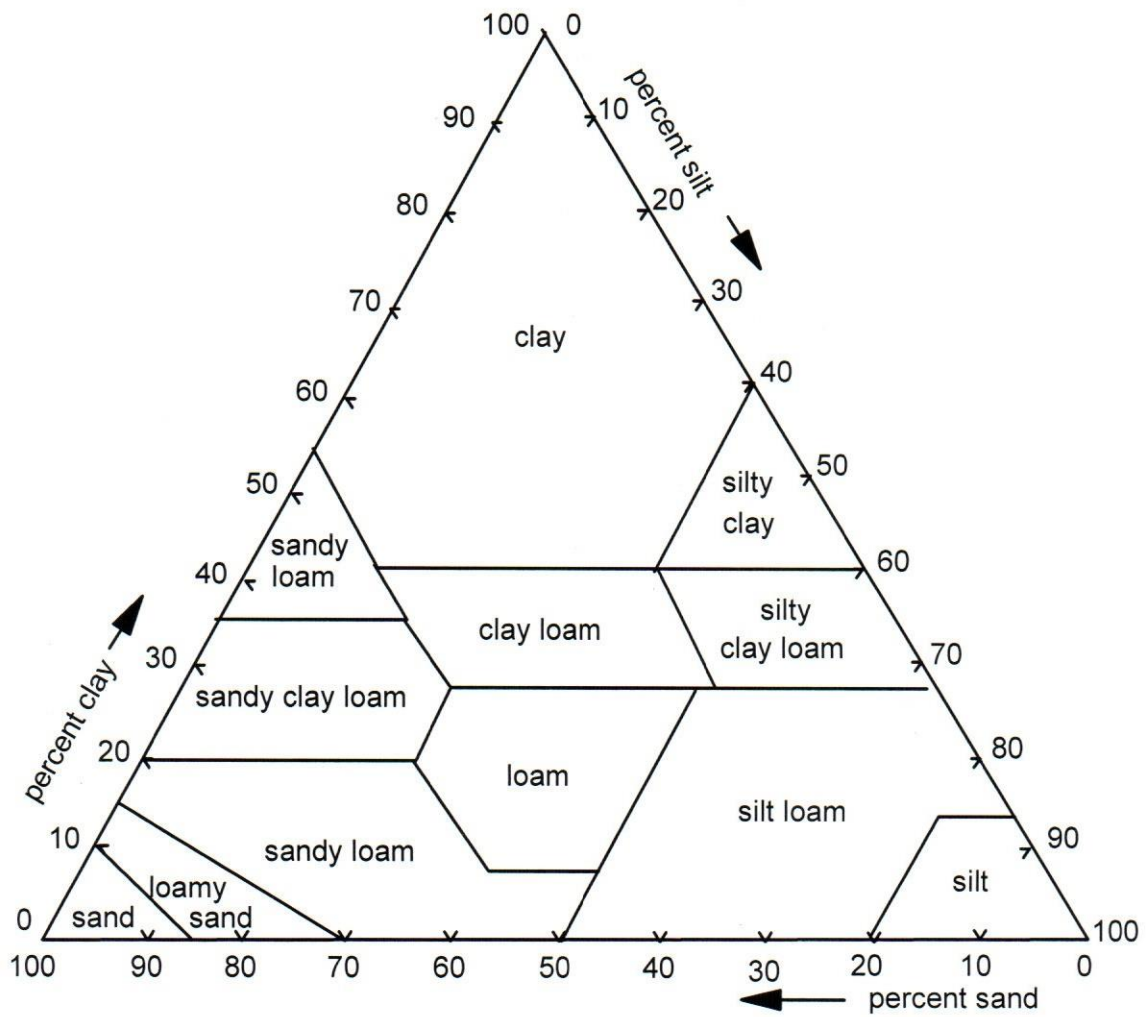
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QUESTION ONE = 30 MARKS (COMPULSORY)

- a) Define the following terms
- i) Contact angle (2 Marks)
 - ii) Permanent wilting point (2 Marks)
 - iii) Capillarity (2 Marks)
 - iv) Hazen's coefficient (2 Marks)
 - v) Terminal velocity (2 Marks)
- b) A soil specimen with a volume of 60.0 cm^3 has a mass of 105.0 g. Its dry mass is 80.2 g. Determine the following characteristics:
- i) Gravimetric water content in % (2 Marks)
 - ii) Bulk density (2 Marks)
 - iii) Porosity (2 Marks)
 - iv) Void ratio (2 Marks)
 - v) Degree of saturation (2 Marks)
- c) In a soil analysis exercise the 1st soil hydrometer reading was 38 g/l and the 2nd reading was 18 g/l. A 50 g soil sample was used. Identify the textural class of the soil. Show how you arrive at the answer. The textural triangle is provided. (10 Marks)



QUESTION TWO = 20 MARKS

Describe various equipment's used to measure amount of water in the soil (20 Marks)

QUESTION THREE = 20 MARKS

a) 50 g of soil is sampled for aggregate stability analysis. The mass of sand is 15% and the mass retained is 15 g. Calculate the aggregate stability of the soil sample. (5 Marks)

b) Using Stoke's law, calculate the time needed for all the sand (2 mm), silt (0.05 mm) and clay (0.002 mm) to settle to a 10 cm depth in an aqueous suspension at 20°C. Given that the acceleration due to gravity is 981 cm s⁻² and viscosity is 0.01002 g/ cm-second.

(15 Marks)

QUESTION FOUR = 20 MARKS

a) Define Surface Tension (2 Marks)

b) State the importance of wetting solid surfaces (2 Marks)

c) Describe the importance of contact angle in capillarity (4 Marks)

d) A soil water has a surface tension of 0.54 N/M and a contact angle of 45°.

i) Derive the formulas for height and pressure (6 Marks)

ii) Calculate the height that the water will move within the soil (4 Marks)

iii) Calculate the pressure that will be exerted by the water on the soil

(2 Marks)