

CHUKA



UNIVERSITY

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**EXAMINATION FOR THE AWARD OF DEGREE OF
MASTER OF SCIENCE IN SOIL SCIENCE**

SOIL 832: SOIL PHYSICS

STREAMS: MSC (SOIL SCI)

TIME: 3 HOURS

DAY/DATE: MONDAY 03/12/2018

2.30 PM – 5.30 PM

INSTRUCTIONS:

ANSWER ALL QUESTIONS IN SECTION A AND ANY TWO IN SECTION B

SECTION A

QUESTION ONE

- (a) Explain two (2) factors that influence infiltration of water in soils and conservation practices that lead to poor infiltration. [5 marks]
- (b) Calculate the available water capacity (AWC) in a single soil horizon with the following parameters. [5 marks]

Thickness 25 cm
Bulk density 1.75 g cm^3
FC 7.8 g/100g (or 7.8% w/w)
PWP 3.2 g/100g (3.2% w/w)

QUESTION TWO

- (a) Explain how evaporation can take place in the field. [4 marks]
- (b) Derive the Void ration, e , equation and explain its significance in soil-water relations. [6 marks]

SECTION B

QUESTION THREE

- (a) Explain the need for estimating ET crop and give the procedure for the calculation of crop water requirement (CWR) as recommended by FAO. [12 marks]
- (b) Explain Stokes law and assumptions made in measurement of particle size that may not be in accord with reality. [8 marks]

QUESTION FOUR

- (a) Discuss consistency of a soil at various moisture contents. [9 marks]
- (b) Explain the phases of hydraulic conductivity during prolonged ponding of water on soil indicated in the diagram below. [11 marks]

QUESTION FIVE

- (a) Calculate the work done in moving a mass of 4 Kg of after to a distance of 3m above reference level and explain the two types of mechanical energy distinguished depending on how work is done. [8 marks]
 - (b) Explain how contact angle hysteresis can arise and its attributed causes. [12 marks]
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