

*(Knowledge for Development)*

**KIBABII UNIVERSITY**  
**UNIVERSITY EXAMINATIONS**  
**2016/2017 ACADEMIC YEAR**

**THIRD YEAR 2ND SEMESTER**  
**SPECIAL/SUPPLEMENTARY EXAMINATION**

**FOR THE DEGREE OF BACHELOR OF AGRICULTURE AND  
BIOTECHNOLOGY**

**COURSE CODE: SAB 313**  
**COURSE TITLE: IRRIGATION AND DRAINAGE**


**DATE: 26<sup>TH</sup> SEPT. 2017**      **TIME: 11:30 AM – 1:30 PM**

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**INSTRUCTIONS TO CANDIDATES**

Answer Question ONE and any other TWO.

TIME: 2 Hours

This paper consists of 3 printed pages. Please Turn Over 

KIBU observes ZERO tolerance to examination cheating



## SAB 313 : IRRIGATION & DRAINAGE

### QUESTION ONE - Compulsory (20 Marks)

- a) What are the three criteria used in the selection of sprinklers for overhead irrigation? (3 Marks)
- b) Give four advantages of using a portable irrigation system (4 Marks)
- c) State any three water conveyance structures used in surface irrigation (3 Marks)
- d) Draw a sketch of a centrifugal pump and label it (6 Marks)
- e) Define the following terms with regard to pumps:
- (i) Cavitation (2 Marks)
  - (ii) Priming (2 Marks)
  - (iii) Characteristic curves (3 Marks)
- f) What three factors would you consider while selecting the depth of a drain pipe? (3 Marks)
- g) Give any four assumptions made in the Hooghoudt equation for drain spacing under steady-state conditions (4 Marks)

### QUESTION TWO (20 Marks)

- a) Define specific speed of a centrifugal pump (2 Marks)
- b) Compute the specific speed of a centrifugal pump that runs at a speed of 200 rpm at its best efficiency point and delivers 50 litres of water per second at a total head of 30 metres (6 Marks)
- c) State three causes of the following pump troubles:
- (i) Pump does not start (3 Marks)
  - (ii) Pump is noisy and vibrates (3 Marks)
  - (iii) Pump discharges very little water (3 Marks)
  - (iv) Pump uses too much power (3 Marks)



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### QUESTION THREE (20 MARKS)

- a) State four factors that affect infiltration of irrigation water into the soil (6 Marks)
- b) The following data was obtained from a Ring Infiltrometer Test of a clay-loam soil.

Time, t (minutes)	Cumulative Infiltration depth, I (cm)
1	0.52
15	3.15
30	4.80
60	7.20
150	14.05
200	15.30

Use Kostiakov's Infiltration Equation to determine the following:

- (i) The constants in the equation (8 Marks)
- (ii) Cumulative infiltration after 3 hours (3 Marks)
- (iii) Instantaneous infiltration of the soil after 5 hours (3 Marks)

### QUESTION FOUR (20 Marks)

- a) Explain three factors that affect the uniformity of irrigation when sprinklers are used in Overhead irrigation (6 Marks)
- b) Give five advantages and one disadvantage of using a Portable Sprinkler irrigation system (5 Marks)
- c) State four conditions for the use of a Permanent (solid-set) Sprinkler irrigation system (4 Marks)
- d) Use a diagram to explain how a Centre-Pivot Sprinkling machine works (5 Marks)

### QUESTION FIVE (20 Marks)

- a) State four reasons for draining a horticultural farm (8 Marks)
- b) Use diagrams to explain four different layout patterns of a drainage system (12 Marks)