



**JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY**

**SCHOOL OF AGRICULTURAL AND FOOD SCIENCES**

**THIRD YEAR FIRST SEMESTER UNIVERSITY EXAMINATION FOR THE DEGREE OF  
BACHELOR OF SCIENCE IN HORTICULTURE AND BACHELOR OF SCIENCE IN SOIL  
SCIENCE**

**3<sup>RD</sup> YEAR 1<sup>ST</sup> SEMESTER ACADEMIC YEAR 2017/2018**

**REGULAR**

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**COURSE CODE: ALS 3317**

**TITLE: SOIL AND WATER ENGINEERING**

**EXAM VENUE:LR 8**

**Stream: BSc (Horticulture); B.SC (Soil Science)**

**DATE: 13/12/17**

**EXAM SESSION: 9.00 – 11.00 am**

**TIME: 2 HOURS**

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**INSTRUCTIONS**

- 1. Answer ALL questions in section A and ANY other 2 Questions in section B.**
- 2. Candidates are advised not to write on question paper.**
- 3. Candidates must hand in their answer booklets to the invigilator while in the examination room.**

**SECTION A [30 MARKS]**

**Answer ALL questions from this Section.**

1. Distinguish between the following process of hydrological water cycle  
a) Precipitation (2 Marks)  
b) Infiltration (2 Marks)  
c) Overland flow (2 Marks)
2. Distinguish between the following terms as applicable in Soil-Water Relationship  
a) Saturation Point (2 Marks)  
b) Field capacity (2 Marks)  
c) Permanent wilting point (2 Marks)
3. Distinguish between the following as apply in flow of water in pipes and open channels  
a) Laminar flow and turbulent flow (2 Marks)  
b) Natural channel and prismatic channels (2 Marks)  
c) Pipe Flow and open channel flow (2 Marks)
4. Briefly THREE performance parameters of an irrigation pump (6 Marks)
5. State THREE factors that determine how much water is held in the root zone of plants (6 Marks)

**SECTION B [40 MARKS]**

**Answer ANY TWO questions from this Section.**

6. Akala village has a drainage basin area of 40,000 m<sup>2</sup>. The basin experiences an estimated suspended sediment discharge of 36,000 kg/year and a bed load discharge of 22,000 kg/year. (20 Marks)  
*The estimated bed load density = 2500kg/m<sup>3</sup>*  
*The estimated soil density = 500kg/m<sup>3</sup>*  
Calculate: (i) The Erosion rate and Unit Erosion Rate of the reservoir  
(ii) The bed lowering rate  
(iii) The soil lowering rate
7. With the aid of sketch diagrams, explain the Irrigation Water Supply System Components between the intake points and typical field application (20 Marks)
8. A drainage system is necessary to remove excess water from the irrigated land. This excess water may be e.g. waste water from irrigation or surface runoff from rainfall. It may also include leakage or seepage water from the distribution system. (20 Marks)  
a) Discuss the importance of drainage  
b) Explain the Surface and Sub-Surface (Underground) categories of drainage
9. Discuss any Five Dry-Land Farming Techniques in Arid Lands (20 Marks)

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