JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

SCHOOL OF AGRICULTURAL AND FOOD SCIENCES

UNIVERSITY EXAMINATION FOR DEGREE OF BACHELOR OF SCIENCE INFOOD SECURITY

THIRD YEAR SECOND SEMESTER 2013/2014 ACADEMIC YEAR

REGULAR

COURSE CODE: PWE 3321

COURSE TITLE: Soil and Water Conservation Management

EXAM VENUE:LR 7   **STREAM: BSc (Food Security)**

DATE:10/12/14   **EXAM SESSION: 2.00 – 4.00PM**

TIME: 2.00 HOURS

Instructions:

1. **Answer ALL question in Section A (compulsory) and ANY TWO questions in Section B.**
2. **Candidates are advised not to write on the 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 in this Section.

1. (a) Outline the aims of soil and water conservation efforts in Kenya.   [4 marks]
   (b)Distinguish the following terminologies as used in soil and water and water management:
      i. Geological and accelerated soil erosion.   [4 marks]
      ii. Static and dynamic threshold wind velocity.   [4 marks]
      iii. Saline and sodic soils.   [4 marks]
      iv. Landscape erodibility and tillage erosivity.   [4 marks]

2. (a) Givethe Soil Loss Equation (USLE) and define its variables/factors.   [8 marks]
   (b) Given silt loam soil with a 6% slope and 250 m in length: The land has been in permanent pastureand is essentially 100% covered with grass. The land owner wants to know what the present predicted soil loss is and if the land can be converted to a maize – soybean rotation that would be expected to produce approximately 2500 kg/ha of maize residue without exceeding tolerance limits. Relevant factors for the current soil loss from thegiven soil are: R= 300; K=0.43; LS=1.91; C=0.003; P=0.1; and T=11 Mt/ha/yr. Converting to a maize - soybean rotation would mean a C factor of: 0.47 for conventional tillage; 0.22 for minimum tillage; and 0.16 for No – Tillage. Using the Universal Soil Loss Equation (USLE), calculate the amount of soil loss (in Mt/ha) for:
      i. The current land use.   [3 marks]
      ii. When land is converted to a maize- soybean rotation under Conventional tillage.   [3 marks]
      iii. When land is converted to a maize- soybean rotation under Minimum tillage. [3 marks]
      iv. When land is converted to a maize- soybean rotation under No – tillage.   [3 marks]

3. (a) Using relevant illustrations, explain the processes of soil transport in wind erosion.   [6 marks]
   (b) Outline wind factors that affect the magnitude of wind erosion.   [6 marks]
   (c) Outline soil factors that influence the magnitude of water erosion.   [8 marks]

SECTION B   [40 MARKS]

Answer any TWO QUESTIONS in this Section.

4. (a) Outline causes of soil acidification.   [5 marks]
5.   Illustrate soil acidification through excessive or continued use of ammonical fertilizer sources.   [5 marks]
6.   Outline approaches to the management and remediation of soil acidity.   [5marks]

7. (a) Discuss problems of soil compaction.   [6 marks]
   (b) Using relevant illustration, explain the relationship between soil compaction and oil permeability.   [3 marks]
   (c) Outline approaches to the management and remediation of soil compaction.   [6 marks]

8. (a) Name and distinguish characteristics of the three categories of salt-affected soils.   [6 marks]
   (b) Outline reclamation approaches for saline–sodic soils.   [9 marks]