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W1-2-60-1-6  
**JOMO KENYATTA UNIVERSITY OF AGRICULTURE AND TECHNOLOGY**  
**University Examinations 2017/2018**

**SECOND SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF  
LAND RESOURCE PLANNING AND MANAGEMENT**

**ALP 2410: LAND USE MODELLING II**

**DATE: AUGUST 2018**

**TIME: 2 HOURS**

**INSTRUCTIONS:**

**Answer Questions One and Any Other Two**

**Illustrate your answers using suitable examples and diagrams**

1. Write short notes on the following
  - a) Concepts of the systems' theory (10 marks)
  - b) Properties of a system (10 marks)
  - c) Classification of systems (10 marks)
  
2. Most models are created in four stages. Outline the four stages of creating a model (20 marks)
  
3. System analysis tackles the system in its totality, studying its structure, the internal links between components, as well as its links with the system's environment. Outline the methodology of systems analysis. (20 marks)
  
4. A model consists of a set of objects, described in terms of variables and relations. Discuss the different types of models citing examples. (20 marks)
  
5. Explain the following concepts as used in land systems analysis, modeling and monitoring
  - a) Grey box (5 Marks)
  - b) White box (5 Marks)
  - c) Black box (5 Marks)
  - d) Cybernetics (5 Marks)