



**JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY**  
**SCHOOL INFORMATICS AND INNOVATIVE SYSTEMS**  
**UNIVERSITY EXAMINATION FOR THE DEGREE OF SCIENCE**  
**ACTUARIAL SCIENCE**  
**3<sup>RD</sup> YEAR 2<sup>ND</sup> SEMESTER 2013/2014 ACADEMIC YEAR**  
**CENTRE: MAIN**

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**COURSE CODE: SAS 312**

**COURSE TITLE: STATISTICAL COMPUTING II**

**EXAM VENUE: STREAM: BSc. Actuarial**

**DATE: 13/12/2013 EXAM SESSION: 9.00 – 11.00 AM**

**TIME: 2 HOURS**

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**Instructions:**

- 1. Answer question 1 (Compulsory) and ANY other 2 questions.**
- 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.**

### QUESTION ONE 30 MARKS (COMPULSORY)

- a) The most frequently asked question concerning sampling is "What size sample do I need?" State and briefly explain the factors that influence sampling size. [6 Marks]
- b) Briefly explain the following three criteria needed to determine appropriate sampling size i) Confidence level, ii) Degree of Variability and iii) Level of Precision [6 Marks]
- c) Briefly explain the following terms as they relate to data structures. i) Arrays ii) Queues iii) Stacks [6 Marks]
- d) Enumerate three properties that are peculiar to arrays [3 Marks]
- e) Differentiate between data structure and algorithm [4 marks]
- f) Explain what linear and non-linear data structures are. Give examples. [5 Marks]

### QUESTION TWO 20 MARKS

- a) Sampling design can either be categorized as probability sampling or non-probability sampling. Give four examples of each group; briefly explain any two from each group . . [12 Marks]
- b) State the advantages and disadvantages of simulation as applied to queuing systems. [6 Marks]
- c) Draw a simulation models tree showing the relationship between static, dynamic, deterministic and stochastic simulation models [2 Marks]

### QUESTION THREE 20 MARKS

- a) The following data represent different types of variables. Classify each one of them as measurable (continuous) or categorical. If a variable is categorical, further classify it as nominal or ordinal. Justify your answer. (No marks will be awarded without justification.) [8 Marks]
  - i. The education level for a number of employees from a company (elementary school, high school, university or postgraduate degree).
  - ii. The blood pressure from 30 hospital patients.
  - iii. The hair colour of 50 persons.
  - iv. The weights of 30 randomly selected cereal boxes.
- b) State four advantages each of oral (verbal) and written interview [8 Marks]
- c) Provide an example where selection bias may occur. Be brief in explaining why selection bias may occur. [2 Marks]
- d) Define survey and state any two of its disadvantages [2 Marks]

#### **QUESTION FOUR 20 MARKS**

- a) You work for a market research company and your boss has asked you to carry out a random sample survey for a mobile phone company to identify whether a recently launched mobile phone is attractive to younger people. Limited time and money resources are available at your disposal. You are being asked to prepare a brief summary containing the items below. (Do not supposed to provide a lengthy answer.) [12 marks]
- i. Choose an appropriate probability sampling scheme. Provide a brief justification for your answer.
  - ii. Describe the sampling frame and the method of contact you will use. Briefly explain the reasons for your choices.
  - iii. Provide an example in which response bias may occur. State an action that you would take to address this issue.
  - iv. State the main research question of the survey. Identify the variables associated with this question.
- e) Enumerate the process for a complete simulation study which presents a systematic approach of carrying out a simulation. [5 Marks]
- f) State three assumptions made when simulating a queuing system [3 Marks]

#### **QUESTION FIVE 20 MARKS**

- a) Survey can be classified into three basic groups. State the groups and give two examples in each group [9 Marks]
- b) Survey errors can mainly be categorized into two. Identify the two categories; define and explain each of the categories [7 Marks]
- c) Compare and contrast deterministic and stochastic simulation and modeling [4 Marks]