



MACHAKOS UNIVERSITY

University Examinations for 2017/2018

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY

**THIRD YEAR SECOND SEMESTER EXAMINATION FOR
BACHELOR OF SCIENCE IN COMPUTER SCIENCE
SCO 303: SIMULATION AND MODELING**

DATE: 13/12/2017

TIME: 2:00 – 4:00 PM

INSTRUCTIONS

Answer Question ONE and any other TWO Questions

QUESTION ONE (30 MARKS)

- a) Explain any FIVE application areas of simulation. (5 marks)
- b) Differentiate between the following models as used in system simulation
 - i. Modeling and simulation
 - ii. Discrete system and Continuous system
 - iii. Dynamic and Static models (6 marks)
- c) Explain the importance of having a statistical element in a simulation package (3 marks)
- d) Explain three techniques of validating a model (3 marks)
- e) A certain insurance company has three points from which customers are served. It takes an average of 5 min to service one customer in both booths and 10 customers arrive per hour. calculate
 - i. The probability of a customer getting served without queuing. (8 marks)
 - ii. Comment on whether there is need to employ another server or not (2 marks)
- f) Outline three advantages of simulation over normal statistical analysis (3 marks)

QUESTION TWO (20 MARKS)

- a) In a certain fast food joint there are 2 service points where customers are served, it takes an average of 2 minutes to serve one customer and 10 customers arrive per hour. Required
- Draw the flow chart showing the above scenario (5 marks)
 - If the manager approached you to develop a queuing system for his joint, what are the THREE requirements you would consider in your design of the queue. (6 marks)
- b) Differentiate between Poisson distribution and Exponential Distribution. (2 marks)
- c) Using a well labelled diagram explain the difference between fixed time model and event to event Model. (7 marks)

QUESTION THREE (20 MARKS)

- a) Explain two benefits of financial models. (4 marks)
- b) Random numbers are generated using random number generators. State two types of random number generators explaining the scenario when each is applied (4 marks)
- c) Using mid-square method, generate six random numbers given that the seed is 123. (10 marks)
- d) State two properties of random numbers (2 marks)

QUESTION FOUR (20 MARKS)

- a) State four categories of simulation software (4 marks)
- b) Discuss three benefits of Visual Interactive Simulation (6 marks)
- c) An MUC students wants to simulate the operations of a bank. Explain three factors he is likely to consider in choosing the simulation language to use. (6 marks)
- d) State four types of models (4 marks)

QUESTION FIVE (20 MARKS)

- a) Explain three methods for testing the randomness of a random variable (6 marks)
- b) Discuss four benefits of visual interactive simulation (8 marks)
- c) Describe three categories of simulation languages (6 marks)