



MACHAKOS UNIVERSITY

University Examinations for 2016/2017

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY

THIRD YEAR SECOND SEMESTER EXAMINATION FOR
BACHELOR OF SCIENCE (MATHEMATICS AND COMPUTER SCIENCE)

SCO 303: SIMULATION AND MODELING

DATE: 24/7/2017

TIME: 2:00 – 4:00 PM

INSTRUCTIONS

Answer question ONE and any other TWO questions

QUESTION ONE (30 MARKS)

- a) State FIVE applications of simulation and modeling. (5 marks)
- b) Differentiate between the following terms as used in system simulation
 - i. Model and simulator
 - ii. Variability and Complexity
 - iii. Dynamic and Static models (6 marks)
- c) Explain the importance of simulating a system rather than monitoring a system in the real world environment. (3 marks)
- d) State three techniques of verifying 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 challenges of time slicing as a technique of simulation (3 marks)

QUESTION TWO (20 MARKS)

- a) Explain two functions of 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 THREE (20 MARKS)

- a) Evaluate four categories of simulation software (8 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)

QUESTION FOUR (20 MARKS)

- a) Differentiate between Poisson Distribution and Exponential Distribution. (4 marks)
- b) Using a well labelled diagram explain the difference between fixed time model and event to event Model. (6 marks)
- c) Mark wants to simulate the operations of a new bank branch to be launched soon. His set up includes two service points, a customer arrives after every three minutes and each customer is to be served for four minutes. Use time slicing method to simulate this operations system for twenty minutes. Also determine the efficiency of the set up as it is. (10 marks)

QUESTION FIVE (20 MARKS)

- a) Discuss three reasons why it is necessary to use animation during the process of modeling and simulation. (6 marks)
- b) Discuss two reasons why it is not possible to perform experiment with a real system. (4 marks)
- c) Describe five common statistics included in the output report of a simulation programming system. (10 marks)