KIRIRI WOMENS' UNIVERSITY OF SCIENCE AND TECHNOLOGY
UNIVERSITY EXAMINATIONS, 2020/2021 ACADEMIC YEAR
FOURTH YEAR, SECOND SEMESTER
FOR THE DEGREE OF BACHELOR OF SCIENCE
(COMPUTER SCIENCE)

KCS 406 - SIMULATION AND MODELLING

Date: 18th December, 2020
Time: 8.30am – 10.30am

INSTRUCTIONS TO CANDIDATES

ANSWER QUESTION ONE (COMPULSORY) AND ANY OTHER TWO QUESTIONS

QUESTION ONE (30 MARKS)

a)   Define the following;

     i)   Simulation   (2 Marks)

     ii)   Pseudo-random numbers   (2 Marks)

     iii)   Seed   (2 Marks)

b)   Differentiate between the following

     i)   pseudo-random numbers and random numbers   (3 Marks)

     ii)   endogenous and exogenous variables   (3 Marks)

c)   Discuss and explain the advantages for using simulation other than experimenting with real life systems?
                                                                                                                    (6 Marks)

d)   Distinguish the following models

     i)   Deterministic vs Stochastic models

     ii)   Discrete vs Continuous models   (8 Marks)

a)   State any four examples of simulation software.   (4 Marks)

QUESTION TWO (20 MARKS)

a)   What are the desired properties of a good random numbers generator   (4 Marks)

b)   Highlight the steps involved in carrying out a simulation exercise   (5 Marks)

c)   Briefly explain any three common techniques used to generate random numbers.
                                                                                (4 Marks)

d)   Consider simulating a single server queue; identify the exogenous and endogenous
      variables   (5 Marks)

QUESTION THREE (20 MARKS)

a)   Consider a bank where arrivals follow a poison process with mean arrival rate of 5.1
      customers per hour, service time are exponential with mean time of 10 minutes. Compute
      the measures of performance.   (16 Marks)

b)   What is the probability that the number of customers in the shop exceeds three?
                                                                                (2 Marks)

c)   What percentage of customers goes directly to service?
                                                                                (2 Marks)

QUESTION FOUR (20 MARKS)

a)   Discuss the common random number generators commonly is use.
                                                                                 (6Marks)

b)   Briefly discuss the different kinds of simulations   (6 Marks)

c)   Write statements (algorithm) in MATLAB on how to simulate a fair coin 50 times and
      record the resulting number of heads and tails   (4Marks)

d)   Discuss any two statistical techniques used to test for randomness when pseudo-random
      numbers are generated   (4 Marks)

QUESTION FIVE (20 MARKS)

a)   What does a M/M/1 model represent?   (1 Mark)

b)   Discuss the different types of systems and there corresponding reliabilities of
      performance   (9 Marks)

c)   Highlight common steps used to all digital simulation   (4 Marks)

d)   i)   What are the areas different in simulation languages   (3 Marks)

      ii)   What are the standard capabilities   (3 Marks)