TECHNICAL UNIVERSITY OF MOMBASA

INSTITUTE OF COMPUTING AND INFORMATICS

DEPARTMENT OF COMPUTER SCIENCE & INFORMATION TECHNOLOGY

UNIVERSITY EXAMINATION FOR:

BSSC/SEPT2021/J-FT/BSCS/SEPT2021/J-FT

EIT 4317_CCS 4402 : SIMULATION AND MODELLING

END OF SEMESTER EXAMINATION

SERIES:DECEMBERPickyear

TIME:2HOURS

DATE: Pick DateDec2024

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of **FIVE** questions. Attemptquestion ONE (Compulsory) and any other TWO questions.

Do not write on the question paper.

Question ONE

a) State and explain any two simulation models [4marks]

b) Business models usually consist of linked series of equations and formulae arranged so that they behave in a systematic manner to the real system being investigated. State four factors/variables that a simulation model should have. [4marks]

c) State four advantages of using simulation other than experimenting with real life systems[4marks]

d) The mean and standard deviation for the grade points of a random sample of 64 college students are calculated to be 3.6 and 0.4 respectively. Find the 95% and 99% confidence interval for the mean of the entire class. [6marks]

e) State two reasons why random numbers are used in simulation [2marks]

f) Excel bakery maintains sufficient stock of its ever delight cake and the daily demand is as given below

Daily Demand	0	10	20	30	40	50	60	70	80
Probability	0.0.2	0.16	0.23	0.15	0.13	0.12	0.10	0.06	0.03

(i) Using the following sequence of random numbers simulate the demand for

the next 10 days. 23,45,23,21,69,32,02,44,47,75 [5marks)

g) A company allows only 5% defective fuses in its production. A sample of 8 fuses is chosen. Calculate the probability of getting more than two defective fuses. [5marks]

Question TWO

a) List and explain the three components of a queuing system model (3 marks)
b) A telephone attendant receives 110 calls during the busy hour. Each call takes, on average, 30 seconds to process.
   i. What percentage of the attendant's time is devoted to answering calls? (2 Marks)
   ii. How long must people wait, on average, before their call is processed? (2 Marks)
   iii. How many people are in the queue, on average? (2marks)
c) Discuss the steps involved in carrying out a simulation study [6marks]
d) Discuss the desirable features that simulation software should have. [5 Marks]

Question THREE

a) Kenya Airways has one reservation clerk on duty in its Moi International Airport branch at any given time. The clerk handles information regarding passenger reservation and flight timings. Assume that the number of customers arriving during any given period is passion distribution with and arrival rate 8 per hour and that the clerk can service 1 customer in 6 minutes on an average, with an exponentially distributed service time.

(i). What is the probability that the system is busy? [2 Marks]
(ii). What is the average time a customer spends in the system? [2 Marks]
(iii). What is the average length of the queue? [4 Marks]

What is the average number of the customers in the system? [2 Marks]

b) State and briefly explain eight reasons that make simulation appropriate for many real-World problems (4 marks)

c) Define discrete event simulation and state five characteristics that it should posses [6marks]

Question FOUR

a) State and explain any two commonly used random number generators [4marks]

b) Kodak photograph studios use an expensive grade of developing fluid when printing special colour portraits. Since the developed fluids cannot be stored for long periods, it is important to keep on hand only as much as is need to fill an anticipated demand. In the past few months, however demand for the product has been fluctuating. The owner has decided to simulate the demand for this source. A study Kodak photograph's appointment book resulted in the following frequency distribution.

Daily demand	0	1	2	3	4	5
Number of days	10	20	40	20	6	4

Using the following sequence of random numbers: 35,92,68,03,51,05,72,84,98,34 generate a ten-day daily demand (sequence of demand values) and estimate the expected daily demand. [10 marks]

c) Briefly explain the techniques that are used in verification and validation of simulation models [10 Marks]

Question FIVE

a) Define the following:

i. Entity (1 Marks)

ii. Attribute (1 Mark)

iii. Activity (1 Mark)

b) Consider a super market as a system, identify entities, attributes, activities, events and state variables. (5 marks)

c) Highlight the steps involved in monter Carlo simulation (4 marks)

d)Simulation models can be classified among three dimensions, state and explain them (6 Marks)

e) Why would an analyst ever prefer a general-purpose language such as BASIC in simulation when there are advantages of using special purpose languages such as GPSS, SIMSCRIPT, XCELL or SLAM (5 Marks)