



PIONEER INTERNATIONAL UNIVERSITY

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ACADEMIC YEAR: 2021/2022

UNIT NAME : SIMULATION AND MODELLING

SEMESTER: SEPT-DEC 2021

UNIT CODE: BSIT 4230

DATE: DEC 2021

TIME: 2 HOURS

INSTRUCTIONS: Answer question one (30 marks) and any other two

IMPORTANT NOTICE !!!!!!!!!!!!!

The following are the possible consequences if found guilty of an Examination Offence:

- 1. a) Expulsion from the University.**
- 2. b) Academic Leave.**

QUESTION ONE

- (a) Define the following terms as used in simulation and modelling
- Simulate
 - System
 - State of a system (6 marks)
- (b) Outline five areas where simulation is applicable (5 marks)
- (c) Differentiate between the following terms as used in classification of simulation models
- Static versus dynamic simulation models (2 marks)
 - Discrete versus continuous simulation models (2 marks)
- (d) List five advantages of using simulation (5 marks)
- (e) Excel bakery maintains sufficient stock for its ever delight cake. Daily demand is as given below:

Daily Demand	0	10	20	30	40	50
Probability	0.01	0.20	0.15	0.50	0.12	0.02

Use the following sequence of random numbers to simulate the demand for the next ten days .25,39, 65, 76, 12, 05, 73, 89, 19, 49 (6 marks)

(f) Give a brief over-view of Monte-Carlo simulation

(4 marks)

SECTION B ATTEMPT ANY TWO QUESTIONS

QUESTION TWO (20 MARKS)

- (a) State and explain five components used in discrete event simulation model (10 marks)
- (b) Represent the components in 2(a) above in a flow diagram (10 marks)

QUESTION THREE (20 MARKS)

Dr. strong is a dentist who schedules all her patients for 30 minutes appointments.

Some of the patients take more than 30 minutes depending on the type of dental work to be done. The following table shows the various categories of work, their probabilities and the time actually needed to complete the work.

Category	Time required	Probability
Filling	45 minutes	0.40
Crown	60 minutes	0.15
Cleaning	15 minutes	0.15
Extractio n	45 minutes 15 minutes	0.10 0.20
Check- up		

Assume that all the patients show up at the clinic at exactly their scheduled arrival time starting at 8.00 a.m.

- i) Calculate the dentists clinic schedule for four hours and determine average waiting time for the patients (17 marks)
- ii) Calculate the time that the doctor would be idle (3 marks)

NB. Use the following random numbers: 40, 82, 11, 34, 25, 66, 17, 79

QUESTION FOUR (20 MARKS)

- (a) A simulation model attempts to describe a business system by a number of equations which are characterized by variables. State and explain these variables (8 marks)
- (b) The Tit-Fit Scientific laboratories is engaged in producing different types of high-class equipment for use in science laboratories. The company has two different assembly lines to produce its most popular product 'pressurex'. The processing time for each of the assembly lines is regarded as a random variable and is described by the following distributions

Process time	10	11	12	13	14
Assembly A ₁	0.10	0.15	0.40	0.25	0.10
Assembly A ₂	0.20	0.40	0.20	0.15	0.05

The following random numbers generate data on process times for fifteen units of the item.

4134	8343	3602	7505	7428
7476	1183	9445	0089	3424
4943	1915	5415	0880	9309

Read the numbers vertically taking the first two digits for A₁ and last two digits for A₂ hence compute the expected process time for the product (12 marks)

QUESTION FIVE (20 MARKS)

- ii) If the company decides to produce twenty-nine units per day, what is the advantage or disadvantage of the company (5 marks)

