Primeasia University

a mission with a vision

Department of Computer Science and Engineering (CSE)

Mid Term Examination, Summer Semester, 2020

Course No.: CSE 417 **Full Marks: 20**

Course Title: Simulation and Modeling **Time: 50 minutes**

There are **Three** questions. Answer any **Two** of them. Figures in the right-hand margin indicate full marks.

1. A drunkard moves from a point to a destination and takes steps towards North direction, South direction, East direction and West direction, at random. The associated probabilities of the directions North, South, East and West are 40%, 20% 30% and 10% respectively. 10

   The position will be changed as follows:

   a) When he moves at North *y* is incremented by the value, that you will get by taking the rightmost digit of the "year" value of your student ID. If that value is 0, then add 4 with it.
   b) When he moves at South *y* is decremented by the value, that you will get by dividing the value that you got for North direction by 2. If you get fraction value then consider the ceiling value.
   c) Take the "semester" value of your student ID. If that value is odd, then add 2 with it and if it is even, then add 1. This is the value that you will get to decrement *x* while moving at West.
   d) When he moves at East *x* is incremented by the value, that you will get by dividing the value that you got for West direction by 2. If you get fraction value then consider the floor value.

   You will find the starting position following the process described below:

   a) Take the middle 3 digits of your ID and consider the rightmost 2 digits maintaining the sequence from left to right. If any of the 2 digits is 0, then add 3 with it. Consider these two values (from left to right) as the position of *x* and *y* respectively.

   Find the final position of the drunkard after he takes 20 steps.

2. Consider an inventory system, where the initial stock is the "year" value of your student ID. The demand as well as the lead times are random variables. 10

Follow the procedure below to get the demands and their associated probabilities (In case of probability, the values you get should be put after point):

a) The first demand value is of 10units and the associated probability is the "year" value of your ID.
b) The second demand value is incremented by 3 units than the first demand value. To get the associated probability, double the probability value which is considered for 10units demand.
c) The third demand value is incremented by 4 units than the second demand value. The associated probability equals to the value, that is necessary to make cumulative probability 0.70.
d) The fourth demand value is incremented by 3 units than the third demand value and the associated probability is 0.30.

Lead time	2	3	4
Probability	0.35	0.50	0.15

There are two reorder points, RP1 and RP2 whereas two reorders, quantity of 10units and 5units respectively, can be outstanding at a time.
To find the level of RP1, you have to divide your department code (of your student ID) and you will get the value. To find the level of RP2, you have to divide the value you got for RP1 and you will get the value (consider the ceiling value if you get fraction value).

Find the service level and the average stock held for the given reorder points and the reorder quantity. Simulate the system for 20 days.

3. A computer technical support center is staffed by two people, Abel and Baker, who takes call and try to answer questions and solve computer problems. The time between call ranges from 1 to 4 minutes as shown: 10

Time between Arrival	Probability
1	0.22
2	0.45
3	0.17
4	0.16

Baker can provide service faster than Abel. The distributions of their service times are shown:
For Baker: (Take the values after point for probability.)

Service Time	**Probability**
3	Take your department code

4	Divide your department code by 3
5	Divide your department code by 2
6	Remaining value which will help to get 1.00 in cumulative probability.

For Abel: (Take the values after point for probability.)

Service Time	Probability
4	0.45
5	Your "semester" value
6	Remaining value which will help to get 0.80 in cumulative probability.
7	Remaining value which will help to get 1.00 in cumulative probability.

When both are idle, Baker takes the call. If both are busy, the call goes on hold.

Random value for arrivals:
46, 15, 81, 74, 39, 45, 59, 06, 09, 56, 65, 10, 95, 21, 92, 89, 38, 13, 61, 50

Random value for service time:

> Take the random values for arrivals and divide each of them by 2 to get the random values for service time. After division, if you get a fraction value take ceiling and floor number alternatively. After division, if the value is below 1, then take your "semester" value and "year" value of your student ID alternatively.

Assume that the first customer arrives at time 0.

Simulate the system for first 20 customers assuming a single server and find the followings:

I. Average Waiting time,
II. Probability a customer has to wait in the queue,
III. Average Service time,
IV. Average time between Arrivals,
V. Average time a customer spends in system,
VI. Average Waiting time of those who wait