B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

July 2023 Semester End Main Examinations

Programme: B.E.
Branch: Industrial Engineering and Management
Course Code: 22IM6DCSMA
Course: Simulation Modeling and Analysis

Semester: VI
Duration: 3 hrs.
Max Marks: 100
Date: 05.07.2023

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

			UNIT - I	CO	PO	Marks
1	a)		Define simulation? State any two of its merits and demerits and also discuss any two simulations applications	CO1	-	**05**
	b)		Discuss the types of models considered in system simulation	CO1	-	**05**
	c)		Bangalore Traffic Police department wants to minimize the Traffic congestions at Mysore road during weekend, As a simulation analyst with a flow chart explain various steps to be incorporated for simulation study.	CO3	PO2	**10**
			OR			
2	a)		A project consists of eight activities A to H. The completion time for each activity is a random variable. The data concerning probability distribution, along with completion times for each activity, is as follows:	CO3	PO2	**15**

Activity	Immediate Predecessor(s)	Time (day) / Probability								
		1	2	3	4	5	6	7	8	9
A	-	-	-	-	0.2	-	0.4	0.4	-	-
B	-	-	-	-	-	-	0.5	-	0.5	-
C	A	-	-	0.7	0.3	-	-	-	-	-
D	B, C	-	-	-	-	0.9	-	-	0.1	-
E	A	-	-	-	-	0.2	-	-	-	0.8
F	D, E	-	-	-	0.6	0.4	-	-	-	-
G	E	-	-	0.4	0.4	-	0.2	-	-	-
H	F	-	0.4	-	-	-	-	0.6	-	-

a) Draw the network diagram and identify the expected activity times and corresponding critical activities.
b) Simulate the project to determine the activity times. Determine the critical path for 5 iterations.

				CO	PO	Marks
		b)	A company dealing with exporting of dry fruits wishes to study the demand for dry fruits during festival season. From the past records it has found that demand of these dry fruits follows a normal distribution with a mean of 175 and standard deviation of 25. Simulate the demand of dry fruits for the next 3 days.	CO2	PO1	05
			UNIT - II			
3	a)		Generate 6 random numbers using multiplicative congruential method with $X0 = 117$, $a = 43$, and $m = 1000$. Test weather generated random numbers follows Uniform distribution. Assume level of Significance = 2%	CO2	PO1	12
	b)		What are pseudo random number? What are the problem that occur while generating pseudo random numbers.	CO1	PO1	04
	c)		List the necessary criteria to be considered for Congruential generators	CO1	PO1	04
			OR			
4	a)		Test whether the 3rd, 8th, 13th, and so on, for the 40 numbers are auto-correlated or not, with level of significance = 10%. 0.12 0.01 0.23 0.28 0.89 0.31 0.64 0.28 0.83 0.93 0.99 0.15 0.33 0.35 0.91 0.41 0.60 0.27 0.75 0.88 0.68 0.49 0.05 0.43 0.95 0.58 0.19 0.36 0.69 0.87	CO4	PO2	10
	b)		Based on runs up and runs down, determine whether the following sequence of 40 numbers is such that the hypothesis of independence can be rejected where $\alpha = 10\%$. 0.41 0.68 0.89 0.94 0.74 0.91 0.55 0.62 0.36 0.27 0.19 0.72 0.75 0.08 0.54 0.02 0.01 0.36 0.16 0.28 0.18 0.01 0.95 0.69 0.18 0.47 0.23 0.32 0.82 0.53 0.31 0.42 0.73 0.04 0.83 0.45 0.13 0.57 0.63 0.29	CO4	PO2	10
			UNIT - III			
5	a)		Five observations were collected from a study and the data were as follows: 2.76 1.83 0.80 1.45 1.24 Develop random variate generator for the above data considering random numbers of 0.83 0.67 0.10 0.49 0.61	CO4	PO2	10
	b)		Times to failure for an automated production process have been found to be randomly distributed with a Weibull distribution with parameters $\beta = 2$ and $\alpha = 10$. generate five values from this Weibull distribution. consider random numbers 0.25 0.68 0.78 0.10 0.01	CO4	PO2	05
	c)		With usual notations derive random variate generator for Uniform distribution			05

			UNIT - IV			
6	a)	Records pertaining to the monthly number of Job-related injuries at an gold mine were studied by a central agency and are as follows: Agencies believe that Injuries follows a poison pattern. Apply suitable test to validate the claim made by the agency, assume level of significance = 5%.	*CO4*	*PO2*	**10**

Injuries / month	0	1	2	3	4	5	6	7	8	9	10	11
Frequency of Injuries	12	10	19	17	10	8	7	5	5	3	3	1

	b)	With a block diagram explain Iterative process of calibrating a model	*CO1*	-	**06**
	c)	Explain Naylor – Finger three step approach for validation process	*CO1*	-	**04**
		UNIT - V			
7	a)	Explain Subsystems considered in simulation material handling system	*CO2*	*PO1*	**10**
	b)	Explain goals and performance measures of manufacturing simulation models.	*CO2*	*PO1*	**10**

******