POKHARA UNIVERSITY

Level: Bachelor | Semester: Fall | Year : 2021
Programme: BE | Full Marks: 100
Course: Simulation and Modeling | Pass Marks: 45
Time : 3hrs.

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Attempt all the questions.

1. a) "Before system simulation, it is necessary to predict how a system performs its activities". Explain this with the principles of system modeling. 7

   b) Why do we need the Monte-Carlo method of simulation? Estimate the value of π using Monte-Carlo simulation. Use 15 iterations to generate numbers. Compare your result with its known value up to 3 decimal places. 8

2. a) Discuss about continuous system Simulation Language (CSSL). Explain different components of analog methods. 8

   b) Draw the Cobweb model (in graph) for market economy graph from the given data 7

   $D = 12.4 - 1.2P$

   $S = 8.0 - 0.6P_{-1}$

   $D = S$ and $P_0 = 1.0$

3. a) Write a program in CSMP III for the RLC circuit model given by the following differential equation (variable and constants have their appropriate meaning). 8

   $Mx'' + Dx' + Kx = KF(t)$

   Where $M = 2.0$, $F = 1.0$ and $K = 400.0$. Make your necessary assumptions if required.

   b) What is the significance of lost calls in a telephone system simulation ? How do you measure the utilization and occupancy of a link in telephone system simulation ? Explain 7

4. a) Why do we need to gather statistics in discrete system simulation? Explain the recording distribution and transit time. 7

   b) How do you generate arrival pattern using bootstrap sampling? Illustrate. 8

5. a) For the given sequence of random numbers, can the hypothesis that the numbers are rejected on the basis of length of runs up and down at $\alpha = 0.05$? 8

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
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

   b) How do you define random numbers in the domain of computation? Explain with a random number generation algorithm 7

6. a) A parts manufacturing shop is turning out parts at the rate of one every 5 minutes. As they are finished, the parts got to the inspectors, who take 4±3 minutes to examine each one and rejects about 10% of the parts. There are three inspectors. During examination, the parts are put on a conveyer, which carries the parts to the inspectors and takes defined interval of time in between. It takes 2 minutes for a part to reach the first inspector; if he is free at the time of part arrives, he takes it for inspection. If he is busy at that time, the part takes a further 2 minutes to reach the second inspector who will take the part if he is not busy. Parts that pass the second inspector may get picked up by the third inspector, who is a further 2 minutes along the conveyer belt; otherwise they are lost. Each part will be represented by one transaction and the time unit selected for the problem will be 1 minute. 8

   Write a GPSS block diagrams and a program for the system.

   b) How do you define the initial bias in a system simulation? How does the replication of runs help to minimize it? 7

7. Write short notes on: **(Any two)** 2×5

   a. Estimation Methods

   b. Digital-Analog Simulator

   c. Queuing system