

Tribhuvan University
Institute of Science and Technology
2076

Bachelor Level / fifth-semester / Science Full marks: 60 **Computer Science and Information Technology(CSC317)** Pass marks: 24
(Simulation and Modelling) Time: 3 hours Candidates are required to give their answers in their own words as far as practicable.
The figures in the margin indicate full marks.

Group A

Long Answer Questions:

Attempt any two questions. (2x10=20)

1. Describe different types of mathematical simulation models. Develop a mathematical model (differential equation) for any dynamic system.
2. Define and develop a Poker test for four-digit random numbers. A sequence of 10,000 random numbers, each of four digits has been generated. The analysis of the numbers reveals that in 5120 numbers all four digits are different, 4230 contain exactly one pair of like digits, 560 contain two pairs, 75 have three digits of a kind and 15 contain all like digits. Use Poker test to determine whether these numbers are independent. (Critical value of chi-square test for $\alpha=0.05$ and $N=4$ is 9.49)
3. Define congestion in a queuing system. Describe different types of components and characteristics of a queueing system.

Group B

Short answer Questions:

Attempt any eight questions. (5x8=40)

4. Define and describe different types of elements and components of a system.
5. Describe the importance of differential/Partial differential equations in simulation.
6. What do you understand about interactive and feedback systems in simulation? Explain.
7. What do you understand about the distributed lag model? explain with an example.
8. Describe the process of calibration and validation in detail.
9. Draw and describe different types of GPSS blocks that are used to deal with queues?
10. Differentiate between fixed time step and event to event model with the help of suitable examples.
11. Why do we need the analysis of simulation output? How do you use the estimation method in output analysis? Explain.
12. Write a computer program in C that will generate four digit random numbers using the multiplicative congruential method. Allow the user to input values of X_0 , a, c and m.
13. Define and describe Markov Chain with an example.