



**Tribhuvan University  
Institute of Science and Technology  
2069**

Bachelor Level/ Third Year/ Fifth Semester/ Science  
**Computer Science and Information Technology (CSc. 302)**  
(Simulation and Modeling)  
**Full Marks: 60 | Pass Marks: 24 | Time: 3 hours.**

Candidates are required to give their answer 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. (2×10=20)**

1. Define simulation. What are the various steps in simulation study? Explain.
2. Explain Markov Chains with example.
3. What are the properties of random number? The sequence of numbers 0.54, 0.73, 0.98, 0.11 and 0.68 has been generated. Use the Kolmogorov – Smirnov test  $\alpha = 0.05$  to determine if the hypothesis that the numbers are uniformly distributed on the interval 0 to 1 can be rejected. (Note that the critical value of D for  $\alpha = 0.05$  and  $N = 5$  is 0.565).

**Group B  
Short Answer Questions:  
Attempt any eight questions. (8×5=40)**

4. When is simulation appropriate and when it is not?
5. What do you mean by server utilization?
6. What do you mean by non-uniform random number?
7. Why an auto-correlation test is needed in random number?
8. What do you mean by calibration and validation?
9. When is estimation method appropriate? Explain.
10. Explain Hybrid simulation with example.
11. Use the multiplicative congruential method to generate a sequence of four three-digit random numbers. Let  $r_0 = 118$ ,  $a = 4$  and  $m = 1000$ .
12. Explain the distributed lag model.
13. Write short notes on:
  - a) Queuing discipline
  - b) CSMP