POKHARA ENGINEERING COLLEGE
Internal Assessment Examination

Level: Bachelor Semester – Spring Year : 2025
Programme: B.E. Computer 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) What is SSQM? How performance of SSQM can be measured? 2+6
   b) What is Monte Carlo simulation? How this method can be used to derive the value of pi. 2+5

2. a) Explain the three general types of statements in CSMP III? Derive a CSMP III program for the automobile suspension problem. 4+4
   b) How simulation differs from analytical solution? What are the steps in simulation study? 3+4

3. a) Draw the analog computer diagram to simulate a system whose behaviour is expressed by the following equations: 8

$$dx_1/dt = -k_{12}x_1 + k_{21}x_2 - k_{31}x_3$$

$$dx_2/dt = k_{12}x_1 - (k_{21}+k_{23})x_2 + k_{24}x_3$$

$$dx_3/dt = k_{23}x_2 - k_{12}x_1$$

   b) Explain different time advance mechanisms in simulation with example. 7

4. a) Test the auto correlation of random numbers using significance level of 99% on the following sequence of random numbers. 8
   0.13,0.21,0.23,0.32,0.19,0.93,0.89,0.73,0.99,0.33,0.27,0.35,0.28,0.65, 0.56,0.42,0.87,0.69,0.37, 0.18,0.88,0.25,0.05,0.68,0.43,0.75,0.33
   b) What are the various types of calls. Simulate telephone system for delayed call system. 2+5

5. a) Parts are being made at rate of one every 9 ± 3 minute. As they are finished, the parts go to an inspector who tasks 15 ± 3 minute to examine each part and reject 20% of the parts. Simulate it for 500 parts. Draw GPSS diagram and write code for same. 5+3
   b) What is random number? Explain the properties of random number. 7

6. a) "Replication of runs will refine simulation output". Justify this statement with statistical analysis. 8
   b) Describe initial bias. How it affects the output of simulation. Explain in detail various techniques of elimination of initial bias. 7

7 Write short notes on **any two:** 2×5
   a) Analog Computer
   b) Feedback System
   c) Facilities and Storages