

IV B.Tech. II Semester Regular Examinations, April/May -2005

SIMULATION & MODELLING

(Common to Computer Science & Engineering and Mechatronics)

Time: 3 hours

Max Marks: 80

**Answer any FIVE Questions
All Questions carry equal marks**

1. (a) Explain the static physical model with an example.
(b) Explain the dynamic physical model with an example.
(c) Discuss the situations of using these models.
2. (a) Compare simulation and analytical methods.
(b) What are distributed lag and Cobweb models and explain each
3. (a) Explain about analog computers and analog methods used in simulation.
(b) Discuss about hybrid computers and digital-analog simulators.
4. (a) Discuss the uniform random number generator.
(b) Discuss Non-uniform continuous Distributed Random Numbers.
5. Explain
 - (a) Erlang distribution.
 - (b) Hyper-Exponential distribution.
 - (c) Normal distribution.
6. (a) List the steps used to measure utilization.
(b) Write the step used to measure occupancy and its purpose.
7. Draw GPSS block diagrams and write programs for the following problem.. Ships arrive a harbor at the rate of one every $1 \pm 1\frac{1}{2}$ hours. There are six berths to accommodate them. They also need the services of a crane for unloading and there are five cranes. After unloading, 10% of the ships stay to refuel before leaving; the others leave immediately. Ships do not need the cranes for refueling. Simulate the queues for berths and cranes assuming it takes $7\frac{1}{2} \pm 3$ hours to unload and $1 \pm \frac{1}{2}$ hours to refuel. Simulate for 100 ships to clear the harbor.
8. Explain the execution of simulation algorithm in
 - a) SIMSCRIPT
 - b) GPSS

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1. (a) Give two examples for Continuous and discrete systems.
(b) Ships arrive at a port. They dock at a berth if one is available. Otherwise they wait until one becomes available. They are unloaded by one of the several work gangs whose size depends upon the ships tonnage. A ware-house contains a new cargo for the ship. The ship is loaded and then departs. Identify the entities, attributes, activities and events for the system.
2. (a) Draw the cobweb model for the following market environment:
 $D = 12.4 - 1.2 P$
 $S = 8.0 + 0.6 P_{-1}$
 $P_0 = 1.0$
(b) Give the advantages and disadvantages of cobweb and distributed lag models.
3. (a) What is the purpose of using continuous system simulation languages.
(b) What are the important types of statements used SCMP III and explain each.
(c) What are the important functional blocks used in CSMP III.
4. (a) Explain the Monte-Carlo method.
(b) Discuss some of the applications of Monte-Carlo method.
(c) Is Monte-Carlo method a simulation technique ? Justify your answer
5. Explain
 - (a) Erlang distribution.
 - (b) Hyper-Exponential distribution.
 - (c) Normal distribution.
6. (a) Illustrate the general flow of control during the execution of simulation program with suitable diagram and explain it.
(b) Discuss the following:
 - i. Eounters
 - ii. Utilizety
 - iii. Occupancy
7. Parts are produced by a machine tool at the rate of one every five minutes. Each part is inspected for 4 ± 3 minutes and 10 % are rejected. Write a SIMSCRIPT program to simulate the system.

8. (a) How to implement the activities in SIMSCRIPT and GPSS?
(b) What are the different types of events in SIMSCRIPT and explain each.
(c) What is called Event scanning? Explain it?

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1. (a) Explain the following with an example: System, Entity, Attribute, Activity, State of the system.
(b) Differentiate between stochastic and deterministic system activities with examples
2. (a) What are the important techniques used in simulation.
(b) What are the different types of system simulation? Explain each.
(c) Give the difference between simulation and analytical methods.
3. (a) Explain about analog computers and analog methods used in simulation.
(b) Discuss about hybrid computers and digital-analog simulators.
4. (a) What is the purpose of using congruence method? How to generate random numbers by using this method?
(b) What are the types of congruence methods? Explain multiplicative congruence method.
(c) How random numbers are used to generate sequences of numbers from discrete distribution.
5. Explain
 - (a) Erlang distribution.
 - (b) Hyper-Exponential distribution.
 - (c) Normal distribution.
6. (a) Illustrate the general flow of control during the execution of simulation program with suitable diagram and explain it.
(b) Discuss the following:
 - i. Eounters
 - ii. Utilizety
 - iii. Occupancy
7. (a) List and explain the block-diagram symbols used in GPSS.
(b) What are the GPSS control statements list and explain them in brief.
8. (a) Discuss the permanent and temporary entities with respect to SIMSCRIPT and GPSS.

(b) Discuss the implementation of Activities in SIMSCRIPT and GPSS.

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1. (a) Explain the following with an example: System, Entity, Attribute, Activity, State of the system.
(b) Differentiate between stochastic and deterministic system activities with examples
2. (a) Draw the cobweb model for the following market environment:
 $D = 12.4 - 1.2 P$
 $S = 8.0 + 0.6 P_{-1}$
 $P_0 = 1.0$
(b) Give the advantages and disadvantages of cobweb and distributed lag models.
3. (a) Define system dynamics.
(b) Draw the structure of system dynamics model and explain with one example.
(c) Differentiate exponential growth model and exponential decay model.
4. (a) Explain the Monte-Carlo method.
(b) Discuss some of the applications of Monte-Carlo method.
(c) Is Monte-Carlo method a simulation technique ? Justify your answer
5. There are 2 workers that are responsible for 10 milling machines. The machines run on the average for 20 minutes, then require an average 5 minutes service period and both the times are exponentially distributed. Determine the various measures of performance, by assuming 0.692 as the probability that an arrival has to wait for service and 0.854 as the efficiency factor.
6. (a) Explain counters and summary statistics used in simulation studies.
(b) Explain the common method of summing the squares while computing the standard deviation.
(c) Under what circumstances double precision calculations are needed while simulation.
7. (a) Write a brief notes on GPSS with its historical background.
(b) Describe the features that makes the GPSS, a good language for simulating queuing systems.
8. (a) Discuss the permanent and temporary entities with respect to SIMSCRIPT and GPSS.

(b) Discuss the implementation of Activities in SIMSCRIPT and GPSS.
