

POKHARA UNIVERSITY

Level: Bachelor	Semester: Fall	Year : 2019
Programme: BCA		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) Why do we need simulate a system? Compare Stochastic with Deterministic Simulation System. 7
 - b) Monte-Carlo method is numerical computation method. Explain how and use it to determine the value of PI. 8
 2. a) Explain Predator- Prey model with example. 7
 - b) Draw block diagram for these equations: 8
- $$dx_1/dt = - k_{12} x_1 + k_{21} x_2$$
- $$dx_2/dt = k_{23} x_2$$
- $$dx_3/dt = k_{12} x_1 - (k_{21} + k_{23}) x_2$$

OR

How do you apply simulation for a discrete system? Explain with suitable example.

3. a) Define CSMP III and explain the types of statement. 8
- b) What do you mean by analog computer? Explain its advantage and disadvantage. 7
4. a) "Call gets lost when link is not available or line is busy" Verify this statement on the basis of various states involved in this simulation. 7
- b) What do you mean by uniformity test? Explain the process of uniformity test of random numbers by K-S test method. 8

OR

Using the linear congruential, find the period of the generator and set of random numbers for $a=5$, $c=1$, $m=8$ & seed $X_0 = 3$.

5. a) What are the types of simulation language? Explain the feature of simulation language. 7
- b) What is confidence interval? Explain estimation methods and state Central Limit Theorem. 8
6. a) Differentiate facilities and storages in detail. Draw a block 8

- diagram of a simple manufacturing shop model having more than one inspector.
- b) What is SIMSCRIPT? Explain SIMSCRIPT program orientation? 7
7. Write short notes on any two: 2×5
- a) Pseudo Random number
 - b) Utilization and occupancy
 - c) Estimation Methods

POKHARA UNIVERSITY

Level: Bachelor
Programme: BCA
Course: Simulation and Modelling

Semester: Fall

Year : 2018
Full Marks: 100
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 system modelling? Explain the types of model. 7
b) What do you mean by Monte Carlo method? Estimate the value of $\int_2^5 x^3 dx$ using Monte Carlo Method. 8
2. a) Use a cobweb model to investigate a market in which the supply and demand functions are:
$$D = \frac{17.91}{p^{\frac{1}{2}}} - 4.66$$
$$9s = 5.0(p_{-1} - 1)$$
Assume the market is always cleared.
b) Why do we need Digital-Analog Simulators? Write the function of following CSMP III Statements 7
DELT, FINTIM, PRDEL, OUTDEL
3. a) What is lost call? How can we maintain the calls from being lost? Simulate the telephone system for such calls. 8
b) Explain measuring Utilization and occupancy of some entity in discrete system simulation process. What is the key difference between utilization and Occupancy? 7
4. a) Explain differential linear and partial differential linear equations in details. 8
b) Write the consequences of properties of random numbers. 7
Explain the runs Test of random numbers with an example.
5. a) Give GPSS block diagram and write program for the following problem: 7
A machine tool in a manufacturing shop is turning out parts at

the rate of one every 5 minutes. As they are finished, the parts go to an inspector, who takes 4 ± 3 minutes to examine each one and rejects about 10% of the parts. Each part will be represented by one transaction, and the time unit selected for the problem will be 1 minute.

- b) Workers come to a supply store at the rate of one every 5 ± 2 minutes. Their requisitions are processed by one of two clerks who take 8 ± 4 minutes for each requisition. The requisitions are then passed to single storekeeper who fills them one at a time taking 4 ± 3 minutes for each request. Write GPSS block diagram and code to simulation above program for 1000 requisitions to be filled. 8
6. a) What is confidence interval? Explain Estimation methods and state Central Limit Theorem. 8
- b) Why gathering of statistics is necessary? Explain utilization and occupancy. 7
7. Write short notes on **any two:** 2×5
- a) Discrete probability function Vs probability density function
 - b) Real time simulation
 - c) Distributed lag model

POKHARA UNIVERSITY

Level: Bachelor

Programme: BCA

Course: Simulation and Modeling

Semester: Spring

Year : 2018

Full Marks: 100

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 modelling. 8
 - b) What is the nature of computation of Monte Carlo method? Find the value I using the Monte Carlo method 7
- $$I = \int_{2}^{5} 2x dx$$
2. a) Discuss about continuous system simulation language(CSSL). Explain different components of analog methods. 8
 - b) Explain Representation of Time in Discrete system simulation. Describe Significant event simulation. 7
 3. a) What is lost call? How can we maintain the calls from being lost? Simulate the telephone system for such calls (Delayed calls). 8
 - b) Enlist the 6 common statistics use to generate the simulated output and explain how you measure them. 7
 4. a) How initial bias can be removed? Explain about replication of run in analysis of simulation output. 8
 - b) Explain different statements in CSMP III. Describe the Execution cycle for the simscript program with necessary diagrams. 7
 5. a) "A random variable is drawn from an infinite population that has a stationary probability distribution with a finite mean and finite variance", elaborate this by using central limit theorem for estimation. 8
 - b) Workers come to a supply store at a rate of one every 5 ± 2 7

minutes. Their requisitions are processed by one of two clerks who take 8 ± 4 minutes for each requisition. The requisitions are then passed to a single storekeeper who fills them one at a time, taking 4 ± 3 minutes for each request. Draw the GPSS block diagram to simulate the queue of workers and measure the distribution of time taken for 1000 requisitions to be filled.

OR

Explain SIMSCRIPT program execution cycle with necessary diagrams.

- | | |
|--|--------------|
| 6. a) What is GPSS? Explain <i>any eight</i> GPSS block diagram symbols with their example. | 8 |
| b) What are the advantages of simulation language over the general purpose programming language for simulation study? Explain about temporary and permanent entities in simscript. | 7 |
| 7. Write short notes on any two : | 2×5 |
| a) Types of models | |
| b) Measuring utilization and occupancy | |
| c) Hybrid simulation | |

POKHARA UNIVERSITY

Level: Bachelor

Semester – Fall

Year : 2017

Programme: BCA

Full Marks: 100

Course: Simulation and Modelling

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) Define simulation and explain the importance of simulation contrasting its application. 8
 - b) What is Monte carlo method and why it is used? Explain steps for the calculation and give a suitable example of Monte carlo method. 7
2. a) Draw the cobweb model of a market economy for the following condition:
 $D=12.4 - 1.2P$
 $S=1.0 + 0.9P_{t-1}$
 $P_0=1.0$ 8

OR

Explain Event and Interval Oriented Time Advance Mechanism with suitable example of each.

- b) Define CSMP III and explain the types of statements. 7
3. a) What is Feedback system? Explain parasite-host model with suitable figure. 8
 - b) Define Discrete event simulation. Explain simulation of a telephone system. 7
4. a) What is Bootstrapping and why it is used? Explain the Generation of Arrival Patterns in discrete system simulation. 8
 - b) Explain Kolmogorov-Smirnov test and steps carried out for the test. 7

OR

Using the multiplicative congruential method, find the period of the generator and set of random numbers for $a = 13$, $m = 2^6$ and $X_0 = 1$ and 2

5. a) Discuss briefly about GPSS. Draw the blocks used in GPSS and also write about any five basic commands. 7
- b) Explain the SIMSCRIPT execution life cycle. 8

6. a) Explain the types of simulation on the basis of output. Define and explain estimation methods used in analysis of simulation output. 8
- b) Why elimination of initial bias is used in simulation output? Explain. 7
7. Write short notes on **any two:** 2×5
- a) Verification and Validation of model
 - b) Pseudo Random numbers
 - c) Hybrid Computers

POKHARA UNIVERSITY

Level: Bachelor	Semester - Fall	Year : 2016
Programme: BCA		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) Define endogenous and exogenous activities. Explain about phases of simulation study. 3+4
- b) What do you mean by Monte Carlo method? Estimate the value of $\int_1^4 (3x/2)dx$ using Monte Carlo Method. Also mention the application of Monte Carlo Method. 2+5+1
2. a) Draw a cobweb model of a market economy for the following equation 8

$$Q = 12.4 - 1.2P$$

$$S = 1.0 + 0.9P_{-1}$$

$$Q = S$$
- b) What are the symbols used in analog method? Draw the analog representation of following partial differential equation. 7

$$X_1 = -K_{12}X_1 + K_{21}X_2$$

$$X_2 = K_{12}X_1 - (K_{21} + K_{23})X_2$$

$$X_3 = K_{23}X_2$$
3. a) Define linear differential Equation and Non-Linear differential equation. Convert the following differential equation into CSMP III format. 8

$$\frac{d^2x}{dt^2} + 8 \frac{dx}{dt} + 5 = 100 F(x)$$
- b) What are the various types of call in telephone system? Explain about the lost call in details 7

4. a) Why gathering of statistics is necessary? Explain about utilization and occupancy. 8
- b) Explain the organization of SIMSCRIPT 7
5. a) Consider the following sequence of number 8
 0.12, 0.01, 0.23, 0.28, 0.89, 0.31, 0.64, 0.28, 0.83, 0.93, 0.99, 0.15,
 0.33, 0.35, 0.93, 0.41, 0.60, 0.27, 0.75, 0.88, 0.68, 0.49, 0.05, 0.43,
 0.95, 0.58, 0.19, 0.36, 0.69, 0.87
 Test whether the 3rd, 8th, 13th, and so on, numbers in the sequence are auto correlated using $\alpha = 0.05$.
- b) Workers come to a supply store at the rate of one every minute. Their requisitions are processed by one of two clerks who take 8 ± 4 minutes for each requisition. The requisition are then passed single store keeper who face them one at time taking 4 ± 3 minutes for each request. Write GPSS block diagram and code to simulation above program 7
6. a) What are the various techniques of elimination of Initial Bias? 7
 b) What is analysis of simulation output? Explain the simulation run statistics. 8
7. Write short note on any two: 2×5
 a) Queuing system
 b) Real-time simulation
 c) Properties of random numbers

POKHARA UNIVERSITY

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) Define System Modeling? What are the various types of system models? Explain each of them. 2+5

b) What is Monte Carlo method? Briefly describe its historical background. Find the value of π using Monte Carlo method. 3+5

2. a) Explain the steps of Simulation Study. 7

b) What are the various component of Analog Computer? Draw the analog computer for the following function. 3+5

$$a\ddot{x} + bx - c\theta = F(t)$$

$$e\ddot{\theta} + f\theta - gx = G(t)$$

3. a) Explain telephone system simulation with busy call. 7

b) Define Linear & Non-Linear differential equation. Explain CSMP III statement with example. 3+5

4. a) Discuss the major task performed in simulation of programming. 7

b) Why random numbers are useful? Test the following random numbers for their uniformity. 8

0.44	0.81	0.14	0.05	0.93
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5. a) Define GPSS. Explain different types of block along with their characteristics. 2+6

b) Explain the organization of SIMSCRIPT program with necessary diagram. 7

6. a) What is estimation method? Discuss the various methods of elimination of internal bias of simulation output. 2+6

- b) How replication of run can be used in simulation output? 7
7. Write short notes on **any two**: 2×5
- a) Feedback
 - b) Queuing System
 - c) Cobweb Models

POKHARA UNIVERSITY

Level: Bachelor Semester: Fall Year : 2015
Programme: BCA Full Marks: 100
Course: Simulation and Modelling 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) Define model. What are the various principle used in modelling. 7
b) What is Monte Carlo Method? What are the areas of application of Monte Carlo Method? Derive the mathematical statement of Monte Carlo for Integration method. 8
2. a) Solve the following market model by using distributed lag model and find the value of P after 5th iteration. 8

$$Q = 12.4 - 1.2 P$$

$$S = 1.0 + 0.9 P_{-1}$$

$$Q = S$$

$$P_0 = 1$$

OR

Explain the steps of simulation study.

- b) Define continuous system with suitable example. Also differentiate between linear differential and non-linear differential equations. 7
3. a) Define analog method. Draw the analog simulation model of the following differential equations: 8

$$X'_1 = -k_{12}X_1 + k_{21}X_2$$

$$X'_2 = k_{12}X_1 - (k_{21} + k_{23})X_2$$

$$X'_3 = k_{23}X_2$$

- b) Explain Event and Interval Oriented Time Advance Mechanism with suitable example of each. 7

4. a) What are the various types of call in telephone system? Explain about the lost call in details. 8

b) Test the following sequence of random numbers for uniformity. 7

0.44	0.83	0.17	0.05	0.92	0.27	0.73	0.59
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OR

Explain predator-prey model.

5. a) Explain the SIMSCRIPT execution life cycle. 7

b) Workers come to supply store at the rate of one every 5 ± 2 minutes. Their requisitions are processed by one of two clerks who take 8 ± 4 minutes for each requisition. The requisitions are then passed to the single storekeeper who fills them one at a time taking 4 ± 3 minutes for each request. Write GPSS block diagram and code to simulation for 1000 requisitions to be filled

6. a) Why elimination of initial bias is used in simulation output? Explain. 7

b) "Replication of runs will refine simulation output". Explain the statement with necessary examples. 8

7. Write short notes on **any two:** 2×5

- a) Pseudo Random Numbers
- b) Queuing system
- c) System Environment

POKHARA UNIVERSITY

Level: Bachelor	Semester – Fall	Year : 2014
Programme: BCA		Full Marks: 100
Course: Simulation and Modelling		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) Define the term system, model and simulation? Discuss about the different types of model. 7
- b) What is Monte Carlo Method? What are the areas of application of Monte Carlo Method? Derive the mathematical statement of Monte Carlo. 8
2. a) Write a CSMP III program of the following differential equation and discuss the control statements used. 7

$$MX'' + DX' + kX = kF(t)$$
- b) Explain the analog method. Draw the analog simulation model of the following differential equation. 8

$$X_1' = -k_{12}X_1 + k_{21}X_2$$

$$X_2' = k_{12}X_1 - (k_{21} + k_{23})X_2$$

$$X_3' = k_{23}X_2$$
3. a) Describe the measuring utilization and occupancy with mathematical modeling. 7
- b) Explain the events in simulations of telephone system as a lost-call system. 8
4. a) Explain the different tasks involved in Simulation of Programming with an algorithm? 7
- b) How can you use replication of runs in an analysis of simulation output? Explain. 8
5. a) What are the various techniques of elimination of Initial Bias? 7
- b) Explain execution procedure of SIMSCRIPT programs. 8

6. a) What are the desirable features of simulation software? Differentiate facilities and storages in detail. 7
- b) Parts are being made at rate of one every 9 ± 3 minute. As they are finished, the parts go to an inspector who takes 15 ± 3 minute to examine each part and reject 20% of the parts. Simulation it for 500 parts. Draw GPPS diagram and write code for the same. 8
7. Write Short notes on **any two**: 2×5
- a) Feedback System
 - b) Discrete Simulation
 - c) Hybrid Simulation

POKHARA UNIVERSITY

Level: Bachelor	Semester –Spring	Year : 2013
Programme: BCA		Full Marks: 100
Course: Simulation & 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) Define calibration and validation of models. Explain different types of models. 7
 b) What do you mean by Monte Carlo method? Estimate the value of pi using Monte Carlo Method. 8
2. a) Draw the analog computer model for the following equations: 7

$$\dot{x}_1 = -k_{12} + k_{21}x_2$$

$$\dot{x}_2 = k_{12}x_1 - (k_{21} + k_{23})x_2$$

$$\dot{x}_3 = k_{23}x_2$$
 b) What is feedback system? Illustrate with an example. 8
3. a) Define trace driven simulation and bootstrapping in terms of generation of arrival pattern. Explain all about the simulation of programming task with necessary block diagram? 8
 b) Explain in detail the simulation of telephone system considering delayed calls. 7
4. a) Explain measuring utilization and occupancy. 8
 b) What is an initial bias? What are various methods to eliminate initial bias? 7
5. a) Why do we need analysis of simulation output? Explain the replication of run. 8
 b) Explain various desirable features of simulation software. 7
6. a) Explain about the execution of subscript program with necessary figures. What are the uses of pointer in simscript? 7
 b) Parts are being made at rate of one every 6 minutes. They are of two 8

types, A and B, and are mixed randomly, with about 20% being type B. A separate inspector is assigned to examine each type of part. The inspection of A part takes 4 ± 2 minutes and B parts take 20 ± 10 minutes. Both inspectors reject about 10% of parts they inspect. Simulate it for 1000 parts. Draw GPSS diagram and write code for same.

7. Write short notes on **any two:** 2×5
- a) Hybrid simulation
 - b) Simulation run statistics
 - c) Continuous system simulation language

POKHARA UNIVERSITY

Level: Bachelor Semester – Spring Year : 2012
Programme: BCA 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 are various advantages and limitation of simulation? 7
 b) Explain the terms verification, validation and calibration. 8

2. a) Compare Analog computer with Hybrid Computer. Describe merits and demerits of analog computer. 7
 b) What do you mean by digital analog simulator? What was the reason to develop CSSL's? Explain CSMP III. 8

3. a) What are various types of calls in telephone system? Explain about lost call system. 8
 b) Explain discrete system and describe how arrival pattern are generated in discrete system? 7

OR

Explain Event and Interval Oriented Time Advance mechanism with flowchart.

4. (i) Explain the statement "Replication of runs will refine simulation output" 7
necessary examples and statistics.

b) What is an initial bias? What are various methods to eliminate initial 8
bias?

5. a) How Monte Carlo method is highly recommendable for simulation 8
describe with example?

b) Assume you are appointed to select the simulation software for the 7
computer system manufacturing company among five simulation
software. Explain your choice with fact and reason why it is better for
your organization?

6. a) Differentiate facilities and storages in detail. Draw a block diagram of a 10

simple manufacturing shop model having more than one inspector.

b) Explain the permanent and temporary SIMSCRIPT entities.

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7. Write short notes on **any two**:

2×5

a) Utilization & occupancy

b) Simulation run statistics

c) Differential Equation

