Name: **Enrolment No:**	

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2022

Course: Modelling and Simulations **Semester: III**
Program: MCA **Time: 03 hrs.**
Course Code: CSEG 8003 **Max. Marks: 100**

Instructions: Attempt all questions.

SECTION A
(5Qx4M=20Marks)

S. No.		Marks	CO
Q 1	In Queuing system, discuss the following term: a) Infinite Population Model b) Finite Population Model	**4**	**CO1**
Q 2	Differentiate between validation and verification process.	**4**	**CO2**
Q 3	Define discrete system with suitable example.	**4**	**CO3**
Q 4	Define deterministic system with suitable example.	**4**	**CO4**
Q 5	Define Poisson distribution process.	**4**	**CO1**

SECTION B
(4Qx10M= 40 Marks)

Q 6	Cluster the following eight points (with (x, y) representing locations) into three clusters using k-means algorithm: A1(2, 10), A2(2, 5), A3(8, 4), A4(5, 8), A5(7, 5), A6(6, 4), A7(1, 2), A8(4, 9)	**10**	**CO2**
Q 7	Generate twenty random numbers using multiplicative congruential method with x=5, a=11, and m=64. Provide your observation for the generated random numbers.	**10**	**CO3**
Q 8	Discuss the concept of Actor based simulation with suitable example. Or Discuss the Monte carlo simulation technique with suitable example.	**10**	**CO4**
Q 9	Draw and explain the mesh network architecture. Discuss the following for the mesh network: a) Types of Mesh Network. b) Advantages and Disadvantages of Mesh Network	**10**	**CO2**

SECTION-C
(2Qx20M=40 Marks)

<table>
<tr>
<td>Q 10</td>
<td>Discuss the following:
a) Binomial and Negative Binomial Distribution
b) Geometric Distribution
Or
Do the analysis of following single server queueing system.
<table><tr><th>Event</th><th>Number of Units at time t</th><th>Number of Arrivals in time dt</th><th>Number of Services in time dt</th><th>Number of units at time t+dt</th></tr><tr><td>1</td><td>0</td><td>0</td><td>-</td><td>0</td></tr><tr><td>2</td><td>1</td><td>0</td><td>1</td><td>0</td></tr></table>
Take the necessary assumptions and find out the equation for steady state condition. Also find out the expected number of units (Ls) in the system.</td>
<td>20</td>
<td>CO3</td>
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<tr>
<td>Q 11</td>
<td>Discuss the various ways to analyse the simulated results. How the available tools are helpful in analysis of results. Discuss the available tools, which are helpful in result analysis.</td>
<td>20</td>
<td>CO4</td>
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