



UNIVERSITY WITH A PURPOSE

UNIVERSITY OF PETROLEUM & ENERGY STUDIES

End Semester Examination, December 2021

Course: Supply Chain Modeling, Design and Simulation
Program: MBA (LSCM)
Course Code: LSCM8026

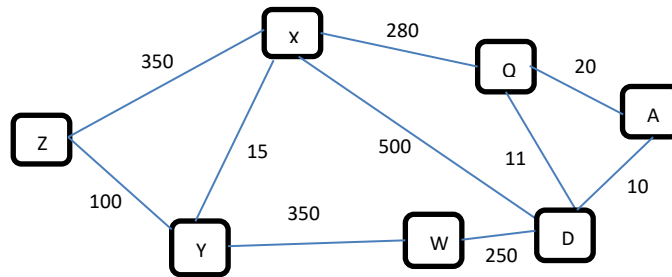
Semester : III
Duration: 3 Hours
Max. Marks: 100

IMPORTANT INSTRUCTIONS

1. Each Question will carry equal Marks section wise

Q.No	Section A (Type the answers in test box)	10Qx2M=20Marks	COs
1	The components of fundamental models in AMPL are _____		CO1
2	_____ problem deals with finding the shortest(Closed) tour in an n city situation.		CO2
3	_____ variables represent the deviations below and above right hand side of the constraints in Goal programming.		CO2
4	The methods for Goal programming problem are _____ and _____.		CO2
5	The full form of AMPL is _____		CO1
6	_____ problems have applications in communication networks while _____ problems are used for network of pipelines.		CO1
7	The elements of discrete event simulation are _____, _____ and _____.		CO2
8	The various types of queueing elements are _____		CO1
9	Select all the correct statements a. Aggregate planning is type of dynamic programming b. Equipment replacement problem is type of maximum flow problem c. Length of a system in single server model is equal to length of queue + 1 d. AMPL is used for solving Linear programming problems		CO1
10	(M/M/4):(GD/10/20) means _____ as per Kendall's notation.		CO2
	Section B (Scan and upload)	4Qx5M= 20 Marks	

11	<p>Show the steps of Monte Carlo sampling to find the area of the following circle:</p> $(x - 3)^2 + (y + 2)^2 = 16$		CO2																									
12	<p>Consider a two person zero sum game with the data given below. Player A has two strategies and player B has three strategies. Solve the problem to get steady state payoff. The payoff is for player A.</p> <table border="1" data-bbox="256 478 1094 590"> <tr> <td></td> <td>B1</td> <td>B2</td> <td>B3</td> </tr> <tr> <td>A1</td> <td>1</td> <td>-3</td> <td>7</td> </tr> <tr> <td>A2</td> <td>2</td> <td>4</td> <td>-6</td> </tr> </table>		B1	B2	B3	A1	1	-3	7	A2	2	4	-6		CO2													
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13	<p>For the network below, find the maximum flow from node 1 to node 5</p>		CO2																									
14	<p>Derive the steady state probability for n customers in a system for General Poisson queuing model.</p>		CO3																									
<p>Section C (Scan and upload)</p>		<p>3Qx10M=30 Marks</p>																										
15	<p>The following distance matrix is of a 4 city Travelling Salesman Problem. Formulate the problem mathematically.</p> <table border="1" data-bbox="256 1289 1094 1474"> <thead> <tr> <th>From/To</th> <th>A</th> <th>B</th> <th>C</th> <th>D</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>-</td> <td>13</td> <td>21</td> <td>26</td> </tr> <tr> <td>B</td> <td>10</td> <td>-</td> <td>29</td> <td>20</td> </tr> <tr> <td>C</td> <td>30</td> <td>20</td> <td>-</td> <td>5</td> </tr> <tr> <td>D</td> <td>12</td> <td>30</td> <td>7</td> <td>-</td> </tr> </tbody> </table>	From/To	A	B	C	D	A	-	13	21	26	B	10	-	29	20	C	30	20	-	5	D	12	30	7	-		CO2
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D	12	30	7	-																								
16	<p>Cranberry Ltd has an arrival rate of delivery vans of 32 vans during an eight-hour day while an average of five vans can be loaded during an hour. Find the following:</p> <ol style="list-style-type: none"> Utilization factor, Average number of customers in the system Average queuing time? 		CO3																									
17	<p>Use the Floyd's Algorithm to find the shortest distance from depot Z to depot A</p>		CO3																									



**Section D
(Scan and upload)**

**2Qx15M= 30
Marks**

18

Mingle Groceries operates with three checkout counters. The manager uses the given schedule in table below to find the number of counters in operation, depending on the number of customers in store. The arrival rate follows Poisson distribution with mean rate of 10 customers per hour. The average checkout time per customer is exponential with mean 12 minutes. Determine the steady state probability of n customers and the probability that there are no customers in the system. Also, find the expected number of idle counters.

Number of customers in store	Number of counters in operation
1 to 3	1
4 to 6	2
More than 6	3

CO4

19

A company in Jaipur makes two products x_1, x_2 . Suppose the company wishes to maximize the profit formulated as $z_1 = 2x_1 + 3x_2$. Also, the company wishes to minimize the cost formulated as $z_2 = x_1 + 5x_2$. Assuming that the decision maker wishes to make atleast 40,000 profit and the cost should not exceed 20,000. The sum of the two products ($x_1 + x_2$) cannot exceed 10, and the difference ($x_1 - x_2$) cannot exceed 4. Formulate the problem using the two methods in goal programming approach. Assume that equal weights are given to both the goals.

CO4