Operation Research BE 6 x 12

University of Mumbai
Examinations Summer 2022

Time: 2 hour 30 minutes Max. Marks: 80

Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	The objective function for a L.P model is 3x1+ 2x2, if $x_1 = 20$ & $x_2 = 30$ what is the value of the objective function?
Option A:	0
Option B:	50
Option C:	60
Option D:	120
2.	An artificial variable leaves the basis means, there is no chance for the _____ variable to enter once again.
Option A:	Slack
Option B:	Surplus
Option C:	Artificial
Option D:	Dual
3.	The order cost per order of an inventory is Rs.400 with an annual carrying cost of Rs.10 per unit. The economic order quantity (EOQ) for an annual demand of 2000 units is:
Option A:	500
Option B:	480
Option C:	400
Option D:	440
4.	If EOQ = 20 units, order cost is Rs.2 per order and carrying cost is Rs.0.20 per unit, what is the usage in units?
Option A:	10
Option B:	16
Option C:	40
Option D:	80
5.	When using Monte Carlo simulation, _____ .
Option A:	the values of the variables generated by the simulation should approximate the values of the real-world variables.
Option B:	the average values of the variables generated by the simulation should approximate the averages of the real-world variables.
Option C:	the averages of the variables generated by the simulation should be somewhat larger than the averages of the real-world variables.
Option D:	the averages of the variables generated by the simulation should be systematically smaller than the averages of the real-world variables.
6.	If driver decides not to enter a lane as the traffic is slow and he has no time to wait, this behavior is called
Option A:	Reneging
Option B:	Faffing
Option C:	Jockeying
Option D:	Balking

7.	Construct the dual to the primal problem- Maximize $z = 3x_1 + 5x_2$ Subject to : $2x_1 + 6x_2 \leq 50$ $3x_1 + 2x_2 \leq 35$ $5x_1 - 3x_2 \leq 10$ $x_2 \leq 20$ $x_1, x_2 \geq 0$
Option A:	Minimize $w = 50y_1 + 35y_2 + 10y_3 + 20y_4$ Subject to: $2y_1 + 3y_2 + 5y_3 \geq 3$ $6y_1 + 2y_2 - 3y_3 + y_4 \geq 5$ Corresponding dual variables $y_1, y_2, y_3, y_4 \geq 0$
Option B:	Maximize $w = 50y_1 + 35y_2 + 10y_3 + 20y_4$ Subject to: $2y_1 + 3y_2 + 5y_3 \geq 3$ $6y_1 + 2y_2 - 3y_3 + y_4 \geq 5$ Corresponding dual variables $y_1, y_2, y_3, y_4 \geq 0$
Option C:	Minimize $w = 50y_1 + 35y_2 + 10y_3 + 20y_4$ Subject to: $2y_1 + 3y_2 + 5y_3 \leq 3$ $6y_1 + 2y_2 - 3y_3 + y_4 \leq 5$ Corresponding dual variables $y_1, y_2, y_3, y_4 \geq 0$
Option D:	Maximize $w = 50y_1 + 35y_2 + 10y_3 + 20y_4$ Subject to: $2y_1 + 3y_2 + 5y_3 \leq 3$ $6y_1 + 2y_2 - 3y_3 + y_4 \leq 5$ Corresponding dual variables $y_1, y_2, y_3, y_4 \geq 0$
8.	What is the optimal processing time for the below mentioned assignment model? The matrix entries represent the processing times in hours.

		Operator				
		1	2	3	4	5
Job	1	9	11	14	11	7
	2	6	15	13	13	10
	3	12	13	6	8	8
	4	11	9	10	12	9
	5	7	12	14	10	14

Option A:	30 hours
Option B:	38 hours
Option C:	45 hours
Option D:	52 hours
9.	Find the value of the game-

		Player B	
		I	II
Player A	I	9	2
	II	8	6
	III	6	4

Option A:	4
Option B:	2
Option C:	6
Option D:	8

10.	In dynamic programming, the output to stage n become the input to
Option A:	stage n-1.
Option B:	stage n itself.
Option C:	stage n+1.
Option D:	stage n-2.

Q2.	**Solve any Two Questions out of Three** **10 marks each**
A	Solve the following L.P.P. by Two-phase method- Minimize $z = 10x_1 + 6x_2 + 2x_3$ Subject to : $-x_1 + x_2 + x_3 \geq 1$ $3x_1 + x_2 - x_3 \geq 2$ $x_1, x_2, x_3 \geq 0$
B	At a railway reservation booking window customers arrive randomly at the average rate of 16 per hour approximated to Poisson's distribution. If service time is exponentially distributed with a mean of 20per hour, determine- (a) Percentage utilization of capacity, (b) Probability that there are at least 3 customers in the queue. (c) Average time spent in the system, (d) Average number of customers waiting in the line, (e) Probability that there are 5 customers in the system.
C	Reduce the following game by dominance and find the game value-

		Player B			
		I	II	III	IV
Player A	I	3	2	4	0
	II	3	4	2	4
	III	4	2	4	0
	IV	0	4	0	8

Q3.	**Solve any Two Questions out of Three** **10 marks each**
A	A TV manufacturing company has three production units and 4 main distribution centers. Cost of transporting one unit from each production unit to distribution centre is given in the matrix. The production capabilities of production units A, B and C are 60, 75 and 105 respectively and the requirements of distribution centre are 50, 65, 75 and 100 respectively. Determine the optimal distribution policy. Use VAM to find initial solution and MODI for finding optimal solution.
B	A particular item has a demand of 9,000 units/year. The cost of one procurement is ₹100 and the holding cost per unit is ₹2.40 per year. The replacement is instantaneous and no shortages are allowed. Determine-

	Distribution Centre			
Plants	W	X	Y	Z
A	17	20	14	12
B	15	21	25	14
C	15	14	15	16

	(i) The economic lot size, (ii) The number of orders per year, (iii) The time between orders, (iv) The total cost per year if the cost of one unit is ₹1.
C	Use dynamic programming to solve the L.P.P. Maximize $z = 2x_1 + 5x_2$ Subject to $2x_1 + x_2 \leq 43$, $2x_2 \leq 46$, $x_1, x_2 \geq 0$

Q4.	**Solve any Two Questions out of Three** **10 marks each**
A	A company manufactures 30 units per day. The sale of these items depends upon demand which has the following distribution Sales (units): 27	28	29	30	31	32 Probability: 0.10	0.15	0.20	0.35	0.15	0.05 The production cost and sale price of each units are Rs. 40 and Rs. 50 respectively. Any unsold product is to be disposed off at a loss of Rs. 15 per unit. There is a penalty of Rs. 5 per unit if demand is not met using the following Monte Carlo simulation technique, estimate the total profit loss for the company for the next 10 days. If the company decides to produce 29 units per day, what is the advantage or disadvantage to the company? Random numbers – 1470, 9283, 6264, 3555, 9743, 2506, 7959, 5352, 6912, 4167, 7984, 8579, 2486, 0788, 8872, 6599, 9769, 4629, 3246,1781.
B	Solve the following L.P.P. using the simplex method Maximize $z = 2x_1 + 5x_2$ Subject to: $x_1 + 4x_2 \leq 24$ $3x_1 + x_2 \leq 21$ $x_1 + x_2 \leq 9$ $x_1, x_2 \geq 0$
C	Use graphical method to minimize the time required to process the following jobs on the machines. For each machine specify the job which should be done first. Also calculate the total elapsed time to complete both jobs. Machines: A, B, C, D, E Job 1 — Sequence: A, B, C, D, E; Time(hours): 6, 8, 4, 12, 4 Job 2 — Sequence: B, C, A, D, E; Time(hours): 10, 8, 6, 4, 12

Gmail Search all conversations

Compose

Mail

Inbox 225

Starred

Snoozed

Chat

No conversations
Start a chat

Spaces

No spaces yet
Create or find a space

Meet

Correction in Q.P. Code: 00090659

External Inbox ×

support@muapps.in via amazonses.com
to me

University of Mumbai

Correction in Q.P. Code: **00090659**
Course Name: **Operation Research** (ILOC)

There is a correction in Que. 4 A.
20 Random no are given, consider the first 10 random no. only to solve the question.
