03/07/23

M.B.A - DEGREE EXAMINATIONS, APR/MAY 2023
Second Semester
Master of Business Administration
20MBT205 - BUSINESS OPTIMIZATION TECHNIQUES
(Regulations 2020)

Duration: 3 Hours

Max. Marks: 100

PART - A (10 × 2 = 20 Marks)
Answer ALL Questions

		Marks, K-Level, CO
1.	Define feasible solution.	2,K1,CO1
2.	Write the dual of the following LP problem: Maximize $Z = X_1 + 2X_2 + X_3$ Subject to: $2X_1 + X_2 - X_3 \le 2$ $-2X_1 + X_2 - 5X_3 \ge -6$ $4X_1 + X_2 + X_3 \le 6$ $X_1, X_2, X_3 \ge 0$	2,K1,CO1
3.	List out the methods available to find out the optimal solution in transportation problem?	2,K2,CO2
4.	What is unbalanced transportation problem?	2,K2,CO2
5.	Define a saddle point.	2,K1,CO3
6.	What are the different types of decision-making situations?	2,K1,CO3
7.	Find EOQ if annual demand is 15000 units, ordering cost is 125/order and carrying cost is Rs.15/- unit/year.	2,K1,CO4
8.	Define Lead-time and re-order level.	2,K2,CO4
9.	List out the different types of replacement policy?	2,K2,CO5
10.	Define 'a queue'.	2,K2,CO5

PART - B (5 × 13 = 65 Marks)
Answer ALL Questions

11.	a)	Solve LPP graphically: Minimize $Z = 3x_1 + 5x_2$ subject to $-3x_1 + 4x_2 \le 12$ $x_1 \le 4$ $2x_1 - x_2 \ge -2$ $x_2 \ge 2$ $2x_1 + 3x_2 \ge 12$ and $x_1, x_2 \ge 0$	13,K2,CO1

OR

	b)	Using dual simplex method solve LPP: Max $Z = -3x_1 - 2x_2$	13,K2,CO1

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create   **11955**

1

Subject to: $x_1 + x_2 \geq 1$

$\qquad x_1 + x_2 \leq 7$

$\qquad x_1 + 2x_2 \geq 10$

$\qquad x_2 \leq 3$

and $x_1, x_2 \geq 0$

12. a) Solve the transportation problem: 13,K3,CO2

	1	2	3	4	Supply
I	21	16	25	13	11
II	17	18	14	23	13
III	32	27	18	41	19
Demand	6	10	12	15	

OR

b) A company has a team of four salesmen and there are four districts   13,K3,CO2
where the company wants to start its business. After making into
account the capabilities of salesman and the nature of districts, the
company estimates that the profit per day in rupees for each salesman
in each district is as below. Find the assignment of salesman to various
districts which will yield maximum profit.

		Districts			
		1	2	3	4
Salesman	A	16	10	14	11
	B	14	11	15	15
	C	15	15	13	12
	D	13	12	14	15

13. a) Solve the following 2 x 4 game graphically: 13,K3,CO3

Player A		Player B			
	1	0	4	-1
	-1	1	-2	5

OR

b) Consider the following payoff in terms of yearly net profits for each   13,K3,CO3
decision alternatives.

	N_1	N_2	N_3
D_1	150	250	350
D_2	450	250	200
D_3	100	180	290

Which decision is to chosen on the basis of:
  i) Maximin Criterion
  ii) Maximax Criterion
  iii) Regret Criterion
  iv) Laplace Criterion

14. a) Find the optimum order quantity for a product for which the price 13,K3,CO4
breaks are as follows:

Quantity	Purchasing cost
$0 \leq Q_1 < 100$	Rs. 20 per unit
$100 \leq Q_2 < 200$	Rs. 18 per unit
$200 < Q_3$	Rs. 16 per unit

The monthly demand for the product is 400 units. The shortage cost is
20% of the unit cost of the product and the cost of ordering is 25.00 per
month.

OR

b) Consider the following 3 machines and 5 jobs flow shop problem. 13,K3,CO4
Using Johnson's algorithm find optimal sequence and also calculate
make span for the problem.

Job	Processing Time		
	Machine -1	Machine -2	Machine - 3
1	8	5	4
2	10	6	9
3	6	2	8
4	7	3	6
5	11	4	5

15. a) Customer arrives at a one window drive-in bank according to Poisson 13,K3,CO5
distribution with mean 10 per hour. Service time per customer is
exponential with mean 5 minutes. The space in front of the window
including that for the serviced car can accommodate a maximum of 3
cars. Other can wait outside this space.
(i) What is the probability that an arriving customer can drive directly
to the space in front of the window?
(ii) What is the probability that an arriving customer will have to wait
outside the indicated space?
(iii) How long the arriving customer is expected to wait before starting
service?

OR

b) A firm is considering replacement of a machine whose cost price is 13,K3,CO5
12,200 and scrap value is Rs.200 from experience the running cost are
found to be as follows:

Year	1	2	3	4	5	6	7	8
Running cost	200	500	800	1200	1800	2500	3200	4000

When the machine to be replaced?

PART - C (1 × 15 = 15 Marks)

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create **11955**

16. a) Solve the following Travelling Salesman Problem.   15,K3,CO2

		From City			
		A	B	C	D
To City	A	-	3	8	5
	B	4	-	14	3
	C	5	5	-	2
	D	7	8	13	-