Reg. No.															

Question Paper Code	12796

MBA - DEGREE EXAMINATIONS, APRIL / MAY 2024

Second Semester

Master of Business Administration

20MBT205 – BUSINESS OPTIMIZATION TECHNIQUES

Regulations - 2020

(Use of Graphs is permitted)

Duration: 3 Hours | Max. Marks: 100

PART - A (10 × 2 = 20 Marks)

Answer ALL Questions

		Marks	K – Level	CO
1.	Write the dual of the following primal problem: Maximize $Z = 4x_1 + 5x_2$ Subject to: $5x_1 + 2x_2 \leq 20$; $7x_1 + 6x_2 \leq 30$ and $x_1 \geq 0$, $x_2 \geq 0$.	2	K2	CO1
2.	Define degenerate solution in Linear Programming Problem.	2	K1	CO1
3.	What is meant by degeneracy in a transportation model?	2	K1	CO2
4.	List the methods used to arrive at an initial basic feasible solution in a transportation model.	2	K1	CO2
5.	What is game theory?	2	K1	CO3
6.	Outline the concept of Saddle point.	2	K2	CO3
7.	Define the following terms: Lead time, Shortage Cost.	2	K1	CO4
8.	List the types of decision making situations.	2	K1	CO4
9.	State the significance of 'r' in a replacement model?	2	K1	CO5
10.	What is meant by group replacement model?	2	K1	CO5

PART - B (5 × 13 = 65 Marks)

Answer ALL Questions

11.	a)	Solve the following LPP by graphical method Maximize$Z = 40x_1 + 100x_2$ Subject to, $12x_1 + 6x_2 \leq 3000$ $4x_1 + 10x_2 \leq 2000$ $2x_1 + 3x_2 \leq 900$ and $x_1 \geq 0$, $x_2 \geq 0$.	13	K3	CO1
		OR			
	b)	Solve the following LPP by Simplex method. Maximize $Z = 2x_1 + 5x_2$ Subject to ,	13	K3	CO1

$$x_1 + 4x_2 \leq 24$$
$$3x_1 + x_2 \leq 21$$
$$x_1 + x_2 \leq 9$$
$$\text{and } x_1 \geq 0\,,\ x_2 \geq 0.$$

12. a) Five wagons are available at stations 1, 2, 3, 4 and 5. These are required at five stations *I, II, III, IV and V*. The mileages between various stations are given by the table below. How should the wagons be assigned to transport so as to minimize the total mileage covered? *13 K3 CO2*

Stations \ Machines	*I*	*II*	*III*	*IV*	*V*
1	10	5	9	18	11
2	13	9	6	12	14
3	3	2	4	4	5
4	18	9	12	17	15
5	11	6	14	19	10

OR

b) Solve the Transportation problem. *13 K3 CO2*

		Destination				
		D_1	D_2	D_3	D_4	**Supply**
Source	S_1	6	1	9	3	70
	S_2	11	5	2	8	55
	S_3	10	12	4	7	70
Demand		85	35	50	45	

13. a) Find Solution of game theory problem using dominance method. *13 K3 CO3*

Player A \ Player B	**B1**	**B2**	**B3**	**B4**
A1	3	5	4	2
A2	5	6	2	4
A3	2	1	4	0
A4	3	3	5	2

OR

b) Find Solution of game theory problem using graphical method *13 K3 CO3*

Player A \ Player B	B1	B2
A1	1	-3
A2	3	5
A3	-1	6
A4	4	1
A5	2	2
A6	-5	0

14. a) A company has a demand of 12,000 units/year for an item and it can produce 2000 units items per month. The cost of one setup is Rs.400. and the holding cost /unit /month is Rs. 0.15. The shortage cost per unit is Rs. 20 per year. Find the optimum lot size and the total cost per year, assuming the cost of 1 unit is Rs. 4. Also find the maximum inventory, manufacturing time and total time. *13 K3 CO4*

OR

b) Find the optimal order quantity for a product for which the price breaks are as follows: *13 K3 CO4*

Quantity	Unit cost (Rs.)
$0 < q < 500$	Rs.10
$500 \leq q < 750$	Rs.9.25
$750 \leq q$	Rs.8.75

The monthly demand for the product is 200 units, storage cost is 2% of the unit cost and cost of ordering is Rs.100.

15. a) In a Marshalling yard, goods train arrives at a rate of 30 trains per day. Assuming that inter arrival time follows Poisson distribution and the service time distribution is exponential distribution, with an average of 36 minutes. Calculate (i) Mean queue size (ii) Probability that queue size exceeds 10 (iii) If the input of the train increases to an average 33 per day, what will be the changes in Q.No: (i) and Q.No: (ii)? *13 K3 CO5*

OR

b) The following failure rates have been observed for certain items. *13 K3 CO5*

End of month	1	2	3	4	5
Probability of failure	0.10	0.30	0.55	0.85	1.00

The cost of replacing an individual item is Rs 1.25. The decision is made

to replace all items simultaneously at fixed intervals and also replace individual items as they fail. If the cost of group replacement is 50 paisa, what is the best interval for group replacement? At what group replacement per item would a policy of strictly individual replacement become preferable to the adopted policy.

PART - C (1× 15 = 15 Marks)
(Compulsory)

16. a) There are five jobs, each of which is to be processed through two machines M_1, M_2 in the order M_1, M_2. Processing hours are as follows: *15 K3 CO3*

Job	**1**	**2**	**3**	**4**	**5**
M_1	3	8	5	7	4
M_2	4	10	6	5	8

Determine the optimum sequence for the five jobs, and minimum total elapsed time. Find also the idle time of machines M_1 and M_2.