

MBA - DEGREE EXAMINATIONS, NOV / DEC 2025

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. Mention the assumptions of Linear Programming.	2	K1	CO1
2. Define Artificial variable of Linear Programming Problem.	2	K1	CO1
3. Explain the North-West Corner Rule.	2	K2	CO2
4. How do you convert the maximization assignment problem into a minimization assignment problem?	2	K2	CO2
5. Define Saddle Point.	2	K1	CO3
6. State the objective of a Sequencing Problem.	2	K1	CO3
7. Define the following terms: Lead time, Shortage Cost.	2	K1	CO4
8. The annual demand for an item is 3200 units. The unit cost is Rs.6 and inventory carrying charges are 25% per annum. If the cost of the procurement is Rs.150, determine economic order quantity.	2	K2	CO4
9. Define discount factor.	2	K1	CO5
10. Explain about Balking and Reneging.	2	K2	CO5

PART - B (5 × 13 = 65 Marks)

Answer ALL Questions

11. a) Solve the following LPP using graphical method: 13 K3 CO1
 Maximize $Z = 8X_1 + 5X_2$
 Subject to:
 $2X_1 + X_2 \leq 500$
 $X_1 \leq 150$
 $X_2 \leq 250$
 $X_1, X_2 \geq 0$
- OR**
- b) Use simplex method to solve the LPP 13 K3 CO1
 Maximize $Z = 4x_1 + 10x_2$
 Subject to ,
 $2x_1 + x_2 \leq 50$
 $2x_1 + 5x_2 \leq 100$
 $2x_1 + 3x_2 \leq 90$
 and $x_1 \geq 0, x_2 \geq 0$

12. a) Solve the following Transportation problem and find the optimal 13 K3 CO2

feasible solution using MODI method.

		Destination				
		P	Q	R	S	Supply
Source	A	21	16	25	13	11
	B	17	18	14	23	13
	C	32	17	18	41	19
Demand		6	10	12	15	43

OR

- b) A company has 5 jobs to be done on five machines. Any job can be done on any machines. The cost of doing the jobs on different machines are given below. Assign the jobs for the different machines so as to minimize the total cost.

13 K3 CO2

		Machines				
		A	B	C	D	E
Jobs	1	13	8	16	18	19
	2	9	15	24	9	12
	3	12	9	4	4	4
	4	6	12	10	8	13
	5	15	17	18	12	20

13. a) Solve the following game theory using dominance property.

13 K3 CO3

		Palyer B		
Player A	4	-2	3	-1
	-1	2	0	1
	-2	1	-2	0

OR

- b) Consider the two machines and six jobs flow shop scheduling problem as given below. Using Johnson's algorithm, obtain the optimal sequence which will minimize the makespan. Also determine the corresponding makespan.

13 K3 CO3

Jobs	Machine 1	Machine 2
1	4	6
2	10	12
3	14	10
4	8	12
5	18	6
6	16	8

14. a) Find the optimal order quantity for a product for which the price breaks are given below. The monthly demand for the product is 200 units, storage cost is 2% of the unit cost and cost of ordering is Rs 100.

13 K3 CO4

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

OR

- b) 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 Re 0.15. 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 units. 13 K3 CO4

15. a) A TV repairman finds that the time spend on his jobs has an exponential distribution with mean 30 minutes. If the repair sets in the order in which they came in, and if the arrival of sets is approximately poisson with an average rate of 10 per 8 hour day, what is repairman's expected idle time each day? How many jobs are ahead of the average set just brought in? 13 K3 CO5

OR

- b) An electronic equipment contains 500 resistors. When any resistor fails, it is replaced. The cost of replacing a resistor individually is Rs. 20. If all the resistors are replaced at the same time, the cost per resistor is Rs. 5. The percentage surviving, S(i) at the end of month I is given below. 13 K3 CO5

Month i	0	1	2	3	4	5
S(i)	100	90	75	55	30	0

What is the optimum replacement plan?

PART - C (1× 15 = 15 Marks)

(Compulsory)

16. a) A company is evaluating the replacement of a machine that costs Rs. 4000 to purchase, with a negligible scrap value at the end of any year. From past experience, it is observed that the maintenance cost is zero in the first year, Rs. 1000 in the second year, and increases by Rs. 300 each subsequent year. Assuming the interest rate is zero, determine the economic life of the machine. 15 K3 CO5