CBCS SCHEME

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MBA204

Second Semester MBA Degree Examination, June/July 2025
Operation Research

Time: 3 hrs. Max. Marks: 100

*Notes: 1. Answer any **FOUR** full questions from Q.No. 1 to Q.No. 7*
2. Question No. 8 is compulsory.
3. M:Marks, L:Bloom'slevel, C: Course outcomes.

			M	L	C
Q.1	a.	Give a brief historical development of Operations Research.	3	L1	CO1
	b.	A firm is engaged in producing two products A and B. Each unit of product A requires 2 kg of raw material and 4 hours of processing time while each unit of product B requires 3 kg of raw material and 3 hours of processing time. The firm has an availability of 100 kg of raw material and 200 hours of processing time. The profit on one unit of productA and B are Rs.80 and Rs.60 respectively. Formulate the problem as an LPP.	7	L3	CO2
	c.	Solve the following LPP using graphical method, $Z_{max} = 6x_1 + 8x_2$, subject to $x_1 + x_2 \leq 450$, $2x_1 + x_2 \leq 600$ and $x_1, x_2 \geq 0$.	10	L3	CO2
Q.2	a.	State the basic assumptions underlying sequencing problems.	3	L1	CO3
	b.	Define the term Operations Research. Mention different phases of operations research.	7	L1	CO1
	c.	Consider the processing time estimates (in minutes) of 5 jobs each of which should go through on two machines M_1 and M_2 in the order M_1, M_2.	10	L3	CO3

Job	J_1	J_2	J_3	J_4	J_5
M_1	5	1	9	3	10
M_2	2	6	7	8	4

Obtain an optimal sequence of the jobs on the machines; find the total elapsed time and idle time of each machine.

Q.3	a.	What is meant by an unbalanced transportation problem?	3	L2	CO1
	b.	Find an initial basic feasible solution to the following Transportation Problem using North West Corner Rule.	7	L3	CO2

Origin \ Destination	D_1	D_2	D_3	
O_1	2	7	4	5
O_2	3	3	1	8
O_3	5	4	7	7
O_4	1	6	2	14
	8	8	18	

	c.	Solve the following assignment problem. Assign the tasks (1, 2 and 3) to the persons (A, B and C) so as to minimize the total cost of assignment.	10	L3	CO2

	A	B	C
1	12	11	8
2	8	9	11
3	11	14	12

Q.4	a.	Write a note on degeneracy of transportation problem.	3	L2	CO2
	b.	Solve the following game using the concept of dominance. B: I, II, III A I: 1, 7, 2 A II: 6, 2, 7 A III: 5, 2, 6	7	L2	CO3
	c.	Solve the following 2 × 3 game using graphical method. B: I, II, III A I: 1, 3, 11 A II: 8, 5, 2	10	L2	CO3
Q.5	a.	Write a short note on Decision Theory.	3	L2	CO2
	b.	Obtain an initial basic feasible solution to the following transportation problem using Vogel's Approximation Method. D_1 D_2 D_3 O_1: 2, 2, 3 — 10 O_2: 4, 1, 2 — 15 O_3: 1, 3, 1 — 40 20, 15, 30	7	L3	CO2
	c.	Define the following terms with reference to game Theory: i) Pay off matrix ii) Pure Strategy iii) Mixed Strategy iv) Value of Game v) Fair Game	10	L2	CO3
Q.6	a.	Define the term sequencing and state it's importance.	3	L1	CO1
	b.	Explain the Max. Min and Min. Maxprinciples with an example for each.	7	L2	CO3
	c.	Three different operations have to be performed on the machines M_1, M_2 and M_3 in the order $M_1M_2M_3$. Obtain the optimal sequence if the processing time estimates of four jobs on the three machines are as follows. Job: J_1, J_2, J_3, J_4 M_1: 3, 12, 5, 2 M_2: 8, 6, 4, 6 M_3: 13, 14, 9, 12	10	L3	CO3
Q.7	a.	Describe the phases of project management.	3	L4	CO4
	b.	Differentiate between PERT and CPM.	7	L2	CO4
	c.	A small project consists of the following jobs whose time estimates in days are given in the table. Job: 1-2, 1-3, 2-3, 2-5, 3-4, 3-6, 4-5, 4-6, 5-6, 6-7 Time: 15, 15, 3, 5, 8, 12, 1, 14, 3, 14 i) Draw an arrow diagram representing the project. ii) Find the critical path and total project duration.	10	L4	CO4