CBCS SCHEME

USN | | | | | | | | | | |

22MBA24

Second Semester MBA Degree Examination, Dec.2024/Jan.2025
Operations Research

Time: 3 hrs. Max. Marks: 100

Note: 1. *Answer any FOUR full questions from Q.No.1 to Q.No.7.*
2. *Question No. 8 is compulsory.*
3. *Use of Statistical / normal distribution tables are permitted.*
4. *M : Marks , L: Bloom's level , C: Course outcomes.*

			M	L	C
Q.1	a.	Define Operations Research. Mention different phases of Operation research.	3	L1	CO1
	b.	Explain the steps involved in decision tree analysis.	7	L2	CO2
	c.	Solve the following LP problem by using graphical method : Minimize $z = 20x_1 + 10x_2$ Subject to constraints $x_1 + 2x_2 \le 40$ $3x_1 + x_2 \ge 30$ $4x_1 + 3x_2 \ge 60$ and $x_1, x_2 \ge 0$	10	L4	CO4
Q.2	a.	With respect to Transportation problem, define the following : (i) Non-Degenerate Basic Feasible solution. (ii) Degenerate Basic Feasible solution.	3	L2	CO2
	b.	Explain various steps involved in Hungarian algorithm.	7	L2	CO2
	c.	There are two machines M_1 and M_2 that performs the five jobs. The processing time (in hours) of five jobs are shown below : Job | 1 | 2 | 3 | 4 | 5 M_1 | 3 | 8 | 5 | 7 | 4 M_2 | 4 | 10 | 6 | 5 | 8 Find the optimal sequence for five jobs so as to minimize elapsed time.	10	L4	CO4
Q.3	a.	Bring out the difference between PERT and CPM.	3	L2	CO2
	b.	Solve the following transportation problem by using Least Cost Method (LCM). Factory | Warehouses A B C D | Supply X | 21 16 25 13 | 21 Y | 17 18 14 22 | 27 Z | 32 27 12 41 | 19 Demand | 14 15 18 20 | 67	7	L3	CO4
	c.	Solve the following assignment problem. Assign 4 tasks to 4 persons so as to minimize the total cost. Persons: P_1 P_2 P_3 P_4 Tasks T_1 42 35 28 21 T_2 30 25 20 15 T_3 30 25 20 15 T_4 24 20 16 12	10	L4	CO4

			M	L	C
Q.4	a.	List the assumptions of LPP.	3	L1	CO2
	b.	Explain different phases of Project management.	7	L2	CO2
	c.	Solve the following transportation problem and determine optimal distribution for the company so as to minimize the total transportation cost. Use VAM method to find initial basic feasible solution. Factories | Warehouses W_1 W_2 W_3 | Available F_1 | 16 20 12 | 200 F_2 | 14 8 18 | 160 F_3 | 26 24 16 | 90 Required | 180 120 170 |	10	L4	CO4
Q.5	a.	Define the following : (i) MinMax and MaxMin principle. (ii) Pure and Mixed Strategy	3	L2	CO2
	b.	A doctor purchases a particular vaccine each Monday. If the vaccine is not used within the week, it becomes useless. The vaccine costs Rs.30 per dose and the doctor charges Rs.60 for the same. The dose administered per week has the following distribution : Doses per week | 20 25 40 60 No. of weeks | 5 15 25 5 Obtain Payoff/regret matrix and determine the optimal number of doses the doctor should buy.	7	L4	CO4
	c.	Explain the scope of operation research in different area.	10	L2	CO3
Q.6	a.	What is decision tree? Write advantages.	3	L2	CO2
	b.	Bring out the differences between Transportation problem and Assignment problem.	7	L2	CO3
	c.	Solve the following game using the concept of dominance. Write the strategies adopted by each player and find value of game: Player B: I II III IV V Player A I 6 15 30 21 6 II 3 3 6 6 4 III 12 12 24 36 3	10	L4	CO4
Q.7	a.	Explain the benefits of operation research.	3	L2	CO2
	b.	Explain the objectives of Network Analysis.	7	L2	CO2
	c.	The twelve jobs and precedence relationship between them for a small maintenance project are given below : Job (i, j) | (1, 2) (1, 3) (1, 4) (2, 3) (2, 5) (2, 6) (3, 7) (4, 5) (5, 6) (6, 7) (6, 8) (7, 8) Duration (days) | 10 4 6 5 12 9 12 15 6 5 4 7 (i) Construct network for the project. (ii) Determine critical path with total project duration. (iii) Compute earliest start, earliest finish, latest start, latest finish. (iv) Find total float, free float and independent float.	10	L4	CO4

Q.8		Case Study:			
	a.	Old hens can be bought for Rs.2.00 each but young ones cost Rs.5.00 each. The old hens lay 3 eggs per week and the young ones, 5 eggs per week, each being worth 30 paise. A hen costs Rs.1.00 per week to feed. If I have only Rs.80.00 to spend for hens, how many of each kind should I buy to give a profit of more than Rs.6.00 per week, assuming that I cannot house more than 20 hens?	10	L4	CO4
	b.	A project consists of 8 activities with the following information :	10	L4	CO4

Activity	Immediate Predecessors	T_o	T_m	T_P
A	-	1	1	7
B	-	1	4	7
C	-	2	2	8
D	A	1	1	1
E	B	2	5	14
F	C	2	5	8
G	D, E	3	6	15
H	F, G	1	2	3

(i) Draw the PERT network and find out the expected project completion time.

(ii) 95% confidence of completion.

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