CBCS SCHEME

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22MBA24

Second Semester MBA Degree Examination, June/July 2024
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. *Tables allowed.*
4. *M : Marks , L: Bloom's level , C: Course outcomes.*

			M	L	C
Q.1	a.	Define Operations Research.	3	L2	CO1
	b.	Give applications of Linear programming problem in management.	7	L3	CO2
	c.	A mutual fund company has Rs.20 lakhs available for investment in government bonds, blue chip stocks, speculative-stocks and short-term deposits. The annual expected return and risk factors are given below :	10	L4	CO3

Type of Investment	Annual expected return in percentage (%)	Risk factor (0 to 100)
Govt. Bonds	14	12
Blue chip stocks	19	24
Speculative stocks	23	48
Short term deposits	12	6

Mutual fund is required to keep at least Rs.2 lakhs in short-term deposits. The average risk factors should not exceed more than 42. Speculative stocks must be at most 20 percent of the total amount invested. How should mutual fund invest the funds so as to maximize its total expected annual return? Formulate a Linear Programming problem.

Q.2	a.	What are the limitations in LPP?	3	L2	CO1
	b.	Write down different steps in Decision Making process.	7	L3	CO2
	c.	Use graphical method to solve the following L.P. problem, Minimize $z = 20x_1 + 10x_2$ Subject to constraints $x_1 + 2x_2 \leq 40$ $3x_1 + x_2 \geq 30$ $4x_1 + 3x_2 \geq 60$ where $x_1, x_2 \geq 0$	10	L4	CO3
Q.3	a.	What is an unbalanced case in a transportation model?	3	L2	CO1
	b.	Illustrate the basic feasible solution for the following transportation problem using NWCM.	7	L4	CO2

Origin	Destination				Supply
	I	II	III	IV	
A	4	6	8	13	50
B	13	11	10	8	70
C	14	4	10	13	30
D	9	11	13	8	50
Demand	25	35	105	20	

	c.	Use Vogel's Approximation Method (VAM) to find initial basic feasible solution for the following transportation problem. D_1 D_2 D_3 D_4 Supply S_1 7 14 8 12 400 S_2 9 10 12 5 300 S_3 11 6 11 4 300 Demand 200 450 300 250	10	L4	CO3
Q.4	a.	What is Saddle point in game theory?	3	L3	CO2
	b.	A company management and the labour union are negotiating a new three year settlement. Each of these has 4 strategies. The costs to the company are given for every pair of strategy choice. Union Strategies / Company strategies I II III IV I 20 15 12 25 II 25 14 8 10 III 40 2 10 5 IV -5 4 11 0 What strategy will the two sides adopt? Also determine the value of the game.	7	L4	CO3
	c.	Provide the optimal job sequencing involving three machines M_1, M_2, M_3 in the order of M_1, M_2 and M_3 for the following data? Job Machine J_1 J_2 J_3 J_4 J_5 M_1 7 12 11 9 8 M_2 8 9 5 6 7 M_3 11 13 9 10 14 Find out the elapsed time (Total time to complete) and IDLE times for all machines?	10	L5	CO5
Q.5	a.	What are the limitations of graphical problems?	3	L3	CO2
	b.	Solve the following game using graphical approach. Find the value of the game. B's strategy A's strategy B_1 B_2 B_3 B_4 A_1 8 5 -7 9 A_2 -6 6 4 -2	7	L4	CO3
	c.	Construct a network diagram for the following project whose activities, precedence relationship and duration of each activity is given below. Also find the critical path and completion time of the project and critical activities. Activities A B C D E F G H I Preceding Activities - - - A A B, D C B F, G Time (Days) 23 8 20 16 24 18 19 4 10	10	L4	CO3

Q.6	a.	What are Looping and Dangling errors in Networking?	3	L2	CO1
	b.	A computer centre has three expert programmers. The centre wants three applications program to be developed. Estimates of the computer time in minutes required by the experts for the application program as follows : Programers Programms 1: A=120, B=100, C=80 2: A=80, B=90, C=110 3: A=110, B=140, C=120 Assign the programmers to the programmes in such a way that the total computer time is minimum.	7	L3	CO2
	c.	Solve by algebraic method the following game problem, Player B Player A: A_1 = 3, 4, 0; A_2 = 5, 0, 8 (B_1, B_2, B_3)	10	L4	CO3
Q.7	a.	Write any three assumptions under sequencing problem.	3	L2	CO1
	b.	Distinguish between PERT and CPM method.	7	L3	CO2
	c.	Following table gives a solution for a transportation problem : A, B, C, D, Supply S1: (21) 1, 5, 3, (13) 3 — 34 S2: 3, (13) 3, 1, (2) 2 — 15 S3: 0, (12) 2, 2, 3 — 12 S4: 2, 7, (17) 2, (2) 4 — 19 Demand: 21, 25, 17, 17 Table Q7 (c) Is the above solution optimal? Justify your answer.	10	L4	CO3
Q.8		**Case Study:**			
	a.	From the following information draw a network diagram, and calculate E_S, E_f, L_S, L_f and Total float.	10	L4	CO3

Activity	a	b	c	d	e	f
Immediate Predecessor	-	-	a, b	a	d	c, e
Duration	3	14	3	7	4	10

	b.	Find the optimal assignment schedule for the following : Note that M_2 cannot be placed at C and M_3 cannot be placed at A.	10	L4	CO3

Machines	A	B	C	D	E
M_1	9	11	15	10	11
M_2	12	9	-	10	9
M_3	-	11	14	11	7
M_4	14	8	12	7	8

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