



Date: 26-04-2025

Dept. No.

Max. : 100 Marks

Time: 09:00 AM - 12:00 PM

SECTION – A

ANSWER ANY FOUR OF THE FOLLOWING:

(4 X 10 = 40)

1. A company sells two different products A and B, making a profit of Rs 40 and Rs 30 per unit, respectively. They are both produced with the help of a common production process and are sold in two different markets. The production process has a total capacity of 30,000 man-hours. It takes three hours to produce a unit of A and one hour to produce a unit of B. The market has been surveyed and company officials feel that the maximum number of units of A that can be sold is 8,000 units and that of B is 12,000 units. Subject to these limitations, products can be sold in any combination. Formulate this problem as an LP model to maximize profit.

2. Use the graphical method to solve the following LP problem.

Maximize $Z = 2x_1 + x_2$

subject to the constraints (i) $x_1 + 2x_2 \leq 10$, (iii) $x_1 - x_2 \leq 2$, and (ii) $x_1 + x_2 \leq 6$,

(iv) $x_1 - 2x_2 \leq 1$ $x_1, x_2 \geq 0$.

3. Find the initial basic feasible solution for given problem by using North-west corner rule.

	D	D2	D3	D4	SUPPLY
P1	2	3	11	7	6
P2	1	0	6	1	1
P3	5	8	15	9	10
DEMAND	7	5	3	2	

4. A computer centre has three expert programmers. The centre wants three application programmes to be developed. The head of the computer centre, after carefully studying the programmes to be developed, estimates the computer time in minutes required by the experts for the application programmes as follows:

Programmes	Programmers		
	A	B	C
1	120	100	80
2	80	90	110
3	110	140	120

Assign the programmers to the programmes in such a way that the total computer time is minimum

5. For the game with pay off matrix

Player A	Player B		
A1	B1	B2	B3
A2	-1	2	-2
A3	6	4	-6

Determine the optimal strategies for player A and B. Also determine the value of game. Is this game (i) fair? (ii) strictly determinable.

6. Use the graphical method for solving the following game and find the value of the game

Player A	Player B		
A1	B1	B2	B3
A2	2	2	3
A3	4	3	2

7. Draw a network diagram of activities for the project.

Activity	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
Predecessor Activity	-	A	A	C	B	C	D,E	G	H	F	I,J	K	L	J	M,N

8. For the following given project:

Activity	A	B	C	D	E	F	G	H	I	J	K	L	M
Predecessor Activity	-	A	B	A	D	E	-	G	J,H	-	A	C,K	I,L
Duration	6	4	7	2	4	10	2	10	6	13	9	3	5

(a) Draw an arrow diagram for this project. (b) Indicate the critical path.

SECTION – B

ANSWER ANY THREE OF THE FOLLOWING:

(3 X 20 = 60)

9. Use the Simplex method to solve the following LP problem:

Maximize $Z = 3x_1 + 5x_2 + 4x_3$ subject to the constraints (i) $2x_1 + 3x_2 \leq 8$, (ii) $2x_2 + 5x_3 \leq 10$, (iii) $3x_1 + 2x_2 + 4x_3 \leq 15$ and $x_1, x_2, x_3 \geq 0$.

10. Use penalty (Big-M) method to solve the following LP problem.

Minimize $Z = 5x_1 + 3x_2$ subject to the constraints (i) $2x_1 + 4x_2 \leq 12$, (ii) $2x_1 + 2x_2 = 10$, $5x_1 + 2x_2 \geq 10$ and $x_1, x_2 \geq 0$.

11. Apply MODI method to obtain optimal solution of the given transportation problem

	D	D2	D3	D4	SUPPLY
S1	19	30	50	10	7
S2	70	30	40	60	9
S3	40	8	70	20	18
DEMAND	5	8	7	14	34

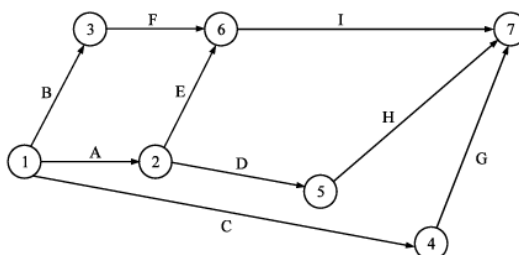
12. Find the maximum cost for the following assignment problem.

	I	II	III	IV	
A	42	35	28	21	7
B	30	25	20	15	5
C	30	25	20	15	5
D	24	20	16	12	4
	6	5	4	3	

13. Players A and B play a game in which each has three coins, a 5p, 10p and a 20p. Each selects a coin without the knowledge of the other's choice. If the sum of the coins is an odd amount, then A wins B's coin. But, if the sum is even, then B wins A's coin. Find the best strategy for each player and the values of the game

14. For the following given project:

Activities	A	B	C	D	E	F	G	H	I
Optimistic time t_o	5	18	26	16	15	6	7	7	3
Pessimistic time t_p	10	22	40	20	25	12	12	9	5
Most likely time t_m	8	20	33	18	20	9	10	8	4



Determine the following:

(a) Expected completion time and variance of each activity

(b) The earliest and latest expected completion times of each event.

(c) The critical path.

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