NAME :- MOHAMMAD MUSA

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Program :- BS(SE)-4

SECTION :- "A"

MID TERM EXAM

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Q1:- There are total of 5 machines and 5 employments are to be relegated and the relation of cost network is as per following:- Locate the best possible task:-

		MACHINES				
J		A	B	C	D	E
O	1	6	12	3	11	15
B	2	4	2	7	1	10
S	3	8	11	10	7	11
	4	16	19	122	23	21
	5	9	5	7	6	10

Ans:- MACHINES

	1	2	3	4	5	Row Maximum
1	6	12	3	11	15	3
2	4	2	7	1	10	1
3	8	11	10	7	11	11
4	16	19	122	23	21	16
5	9	5	7	6	10	5

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MACHINES

	1	2	3	4	5	Row deduction
1	3	9	0	8	12	
2	3	1	6	0	9	
3	1	4	3	0	4	
4	0	3	106	7	5	
5	4	0	2	1	5	

Column min. 0 0 0 0 4

MACHINES

	1	2	3	4	5
1	3	9	0	8	8
2	3	1	6	0	5
3	1	4	3	0	10
4	0	3	106	7	1
5	4	0	2	1	1

5 = 5 optimal Solution

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Jobs	Machines	Time
1	3	3
2	4	1
3	5	11
4	1	16
5	2	5
		36

Total processing time = 36 Hr/hour.

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Q2:- Solve the following Linear programming Problem:-

$$\min z = 2x_1 + 3x_2$$
$$s.t\ (1/2)x_1 + (1/4)x_2 \leq 4$$
$$x_1 + 3x_2 \geq 20$$
$$x_1 + x_2 = 10$$
$$x_1, x_2 \geq 0$$

Ans:- Solving the inequality by Big M

$$1/2x_1 + 1/4x_2 + S1 = 4$$
$$x_1 + 3x_2 - S2 + A = 20$$
$$x_1 + x_2 - S3 + A_2 = 10$$

$$z - 2x_1 + 3x_2 + MA_1 + MA_2$$
$$z - 2x_1 - 3x_2 - MA_1 - MA_2 = 0$$

⇒ Now make the table:-

x_1	x_2	S_1	S_2	S_3	A_1	A_2	z	
1/2	1/4	1	0	0	0	0	0	4
1	3	0	-1	0	1	0	0	20
1	1	0	0	-1	0	1	0	10
2	-3	0	0	0	-M	-M	1	0

÷ing $R_4 - M$

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x_1	x_2	S_1	S_2	S_3	A_1	A_2	Z	
-1/2	1/4	1	0	0	0	0	0	4 ← PIVOT row
1	3	0	-1	0	1	0	0	20
1	1	0	0	-1	0	1	0	10
-2/M	3/M	0	0	0	0	1	-1/M	0

PIVOT column

x_1	x_2	S_1	S_2	S_3	A_1	A_2	Z	
1	1/2	2	0	0	0	0	0	8
1	3	0	-1	0	1	0	0	20
1	1	0	0	-1	0	1	0	10
-2M	3/M	0	0	0	1	1	-1/M	0

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⇒ By $(R_1)_2$

x_1	x_2	S_1	S_2	S_3	A_1	A_2	Z	
1	1/2	2	0	0	0	0	0	8
0	5/2	-2	-1	0	1	0	0	12
0	1/2	-2	0	-1	0	1	0	2
0	4/M	4/M	0	0	1	1	-1/M	16/M

$R_2 \rightarrow R_2 - R_1$

$R_3 \rightarrow R_3 - R_1$

$R_4 \rightarrow (2/M)R_1 + R_4$

$x_1 = 8$
$A_1 = 12$
$A_2 = 2$
$Z = 16/M$
$x_2 = 0$
$S_1 = 0$
$S_2 = 0$
$S_3 = 0$

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Q3:- Use Vogel's Approximation method to obtain the initial feasible solution of:-

Origin	Destination				Supply
	1	2	3	4	
1	20	22	17	4	120
2	24	37	9	7	70
3	32	37	20	15	50
Demand	60	40	30	110	240

Ans:- Balanced Transportation problem:-

	1	2	3	4					
1	X	40	X	80	~~80~~ 0	13	13	-	
	20	22	17	4	~~120~~				
2	10	X	30	30	~~40~~ 0				
	24	37	9	7	~~70~~	2	2	2	17
3	50	X	X	X					
	32	37	20	15	~~50~~ 0	5	5	5	17
	~~60~~	~~40~~	~~30~~	~~110~~					
	~~50~~	0	0	~~30~~ 0					
	4	15	8	3					
	4	-	8	3					
	8	-	11	8					
	8	-	-	8					

Demand = Supply

$880 + 320 + 240 + 270 + 210$

$(40 \times 22) + (80 \times 4) + (10 \times 24) + (30 \times 9) + (30 \times 7) = 1600$

$(50 \times 32) = 3520$

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