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Program BS S.E

Section: B Class Wednesday

Mid Term Exam\*

Q1:- There are total of 5 machines and 5 employment's are to be relegated and the relation of Cost network is as per following:

Locate the best possible task:

		Machines					
		A	B	C	D	E	
J	O	1	6	12	3	11	15
B	S	2	4	2	7	1	10
S		3	8	11	10	7	11
		4	16	19	12	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

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 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

S = 5 optimal Solution.

Job	Machines	Time
1	3	3
2	4	1
3	5	11
4	1	16
5	2	5
		<u>36</u>

Total Processing time = 36 cr/hour.

Qno 2:- Solve the following linear programming problem:-

$$\min z = 2x_1 + 3x_2$$

$$\text{s.t. } (1/2)x_1 + (1/4)x_2 \leq 4$$

$$\begin{aligned} x_1 + 3x_2 &\geq 20 \\ x_1 + x_2 &= 10 \\ x_1, x_2 &\geq 0 \end{aligned}$$

Ans:- Solving the inequality by Big M

$$1/2x_1 + 1/4x_2 + S_1 = 4$$

$$x_1 + 3x_2 - S_2 + A = 20$$

$$x_1 + x_2 - S_3 + A_2 = 10$$

$$z - 2x_1 + 3x_2 + MA + MA_2$$

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

⇒ 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	4	
1	3	0	-1	0	1	0	20	
1	1	0	0	-1	0	1	10	
2	-3	0	0	0	-M	-M	1	0

÷ ing  $R_4 = M$

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

$\Rightarrow$  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	$-1/M$	$16/M$

$$R_2 \rightarrow R_1 - R_1$$

$$R_3 \rightarrow R_3 - R_1$$

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

$$x_1 = 8$$

$$A_1 = 12$$

$$A_2 = 2$$

$$Z = 16$$

$$x_2 = 0$$

$$S_1 = 0$$

$$S_2 = 0$$

$$S_3 = 0$$

Qno3:- 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	13	13	-
	20	22	17	4	120			
2	10	X	30	30	40			
	24	37	9	7	70	2	2	2 17
3	50	X	X	X				
	32	37	20	15	50	5	5	5 17
	60	40	30	110				
	50	0	0	360				
	4	15	8	3				
	4	-	8	3				
	8	-	11	8				
	8	-	-	8				

Demand = Supply

$$880 + 320 + 240 + 270 + 210$$

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

$$(50 \times 32) + 3520$$