NAME : NAVEED AHMAD

ID : 14519

SECTION : A

DEPARTMENT : BS (SE)

SUBMET TO : SAIFULLAH JAN

SUBJECT : OPERATIONS RESEARCH

EXAM : MID TERM

SEMISTER : 4th

DATE : 14, APRAL, 2020

ANSWER NO : 1

Mechanics

Jobs	1	2	3	4	5	Row minimum
1	6	12	[3]	14	[15]	3
2	4	2	7	[1]	10	1
3	8	11	10	7	[11]	7
4	[16]	19	122	23	21	16
5	9	[5]	7	6	10	5

Mechanics — Row Reduction

Jobs	1	2	3	4	5
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

Machanic = 3

Columm Ratio

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

$5 = 5$ Optimal Solution

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

Total Processing Time = 36 hours

ANSWER NO: 2.

SOLUTION:-

Step:-1: Introduce artifical variable in each row.

Which is,

S_1, S_2, S_3

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

$x_1 + 3x_2 - S_2 + A_1 = 20$

$x_1 + x_2 - S_3 + A_2 = 10$

Step 2: Put the artifical variable into the objective function: for max-Problem max.

$Z = 2x_1 + 3x_2 + MA_1 + MA_2$

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

Step 3:- "Clean UP" the Objective function.

Now to make a 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

Dividing Ry by -M

MOST PIVOT ROW:

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
$\frac{-2}{M}$	$\frac{3}{M}$	0	0	0	1	1	$\frac{-1}{M}$	0

MOST PIVOT COLUMN:

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
$\frac{-2}{M}$	$\frac{3}{M}$	0	0	0	1	1	$\frac{-1}{M}$	0

MOST PIVOT NUMBER:

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
$\frac{-2}{M}$	$\frac{3}{M}$	0	0	0	1	1	$\frac{-1}{M}$	0

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
$\frac{-2}{M}$	$\frac{3}{M}$	0	0	0	1	1	$\frac{-1}{M}$	0

by $(R_1)_2$

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

$R_2 \rightarrow R_2 - R_1$

$R_3 \rightarrow R_3 - R$

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

ANSWER NO: 3

Minimum cost of transportation = $40 \times 22 + 80 \times 4 + 10 \times 24 + 30 \times 9 + 30 \times 7 + 50 \times 32 = 3520$