Summer-2020 Final Term

Operations Research

Submitted By: Mudassir Ahmad Khan
ID# 14086
BSSE

Submitted To: Mr. SAIF ULLAH JAN
(Lecturer)

Date: September 24, 2020

Question No - 2

Solution:-

	Destination 1	2	3	Supply	Row Penalty
1	50	[110] 100	100	110	(50), 0, 0
2	200	[80] 300	[80] 200	~~160~~ 80	(0), 100
3	[140] 100	[10] 200	300	~~150~~ 10	(100), 100
Demand	~~140~~ 0	~~200~~ 0	~~80~~ 0		

Column Penalty	(50)	(100)	(100)
		(100)	(100)
		(100)	200

Initial Basic Feasible Solution of given T.P is

$x_{12} = 110$, $x_{21} = 8$, $x_{23} = 80$

$x_{31} = 140$, $x_{32} = 10$

and minimum Tranputation Cost

$(110 \times 100) + (80 \times 300) + (80 \times 200) + (140 \times 100) + (10 \times 200) = 67000$ Rs. solved.

Question No 3

Stage # 1

- The possible alternative is only z
- The possible state variables are w,x,y

State Variable x1	Alternative m1 z	$F_1(x_1)^*$	m_1^*
w	3	3	z
x	4	4	z
y	1	1	z

Stat variable x	$F_1(x)^*$
w	3
x	4
Y	1

Stage #2

The possible alternative are w,x,y
The possible state variable are T,U,V

S M T W T F S Date:

State variable x2	Alternative m2			F2(x2)*	m2*
	w	x	y		
T	7+3 = 10	5+4 = 9	11+1 = 12	9	X
U	9+3 = 12	2+4 = 11	11+1 = 12	11	X
V	8+3 = 11	7+4 = 11	10+1 = 11	11	X

State variable x	F2(U2)*
T	9
U	11
V	11

Stage # 3

The possible alternatives are:
T, U, V

The possible state variable are Q, R, S

State variable x3	Alternative m3			F3(x3)*	m3*
	T	U	V		
Q	7+9 = 16	6+11 = 17	5+11 = 16	15	V
R	8+9 = 17	5+11 = 16	7+11 = 18	16	U
S	14+9 = 13	4+11 = 15	6+11 = 17	13	T

State variable x	$F_3(x_3)^*$
Q	15
R	16
S	13

Stage # 4

- Possible alternatives are Q, R, S
- The possible stat variab is P

State variable	Alternative m_4			$F_4(x_4)^*$	M_4^*
	Q	R	S		
P	3+15=18	3 + 16 = 17	3 + 13 = 16	16	S

Shortest path is

P → S → U → X → Z

Answer.

S M T W T F S Date:

Question-No 04

Solution:-

Let

- x be the number of units of x produced in the Curren week

- y be The number of units of Y produced in the current week

Then the Constraints are:

- $50x + 24y <= 40(60)$ machine A time
- $30x + 33y <= 35(60)$ machine B time
- $x >= 75 - 30$
- i.e. $x >= 45$ so production of $x >=$ demand (75) - initial Stock (30), which ensures we meet demand
- $y >= 95 - 90$
- i.e. $y >= 5$ So production of $y >=$ demand (95) - initial stock (90), which ensures we meet demand

The objective is: maximise

$$(x + 30 - 75) + (y + 90 - 95) = (x + y - 50)$$

i.e. to maximise the number of units left in Stock at the end of the week.

Solved.

Question No- 05

(5.1)

Solution:-

Starting from the North west corner, we allocate min (50, 20) to P_1R_1, i.e. 20 units to cell P_1R_1. The demand for the First Column is satisfied. The allocation is shown in the following table.

Table 1

Company	Retail				Supply
	R_1	R_2	R_3	R_4	
P_1	(3) 20	(5) 20	(7) 10	6	50
P_2	2	5	(8) 40	(2) 35	75
P_3	3	6	9	(2) 35	25
Demand	20	20	50	60	

Now we move horizontally to the second column in the first row and allocate 20 units to cell P_1R_2. The demand for the second column is also satisfied.

Proceeding in this way, we observe that $P_1R_3 = 10$, $P_2R_3 = 40$, $P_2R_4 = 35$, $P_3R_4 = 25$. The resulting feasible solution is shown in the following table.

Here, number of retail shops $(n) = 4$ and number of plants $(m) = 3$.
number of basic variables
$= m + n - 1 = 3 + 4 - 1 = 6$.

initial basic feasible solution

The initial basic feasible solution is $x_{11} = 20$, $x_{12} = 5$, $x_{13} = 20$, $x_{23} = 40$, $x_{24} = 35$ and minimum cost of transportation ~~= 20~~

$= 20 \times 30 + 20 \times 5 + 10 \times 7 + 40 \times 8 + 35 \times 2 ~~4~~ + 25 \times 2 = 670.$

Solved.