ASSIGNMMENT 4

1) To formulate the model, let *Z* denote the minimize the combined cost of production and shipping, and

let X_{ij} (*i* _= 1, 2, ; *j* =1, 2, 3) be the number of automated external defibrillators (AEDs) to be shipped from plant i to warehouse j.

Minimize *Z* = 22 X11 + 14 X12 + 30 X13 +0 X14+ 16 X21 + 20 X22 +24 X23 + 0 X24 + 600(X11+X12+X13) + 625(X21 +X22+X23)

By Simplifying the above equation we get

Minimize *Z* = 622 X11 + 614 X12 + 630 X13 + 0 X14 + 641 X21 + 645 X22 + 649 X23 + 0 X24

Subject to constraints

X11 + X12 + X13 + X14 = 100

X21 + X22 + X23 + X24 = 120

SUPPLY FOR BOTH PLANT A , PLANT B

X11 + X21 = 80

X12 + X22 = 60

X13 + X23 = 70

X14 + X24 = 10

DEMAND FROM WHOLE SALERS THROUGH WARE HOUSES

Where, **Xij ≥ 0** (i =1,2 and j = 1,2,3,4)

2) To formulate the model, let *Z* denote the minimum cost of providing oil to refineries, and

Let X_{ij} (i = A ,B, ,C (Pumps) ; j = 1,2,3 (Wells) 4,5,6,7,8,9(Refineries)) and here source is wells and destination is refineries and it will reach through pumps. Since source and demand are not equal

We will create a dummy variable 2 in the destination (refineries) to obtain optimal solution.

Here

Minimum Z = 1.52 X1A + 1.60 X1B + 1.40 X1C + 1.70 X2A + 1.63 X2B + 1.55 X2C + 1.45 X3A +

1.57 X3B + 1.30 X3C + 5.15 XA4 + 5.12 XB4 + 5.32 XC4 + 5.69 XA5 + 5.47 XB5 + 6.16 XC5 +

6.13 XA6 + 6.05 XB6 + 6.25 XC6 + 5.63 XA7 + 6.12 XB7 + 6.17 XC7 + 5.80 XA8 + 5.71 XB8 +

5.87 Xc8

Subject to the constraints,

SUPPLY CONSTRAINTS

X1A +X1B + X1C = 93

X2A + X2B + X2C = 88

X3A + X3B + X3C = 95

REFINARY CONSTRAINTS

XA4 + XB4 + XC4 = 30

XA5 + XB5 + XC5 = 57

XA6 + XB6 + XC6 = 48

XA7 + XB7 + XC7 = 91

XA8+ XB8 + XC8 = 48

XA9 + XB9 + XC9 = 2

Constraints from wells to pumps equal to pumps to wells

X1A + X2A + X3A = XA4 + XA5 + XA6 + XA7 + XA8 + XA9

X1B + X2B + X3B = XB4 + XB5 + XB6 + XB7 + XB8 + XB9

X1C + X2C + X3C = XC4 + XC5 + XC6+ XC7 + XC8 + XC9

Where, Xij >= 0

2 b)

By solving the above problem The minimum cost of supplying oil to the refineries is 1966.68. From the decision variable we can observe that well 3 has the minimum cost compared to other wells. So well 3 uses maximum of its capacity.

The network diagram is shown below