2)
a) The decision variable should represent the number of units shipped from well to each transshipment point(pump) to each destination (refinery points), The decision variable shipped from location i to j

Where i = 1,2,3,4
j=4,5,6,7,8,9,10,11,12

	R1	R2	R3	R4	R5	Dummy
Pump A	5.15	5.69	6.13	5.63	5.80	0
Pump A	5.12	5.12	5.47	6.05	6.12	0
Pump A	5.32	6.16	6.25	6.17	5.87	0
Demand	30	57	48	91	48	2

Minimize total cost:
1.52x14 + 1.60x15 + 1.40x16 + 1.70x24 + 1.63x25 + 1.55x26 + 1.45x34 + 1.57x35 + 1.30x36 + 5.15x47+5.69 x48 +6.13x49 +5.63x4,10 +5.80x4,11 +x4,12+5.12x57 +5.47x58 +6.05x59 +6.12x5,10 +5.71x5,11 + x5,12 +5.32x67 +6.16x68 +6.25x69 + 6.17x6,10 + 5.87x6,11 +x6,12

s.t.
x14 + x15 + x16 <= 93 Supply at Well 1 [node 1]
x24 + x25 +x26 <=88 Supply at Well 2 [node 2]
x34 +x35 +x36 <=95 Supply at Well 3 [node 3]
x47 + x57 +x67 = 30 (Demand at Refinery 1 [node 7])
x48+ x58+x68 = 57 (Demand at Refinery 2 [node 8])
x49+x59+x69 = 48 (Demand at Refinery 3 [node 9])
x4,10 +x5,10 +x6,10 = 91 (Demand at Refinery 4 [node 10])
x4,11+ x5,11 +x6,11 = 48 (Demand at Refinery 5 [node 11])
x4,12 +x5,12 +x6,12 = 2 (Dummy Variable [node 12])
x14+x24+x34 = x47+x49+x4,10+x4,11+x4,12 ((Shipping through Pump 1 [node 4])
x15+x25+x35 = x57+x58+x59+x5,10+x5,11+x5,12 (Shipping through Pump 2 [node 5])
x15+x26+x36 = x67+ x68+x69+x6,10 +x6,11+x6,12 (Shipping through Pump 3 [node 6])

Xij ≥ 0 for all i and j (Non negativity constraint)

b) The network diagram for this problem: -
Where W = well, P = pump and R = refinery