Assignment 4

1. **Oil Distribution** Texxon Oil Distributors, Inc., has three active oil wells in a west Texas oil field. Well 1 has a capacity of 93 thousand barrels per day (TBD), Well 2 can produce 88 TBD, and Well 3 can produce 95 TBD. The company has five refineries along the Gulf Coast, all of which have been operating at stable demand levels. In addition, three pump stations have been built to move the oil along the pipelines from the wells to the refineries. Oil can flow from any one of the wells to any of the pump stations, and from any one of the pump stations to any of the refineries, and Texxon is looking for a minimum cost schedule. The refineries’ requirements are as follows.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Refinery | R1 | R2 | R3 | R4 | R5 |
| Requirement (TBD) | 30 | 57 | 48 | 91 | 48 |

The company’s cost accounting system recognizes charges by the segment of pipeline that is used. These daily costs are given in the tables below, in dollars per thou- sand barrels.



1. What is the minimum cost of providing oil to the refineries? Which wells are used to capacity in the optimal schedule? Formulation of the problem is enough.

Let Xij = numbers of oil flow from i to j, well 1=1, well 2=2, well 3=3, pump a=4, pump b=5, pump c=6, r1=7, r2=8, r3=9, r4=10, r5=11, r6=12.

Objective function:

Min = 1.52 X14 + 1.60 X15 + 1.40 X16 + 1.70 X24 + 1.63 X25 + 1.55 X26 + 1.45 X34 + 1.57 X35 + 1.30 X36 + 5.15 X47 + 5.69 X48 + 6.13 X49 + 5.63 X4,10 + 5.80 X4,11 + 5.12 X57 + 5.47 X58 + 6.05 X59 + 6.12 X5,10 + 5.71 X5,11 + 5.32 X67 + 6.16 X68 + 6.25 X69 + 6.17 X6,10 + 5.87 X6,11

St:

Supply Constraints

X14 + X15 + X16= 93

X24 + X25 + X26= 88

X34 + X35 + X36= 95

Demand Constraints

X47 + X57 + X67 = 30

X48 + X58 + X68 = 57

X49 + X59 + X69 = 48

X4,10 + X5,10 + X6,10 = 91

X4,11 + X5,11 + X6,11 = 48

X4,12 + X5,12 + X6,12 = 2

1. Show the network diagram corresponding to the solution in (a). That is, label each of the arcs in the solution and verify that the flows are consistent with the given information.

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