**CBA 2018: Assignment II**

**Q4 –**

Z = 38.920 (0,0,5.5,0) using LP relaxation

X1 = 1 X1 = 0

Z = 21.76 (1,0,1.68,0) Same solution

X2 = 0 X2 = 1 X2 = 0 X2 = 1

Z = 14.8 Same Z = 31.96(0,1,4.2,0)

X3= 0 X3=1

Q5 -- Node 0 Using LP relaxation , Z = 17 and (1,0.5,0.5,.5)

X1 = 0 X1 = 1

Z = 14 (0,1,1,1) -> incumbent solution Z = 17 - Same solution

X2 = 0 X2 = 1 X2 = 0 X2 = 1

(1,0,1,0) Z =17 (1,1,0,0)Z = 12

X3 = 0 X3 = 1

Z= 15(1,0,0,1) Z = 17

(1,0,1,0)

Z = 17 (1,0,1,0) Infeasible Solution

Using LP relaxation – Z = 320 (3.6 , 1.4)

X1 <= 3 X1 >=4

Z= 500 Z = 333.33

(3, 3.5) ( 4, 1.33)

X2<= 1 X2>=2

33 Z= 400 z = 400

(6,1) (4,2)

Q8 –

Using Hungrarian algorithm -

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | A | B | C | D | E | F |
| 1 | 5 | 7 | 6 | 4 | 9 | 0 |
| 2 | 8 | 10 | 3 | 4 | 7 | 0 |
| 3 | 6 | 11 | 5 | 4 | 7 | 0 |
| 4 | 5 | 8 | 7 | 3 | 9 | 0 |
| 5 | 3 | 6 | 4 | 2 | 7 | 0 |
| 6 | 3 | 7 | 5 | 3 | 7 | 0 |

Minimum value in each row – 0, table will remains same

Minimum value in each column is 3,6,3,2,7,0

After subtracting the minimum values from each column – the table is ->

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | A | B | C | D | E | F |
| 1 | 2 | 1 | 3 | 2 | 2 | 0 |
| 2 | 5 | 4 | 0 | 2 | 0 | 0 |
| 3 | 3 | 5 | 2 | 2 | 0 | 0 |
| 4 | 2 | 2 | 4 | 1 | 2 | 0 |
| 5 | 0 | 0 | 1 | 0 | 0 | 0 |
| 6 | 0 | 1 | 2 | 1 | 0 | 0 |

Count of Assigned zeroes = 5 and it equal to number of lines.

For optimized solution , there should be 6 assigned zeroes , one in each row and column

The iteration will stop , once no of assigned zeroes = no of rows.

1. Subtract 1 from each uncut cell. And add 1 to the cell, which has intersection of lines.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | A | B | C | D | E | F |
| 1 | 2 | 0 | 2 | 1 | 2 | 0 |
| 2 | 6 | 4 | 0 | 2 | 1 | 1 |
| 3 | 3 | 4 | 1 | 1 | 0 | 0 |
| 4 | 2 | 1 | 3 | 0 | 2 | 0 |
| 5 | 1 | 0 | 1 | 0 | 1 | 1 |
| 6 | 0 | 0 | 1 | 0 | 0 | 0 |

Repeat the process of assigning zeroes in each row and column such that the optimized number of assigned cells are 6.

There are 2 solutions to this problem:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | A | B | C | D | E | F |
| 1 | 2 | 0 | 2 | 1 | 2 | 0 |
| 2 | 6 | 4 | 0 | 2 | 1 | 1 |
| 3 | 3 | 4 | 1 | 1 | 0 | 0 |
| 4 | 2 | 1 | 3 | 0 | 2 | 0 |
| 5 | 1 | 0 | 1 | 0 | 1 | 1 |
| 6 | 0 | 0 | 1 | 0 | 0 | 0 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | A | B | C | D | E | F |  |
| 1 | 2 | 0 | 2 | 1 | 2 | 0 |  |
| 2 | 6 | 4 | 0 | 2 | 1 | 1 |  |
| 3 | 3 | 4 | 1 | 1 | 0 | 0 |  |
| 4 | 2 | 1 | 3 | 0 | 2 | 0 |  |
| 5 | 1 | 0 | 1 | 0 | 1 | 1 |  |
| 6 | 0 | 0 | 1 | 0 | 0 | 0 |  |

Q9 –

**Using Minimum Weight Spanning Tree algorithm.**

**Using Kruskal algorithm**

1. **Sort the edges on the basis of minimum proability.**
2. **Take those edges which have least probability of interception and do not form a cycle.**
3. **Iterate the process until the total number of edges are N -1.**

**N = no of vertices.**