CS2023 - Data Structures and Algorithms

In-class Lab Exercise 12

Week 11, Intake 20
Index No: 200417M

Question 1

Weighted adjacency matrix

$$\begin{bmatrix} 0 & 10 & 0 & 0 & 15 & 5 \\ 10 & 0 & 10 & 30 & 0 & 0 \\ 0 & 10 & 0 & 12 & 5 & 0 \\ 0 & 30 & 12 & 0 & 0 & 20 \\ 15 & 0 & 5 & 0 & 0 & 0 \\ 5 & 0 & 0 & 20 & 0 & 0 \end{bmatrix}$$

Question 2

GitHub link: https://github.com/Saeedha-N/DSA_in_class.git

Question 3

Source city = 0

```
PS E:\UoM\4th semester\Live Lectures\CS2023 - Data Structures and Algorithms\DSA week 12\Lab_12>  & 'c:\Users\Saeedha Nazar
\.vscode\extensions\ms-vscode.cpptools-1.15.4-win32-x64\debugAdapters\bin\WindowsDebugLauncher.exe' '--stdin=Microsoft-MIEn
gine-In-bxk5scmx.p45' '--stdout=Microsoft-MIEngine-Out-tyzo1nsn.wuv' '--stderr=Microsoft-MIEngine-Error-ddbdf4q1.wdv' '--pi
d=Microsoft-MIEngine-Pid-3fuoqowf.rtf' '--dbgExe=D:\Software\MSYS2\mingw64\bin\gdb.exe' '--interpreter=mi'
Source City = 0
City                    Time            Path
0                       0               0
1                       10              0 -> 1
2                       20              0 -> 1 -> 2
3                       25              0 -> 5 -> 3
4                       15              0 -> 4
5                       5               0 -> 5
Average time from source city to all others cities = 15.00
```

Source city = 1

```
Source City = 1
City                    Time            Path
0                       10              1 -> 0
1                       0               1
2                       10              1 -> 2
3                       22              1 -> 2 -> 3
4                       15              1 -> 2 -> 4
5                       15              1 -> 0 -> 5
Average time from source city to all others cities = 14.40
```

Source city = 2

```
Source City = 2
City                    Time            Path
0                       20              2 -> 4 -> 0
1                       10              2 -> 1
2                       0               2
3                       12              2 -> 3
4                       5               2 -> 4
5                       25              2 -> 4 -> 0 -> 5
Average time from source city to all others cities = 14.40
```

Source city = 3

```
Source City = 3
City                    Time            Path
0                       25              3 -> 5 -> 0
1                       22              3 -> 2 -> 1
2                       12              3 -> 2
3                       0               3
4                       17              3 -> 2 -> 4
5                       20              3 -> 5
Average time from source city to all others cities = 19.20
```

Source city = 4

```
Source City = 4
City                    Time            Path
0                       15              4 -> 0
1                       15              4 -> 2 -> 1
2                       5               4 -> 2
3                       17              4 -> 2 -> 3
4                       0               4
5                       20              4 -> 0 -> 5
Average time from source city to all others cities = 14.40
```

Source city = 5

```
Source City = 5
City                    Time            Path
0                       5               5 -> 0
1                       15              5 -> 0 -> 1
2                       25              5 -> 0 -> 1 -> 2
3                       20              5 -> 3
4                       20              5 -> 0 -> 4
5                       0               5
Average time from source city to all others cities = 17.00

PS E:\UoM\4th semester\Live Lectures\CS2023 - Data Structures and Algorithms\DSA week 12\Lab_12>
```

Question 4

- Average time from city 0 to other cities =: 15.0
- Average time from city 1 to other cities = 14.4
- Average time from city 2 to other cities = 14.4
- Average time from city 3 to other cities = 19.2
- Average time from city 4 to other cities = 14.4
- Average time from city 5 to other cities = 17.0

The smallest average time 14.4 is obtained in three different cities. Therefore the cities with the smallest average time are city 1, city 2, and city 4. Thus the hospital can be placed in any three of these.