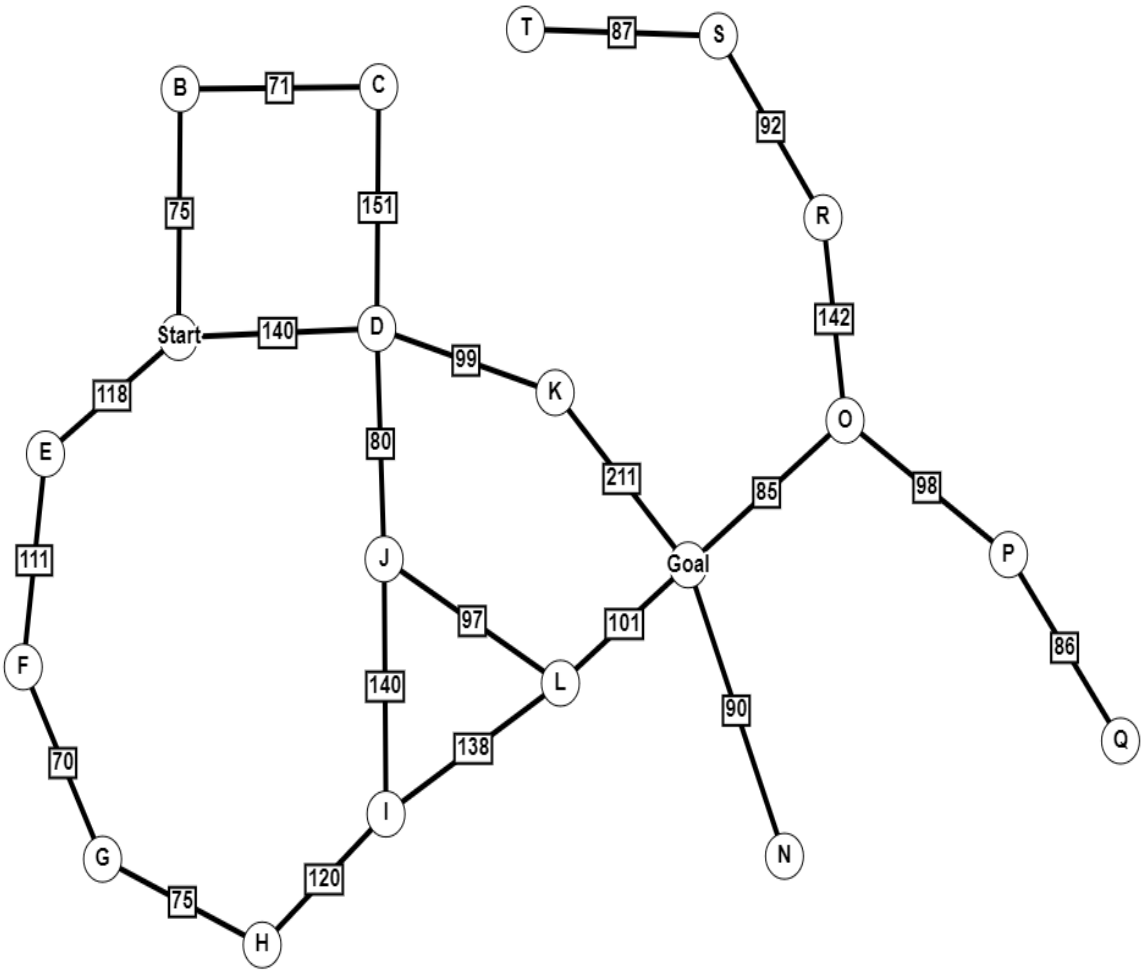
## Department of CIS

**Subject: Artificial Intelligence**
**Fall 2020**

## Theory Part (35 Marks) -




**In this graph, Node Start is the source and Node Goal is the goal.**

**Heuristic Values:**

| Node | Heuristic Value |
|---|---|
| Start | 366 |
| Goal | 0 |
| B | 374 |
| C | 380 |
| D | 253 |
| E | 329 |
| F | 244 |
| G | 241 |
| H | 242 |
| I | 160 |
| J | 193 |
| K | 176 |
| L | 10 |
| N | 77 |
| O | 80 |
| P | 151 |
| Q | 161 |
| R | 199 |
| S | 226 |
| T | 234 |

**Task 1 (Design): 10 marks**

Simulate the graph using Uniform Cost Search to find the shortest path from Node Start to Node Goal.

**Task 2 (Simulation): 15 marks**

Using the Heuristic given in the table, run A* t search on the following graph. A* is a type of Informed search; so, write the general time complexity of this search and compare with the complexity of UCS that you found in Task 1.

**Task 3 (Critical Evaluation): 10 marks**

Check if the heuristics are applicable for Greedy Best First Search as well by simulating it using that set of Heuristics.

## Lab Part (25 Marks) –

A dataset for Corona Virus is uploaded here.

**https://drive.google.com/file/d/1kUaYc_fIsDmN-bP3BMPg3fk1I-ys0Bd-/view?usp=sharing**

**The file name will be "CONVENIENT_global_confirmed_cases.csv".**

**Task 1 (8 Marks):**

Pre-process the dataset by –

a) Remove the first row of the dataset (the row that has the values of different provinces)
b) Add the values of the rows of Australia, Canada, China, Denmark, France, Netherlands, United Kingdom into one columns for each country instead of separate ones based on their provinces.

**Task 2 (2 Marks):**

a) Create a column in the dataframe called "confirmed_globally" and add all the values of each row in that column.
b) Calculate the total number of confirmed victims and store them in a variable.

**Task 3 (15 Marks):**

a) Use the following code snippet to create an epidemics dataframe.

```
epidemics = pd.DataFrame({
    'epidemic' : ['SARS', 'EBOLA', 'MERS', 'H1N1'],
    'start_year' : [2003, 2014, 2012, 2009],
    'end_year' : [2004, 2016, 2017, 2010],
    'confirmed' : [8096, 28646, 2494, 6724149],
    'deaths' : [774, 11323, 858, 19654]
})
```

b) Add another row in this dataframe named 'COVID-19' with the start year being 2019, the end year being 2020, and the number of confirmed coming from the calculations in the previous task and number of deaths being 1388051.

c) Calculate Mortality using the following formula – deaths/confirmed*100 and keep until 2 decimal points.

d) Show the bar chart of the Mortality of every epidemic using matplotlib.

## Submission Guidelines:

- Your submission should be in the form of a single word-processed document **(.doc or .docx)** that includes any necessary diagrams.
- Naming of the file as **example:** 183-16-315.docx
- **Marks will be deduced accordingly if any plagiarism of work is provided.**

# DEADLINE: 14th December, 2020