INDRAPRASTHA INSTITUTE of INFORMATION TECHNOLOGY DELHI

CSE140 – Introduction to Intelligent Systems

Winter 2021 session

Mid-sem exam

Max marks: 25 **17-July-2021**

Submission deadline: 17-July-2021 at 13:00 hrs (1 PM)

INSTRUCTIONS:

You will have to create a PDF file with your answers, name the file as IIS-MidSem-<Name>-<RollNo> and upload it on the classroom page by 1:00 pm. In the answer sheet write your name and roll number. In case you choose to have hand-written answers then those pages can be scanned and uploaded (make sure that it is clearly readable). Make sure it has the name and roll number on it.

Q1: Express the following in FOPL. (5 marks)

(a) Every house is on some floor.
(b) Every house that is green is free.
(c) There is some house that is red and is not free.
(d) Every house that is free has no floor above it.
(e) Every house that is not green and is below another house is red.

Q2: Represent the following in propositional logic. (3 marks)

(a) If Shilpa's house is red then she will sleep.
(b) If Shilpa's house is green then she will work.
(c) If Shilpa sleeps then she is lazy.
(d) If Shilpa is lazy then she has to sell her house.
(e) Shilpa paints her house red.

Using resolution show whether the statement "Shilpa has to sell her house" is TRUE or FALSE.

Q3: Answer the following: (4 marks)

(i) Explain Best-first search method. How is it useful?

(ii) Explain A* search method. What is the difference between A* search and Best-first search? Which one is better and why?

Q4: Answer the following: (4 marks)

(i) Describe Modus Tollens and explain the rationale of its derivation.

(ii) What is Resolution? Show in logic form.

(iii) What is Hypothetical Syllogism? Explain its derivation using resolution.

(iv) What knowledge does the following logic statement express? Is it a valid statement?

$$\exists x \, (\text{StudiesAt}(x, \text{IIITD})) \rightarrow \text{Smart}(x))$$

Q5: Describe Hill-climbing method. What is the problem with Hill-climbing? Why is Hill climbing method required when we have Best-first search? (4 marks)

Q6: You are given the road distance between a few cities below. Describe A* search of finding a route from Agartala to Amritsar in the data given below. Write out the initial state, actions, state-space, path, goal-test for the search. Create your own reasonable heuristic. (5 marks)

Distance in Kilometres	Ahmedabad	Bangalore	Bhubaneshwar	Bombay	Calcutta
Agartala	3305	3824	2286	3593	1863
Agra	878	1848	1578	1202	1300
Ahmedabad	-	1490	1697	552	2068
Allahabad	1251	1686	1090	1457	817
Amritsar	1356	2496	2224	1849	1919