B. Tech Fourth Year Mid-semester Examination

Department: Computer Science and Engineering

Course Name: Artificial Intelligence Code: CS 461

Full Marks-60 Time: 2 hours

Make reasonable assumptions as and whenever necessary. Notations carry the usual meanings

Answer ALL the questions

1 (a). Define intelligent agent and describe its various components in brief.

(b). Distinguish the following terms with appropriate examples

(i). Fully observable vs. Partially observable environment

(ii). Deterministic vs. Stochastic environment 5+5

2. (a). Show that breadth search is a special case of uniform-cost search.

(b). Distinguish between BFS and UCS. Show the worst-case time and space complexities of UCS algorithm. 3+7

3. (a). Why is heuristic search preferred over uninformed search? How are best first, uniform cost and A* searches related to each other?

(b). What is meant by admissible heuristics? What is the optimality criteria of A* search algorithm? Prove the optimality of A* search under this criteria.

5+5

4. (a). Show the various steps of hill climbing algorithm for the following 8-puzzle problem. Assume the heuristic function to be the number of misplaced tiles.

2	8	3
1	6	4
7		5

Start Sate

1	2	3
8		4
7	6	5

Goal State

(b). What are the merits and demerits of hill climbing search?

5+5

(18)

5. (a). The heuristic path algorithm is a best-first search in which the objective function is f (n)= (2-w)* g(n)+w*h(n). For what values of w is this algorithm guaranteed to be optimal? What kind of search does this perform when w=0, w=1 and w=2?

(b). Mention the disadvantages of depth-limited search.

7+3

6. Why is learning beneficial in any system? What are the different types of learning? Formulate naive-Bayes classifier in terms of text classification (**hints**: *mention basic assumptions, different probabilities involved, and procedures to compute these probabilities etc.*).

2+3+5