Mid-semester Examination

Department: Computer Science and Engineering

Course Name: Artificial Intelligence Code: CS 561

Full Marks-60 Time: 2 hours

Make reasonable assumptions as and whenever necessary. Answer the questions in any sequence. However, the answers to any particular question should appear together .

Answer ALL the questions

1 (a). Distinguish the following terms with appropriate examples

(i). Sequential vs. Episodic environment

(ii). Deterministic vs. Stochastic environment

(b). When BFS and DFS outperform each other? Derive the time and space complexities of depth first search.

6+6

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

(b). Distinguish between iterative deepening search and UCS. Show the worst-case time and space complexities of UCS algorithm.

4+8

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

(b). Write the various steps of hill climbing. What can be the problems with hill climbing?

6+6

4. (a). A 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 the algorithm guaranteed to be optimal? What kind of search does this perform when w=0, 1, and 2?

(b). Why is simulated annealing more suitable than hill climbing? Distinguish between local beam search and simulated annealing.

6+6

5. (a). What are the basic steps of NSGA-II, multiobjective genetic algorithm? Mention the effectiveness of multiobjective genetic algorithm over the single objective genetic algorithm.

b) Define the following: i) non-domination ii) Pareto-optimality. 6+3+3