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. Abbreviations carry the usual meanings.

Answer ALL the questions

1. (a) Give the name of the algorithm that results from each of the following cases: Local beam search with k=1; Simulated annealing with T=0 all the times; Genetic algorithm with population size=1; local beam search with K (number of successors) =∞; Uniform cost search with unit step cost (***Please explain for your answer***)

15

2. How is local beam search different from the random restart search? Derive best and worst case space and time complexities of DFS. Under what conditions BFS and DFS outperform each other? (***Please give proper explanation***)

3+8+4

3. Mention the various problems of hill climbing and their possible remedies. Why is propositional logic monotonic? Consider the following propositional logic knowledge base:

$KB = (B_{1,1} \Leftrightarrow (P_{1,2} \vee P_{2,1})) \wedge \neg B_{1,1}$

Use resolution algorithm to show whether $\alpha = \neg P_{1,2}$ can be concluded or not.

5+10

4. (a). Distinguish between propositional logic and first-order logic. Consider the following knowledge base:

The law says that it is a crime for an American to sell weapons to hostile nations. The country Nono, an enemy of America, has some missiles, and all of its missiles were sold to it by Colonel West, who is American.

Prove using first-order logic backward chain resolution algorithm that *Col. West is a criminal.* Show the detailed knowledge base at each step.

(b). Find out all possible unifiers for the following first-order predicate expressions (*x, y, z*: variables; *John*: constant and *Knows*: predicate function): *Knows (John, x)* and *Knows(y, z)*

Which one is the most general unifier?

12+3

67