IITJ, B.Tech 3rd year(CSE), II semester
II Mid-Sem. Examination-2014
32002: Artificial Intelligence

Duration: 1 Hour M.M. 20

1. Find the extensions of the following default theory for default reasoning: (4)

   $T =< \{p \vee q\}, \{\frac{:\neg p}{p}, \frac{p \vee q : \neg p}{\neg p}\} >$

2. Consider a state space search where start state is numbered as 1 and successor function for state n returns two states $2n$ and $2n + 1$. (1,2,3)

   (a) Draw the state-space diagram for states 1 to 15, with children for all states numbered in increasing order from left to right.

   (b) Assume that goal state is 12. List the order in which nodes are to be expanded for breadth-first search and DFID (depth-first iterative deepening).

   (c) What is branching factor when searching from goal node towards the start node? Make use of this answer to construct an algorithm that can generate a path from initial state to any given goal state in $O(\log N)$ time, where N is the total number of states.

3. Consider a state space with reversible actions, i.e., for any action a from state s to s' there exists an action a^{-1} from s' to s. (2.5, 2.5)

   (a) For general search spaces it is necessary for graph-search version of BFS to keep nodes at all previous depths in the *closed* set to avoid re-expanding a state. Is it also necessary for state spaces with reversible states? (Ignore the fact that we need nodes in the closed set to reconstruct the solution path.)

   (b) Assume that you succeed in developing a graph-search version of BFS for state-space search with reversible actions that only keep nodes of some depth in memory. Can this algorithm be used to reconstruct the solution path, and if so, how?

4. Consider that a large number of websites are available, with their domain names in a domain-name-file. Each website has index-page (homepage) and other pages linked directly or indirectly from the homepage. In addition, there may be links from website pages to other website pages. Suggest a method and write an algorithm to crawl (visit) these websites to create an index table for search whose each row has one entry corresponding to each domain name, comprising the domain name and five most frequently available keywords: {domain-name, key-word1, ..., key-word5}. Your algorithm must follow a suitable search approach. (5)