Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

A Constituent Institution of Manipal University

VII SEMESTER B.TECH. (COMPUTER SCIENCE & ENGINEERING)

END SEMESTER MAKEUP EXAMINATIONS, NOV/DEC 2016

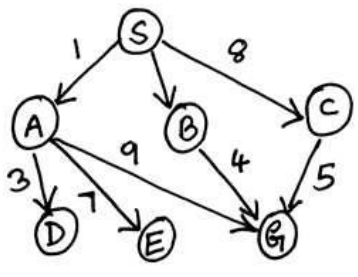
SUBJECT: ARTIFICIAL INTELLIGENCE (ELECTIVE – III) [CSE 423]

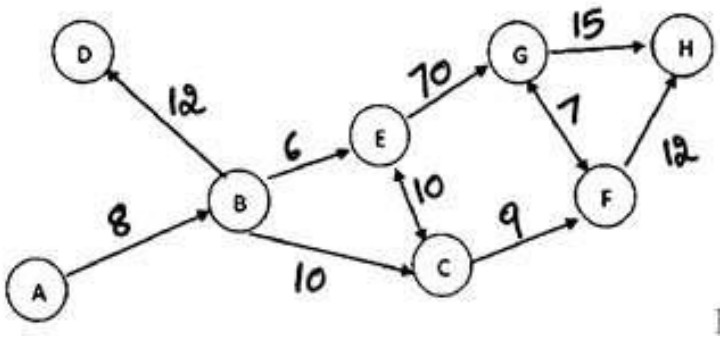
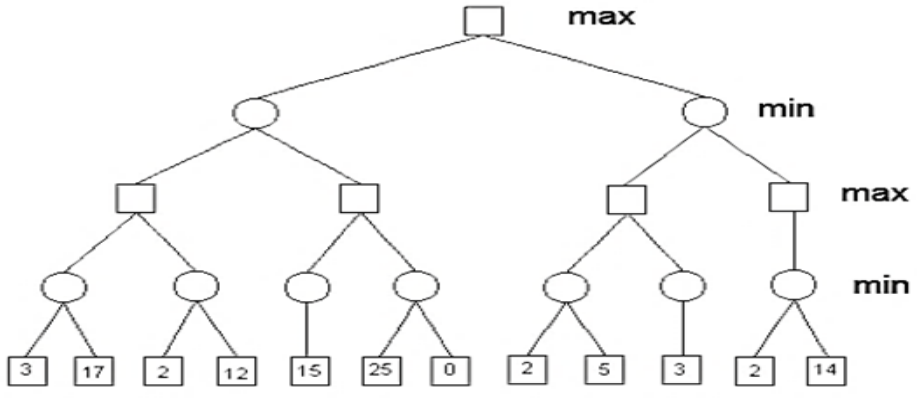
REVISED CREDIT SYSTEM
(06/01/2017)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ANY FIVE FULL** questions.
- Missing data may be suitable assumed.

1A.	Suppose you design a machine to pass the Turing test. What are the capabilities such a machine must have? Explain.	**3**
1B.	List and explain all the characteristics of a hardest environment. Distinguish it from simpler environment characteristics with an example for each.	**5**
1C.	Consider a vacuum cleaner agent environment, in which the geography of the environment – its extent, boundaries, and obstacles – is unknown, as is the initial dirt configuration. (The agent can go Up and Down as well as Left and Right.) (i) Can a simple reflex agent be perfectly rational for this environment? Explain. (ii) Can a simple reflex agent with a randomized agent function outperform a simple reflex agent? Explain.	**2**
2A.	Compare breadth first, depth first, uniform cost and bidirectional search strategies based on completeness, optimality, time complexity and space complexity.	**4**
2B.	Consider a directed graph shown Figure 1, where S is the start node and G is the goal node. Use tree based Breadth-first search and Uniform cost search techniques for traversal from start node to goal node. Show the contents of open and closed lists at each step. Compute cost path for both and advice if any changes to be made to above techniques.  Figure 1	**4**

2C.	Prove that uniform-cost search and breadth-first search with constant step costs are optimal when used with the GRAPH-SEARCH algorithm. Show a state space with varying step costs in which GRAPH-SEARCH using iterative deepening finds a suboptimal solution.	**2**
3A.	Consider a graph as shown in the Figure 2, with A as start node and H as goal node. Run greedy search and A* search on this graph. The heuristic values at each node is given as follows. A: 24, B: 19, C: 17, D: 16, E: 14, F: 10, G: 9, H: 0  Figure 2.	**5**
3B.	If two heuristic functions h1 and h2 are available, where h1< h2 then which of the (2) heuristic function to be applied in the search algorithm? Why?	**2**
3C.	Prove that if heuristic h(n) is admissible, then A* using tree-search is optimal. Also give proof for optimality of A* using graph-search.	**3**
4A.	What are the differences between simple search and game search methods? Draw the complete game tree for a game nim with single pile of 7 match sticks. With MIN playing first. Each player in particular must divide the pile into 2 non empty piles of different sizes. Player who can no longer make a move loses game. At the terminal assign 1 if MAX wins and 0 if MAX loses. Find Minimax values at each node.	**4**
4B.	In the following zero sum game tree (Figure 3), determine the nodes which are pruned when alpha- beta pruning is applied. Show clearly the trace of algorithm.  Figure 3.	**3**
4C.	Write the detailed planning steps for solving the following blocks world problem with initial and final states given as follows.	**3**
5A.	The following hypothesis is as follows. Either Heather attended the meeting or Heather was not invited. If the boss wanted Heather at the meeting, then she was	**4**

	invited. Heather did not attend the meeting. If the boss did not want Heather there, and the boss did not invite her there, then she is going to be fired. Prove (i) Represent the above using proper propositional grammar. (ii) Prove by resolution that "Heather is going to be fired".	
5B.	Consider a following sentence: "If I win election then Taxes will go down" (a) Break the above sentence into atomic sentences and represent them using syntax (symbols) and semantics (inference rule) of propositional logic. (b) Find the negation of the above representation. Verify with truth table. (c) Write the sentence that results from (b)	**2**
5C.	With proper example explain the advantage of predicate logic over propositional logic. Consider a vocabulary with the following symbols: Fools(x, y, t): person x fools person y at time t Shaves(x, y): person x shaves person y Use the above to write the following assertions in first order logic. (i) Politicians can fool some of the people all of the time, and they can fool all of the people some of the time, but they can't fool all of the people all of the time. (ii) There is a barber who shaves all men in town who do not shave themselves.	**4**
6A.	Explain the following learning mechanisms. (i) Error correction learning (ii) Memory based learning	
6B.	Draw a semantic network to illustrate inheritance and show that it helps in drawing inference.	**4**
6C.	With a neat diagram explain a single neuron model with threshold as activation function.	**3**