Reg. No.										

anipal Institute of Technology, Manipal

(A Constituent Institute of Manipal University)

VII SEMESTER B.TECH (COMPUTER SCIENCE AND ENGINEERING)

MAKEUP EXAMINATIONS, DEC 2015/JAN 2016

SUBJECT: ELECTIVE III - ARTIFICIAL INTELLIGENCE [CSE 423]

REVISED CREDIT SYSTEM

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ANY FIVE FULL** questions.
- Missing data, if any, may be suitably assumed.

1A. What are the capabilities a computer would need to pass Turing test? 3M

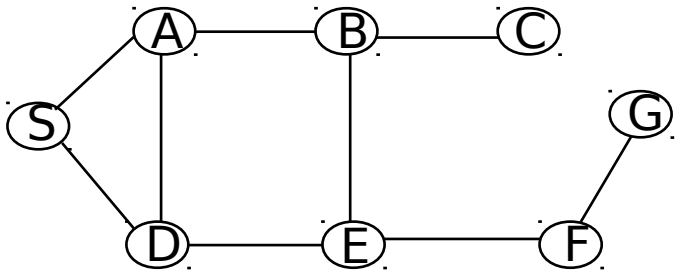
1B. Define in your own words: (a) Intelligence, (b) Artificial intelligence, (c) Agent, (d) Rationality. 2M

1C. Describe the different types of task environment in which agent has to operate. 5M

2A. How agent programs are different from software. With a neat block diagram explain model based reflex agents and goal based agents. 5M

2B. Consider a graph shown in Figure 1, where S is the start node and G is the goal node. Use Breadth-first search and Depth-first search techniques for tree traversal from start node to goal node. Show the contents of open and closed lists at each step. Compare both the techniques using time and space complexity. 5M

Figure 1



3A. Start state and goal state of 8 puzzle problem is shown in Figure 2. Calculate the evaluation function f(n)=g(n)+h(n) at each state. Where g(n) is the depth of node n in search tree and h(n) is the number of tiles not in their goal position in a given state n. Draw the complete search tree. (Child nodes are created in up, left, right and down order). 3M

5	1	2
4		8

Start state

5	3	6
7		2
4	1	8

Goal state

Figure 2

3B. 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. 3M

3C. Consider a graph as shown in the Figure 3, 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. 4M

A	B	C	D	E	F	G	H
24	19	17	16	14	10	9	0

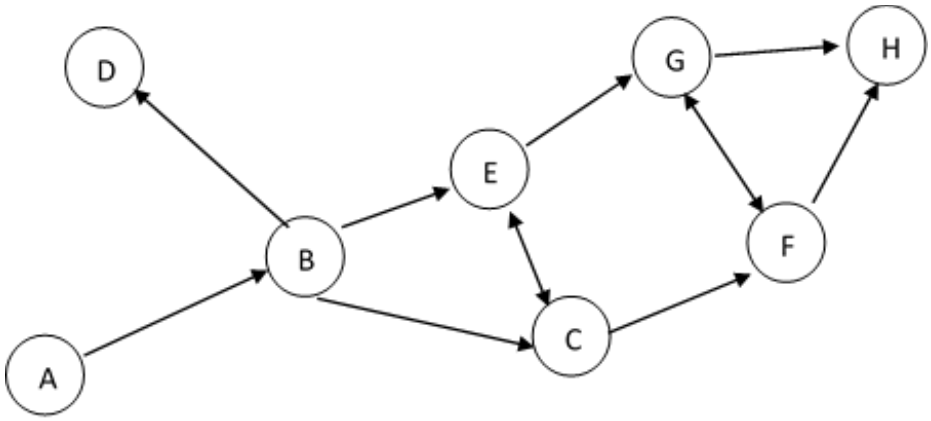


Figure 3

4A. Perform a left-to-right alpha-beta prune on the tree as shown in Figure 4(Root is a maximizer.) Perform a right-to-left prune on the same tree. Discuss why a different pruning occurs. 5M

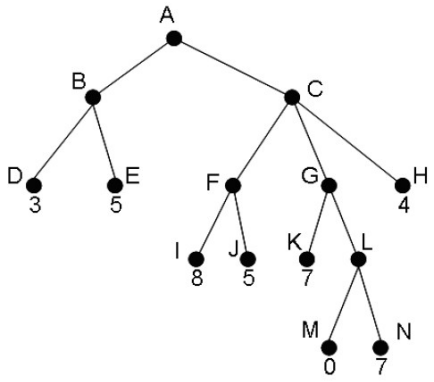


Figure 4

4B. Decide whether each of the following sentences is valid, unsatisfiable, or neither. Verify your decisions using truth tables.

(a) Big v Dumb v (Big → Dumb)

(b) (Smoke → Fire) → ((Smoke ^ Heat) → Fire)

(c) ((Smoke ^ Heat) → Fire) ↔ ((Smoke → Fire) v (Heat → Fire))

(d) (Big ^ Dumb) v ¬Dumb 2M

4C. Consider a blocks world problem domain. Initially, block A is on the floor, block C is on block A and block B is on the floor. The goal state is defined by block C on the floor,

block B on block C and block A on block B. Using PDDL represent initial state, goal state and set of action schemas. 3M

5A. Consider the vocabulary with the following symbols:
Buys(x, y, z): x buys y from z
Sells(x, y, z): x sells y to z
Parent(x, y): x is a parent of y
Citizen(x, c, r): x is a resident of country c for reason r
Resident(x, c): x is a resident of country c
Use these symbols to write the following assertions in first-order logic. 4M

(a) No person buys an expensive policy
(b) There is an agent who sells policies only to people who are not insured
(c) A person born in the UK, each of whose parents is a UK citizen or a UK resident, is a UK citizen by birth.
(d) A person born outside the UK, one of whose parents is a UK citizen by birth, is a UK citizen by descent.

5B. Why propositional logic is a weak knowledge representation language? List out different inference rules in propositional logic. Consider following propositions and prove R using resolution. 6M
P v Q
P → R
Q → R

6A. Differentiate between supervised and unsupervised learning. Draw the McCulloch-Pitt's model of artificial neural network and explain. 4M

6B. Explain the following 6M
(a) Ontology
(b) Semantic Nets

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