Reg. No.									

Manipal Institute of Technology

(A Constituent Institute of Manipal University)

III SEMESTER M. C. A.
END SEMESTER EXAMINATION – NOV/DEC 2015

SUBJECT: ARTIFICIAL INTELLIGENCE & EXPERT SYSTEMS [MCA 5009]

Time : 3 hours | 02-12-2015 | Max. Marks : 50

Instructions to Candidates

1. Answer **ANY FIVE FULL** questions.
2. Missing data may be suitably assumed.

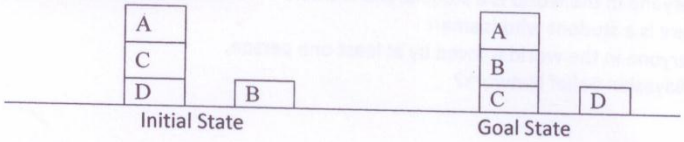
1A Given the initial state of the game Tic-Tac-Toe board [b b b b b X b b b], generate the movetable for the next best 3 moves.

1B State the 8 – puzzle problem precisely and analyze the problem along any 3 dimensions.

1C What do you understand by defining a problem using state space in AI.

(5 + 3 + 2)

2A What is a Heuristic function? Define and use local and global heuristics to give FIRST 2 Best moves for the following blocks problem



2B What is pruning? Discuss Alpha-Beta pruning in the Minimax game search algorithm.

2C What is zero-sum game playing?

(5 + 3 + 2)

3A Using A* searching algorithm trace the given state space in figure-1 and find out the optimal path from node 1 to node 12.

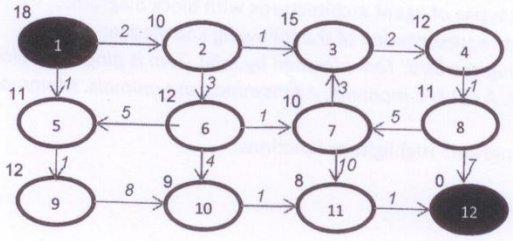


Figure - 1

3B What is problem reduction? Discuss how do you reduce the problem by taking one example.

3C Justify why Best First Search is called a heuristic technique, as compared to DFS and BFS which are not.

(5 + 3 + 2)

4A Consider an alarm system installed in a house that can be triggered by three events, namely, earthquake (E), burglary(B), and wind(W). Model this situation with the help of Bayesian network and perform the inference for the following queries using probability values given below:

1. "What is the probability, that it is an earthquake, given the alarm is ringing?"
2. "What is the probability of burglary, given the alarm is ringing?"
3. "What is the probability of the alarm ringing if both earthquake and wind occur?"

P(E)	P(B)
0.4	0.7

E	P(W)
false	0.8
true	0.5

E	B	W	P(A)
T	T	T	1.0
T	T	F	0.9
T	F	T	0.95
T	F	F	0.85
F	T	T	0.89
F	T	F	0.7
F	F	T	0.87
F	F	F	0.3

4B Convert the following English sentences into its predicate forms

- John is not tall
- All students are smart
- Everyone in the world is a student and is smart
- There is a student who is smart
- Everyone in the world is loved by at least one person.

4C What is a Bayesian Belief Network?

(5 + 3 + 2)

5A What is Non-monotonic reasoning? Explain the importance and use of Truth-Maintenance-System (TMS) in a reasoning system with its architecture.

5B What is Circumscription? Explain with suitable example.

5C Discuss forward and backward reasoning.

(5 + 3 + 2)

6A Explain the different types of agent architectures with block diagram.

6B Show a Semantic Net representation of the following knowledge:
Tom is a cat. Tom caught a bird. Tom is owned by John. Tom is ginger in colour. Cats like cream. The cat is sat on the mat. A cat is a mammal. All mammals are animals. Mammals have fur.

6C What is an Agent Program? Highlight its functions.

(5 + 3 + 2)