Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/MCA/SEM-3/MCA-303/2012-13

2012
INTELLIGENT SYSTEMS

Time Allotted : 3 Hours *Full Marks :* 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following : 10 × 1 = 10

   i) There are no existential quantifiers in

      a) PCNF b) SSF

      c) WFF d) FOPL.

   ii) The region in the state space where all adjacent nodes have same value is called

      a) Plateau b) Ridge

      c) Local Maxima d) Goal.

   iii) Which of the following is a proposition ?

      a) You may get 8·5 in this semester

      b) Be sincere with your studies

      c) What a beautiful music !

      d) 2 + 2 = 5.

iv) A formula is invalid

a) If it is consistent

b) If there exists one counter model

c) If it is contradiction

d) If it is inconsistent.

v) Which of the following is not an optimal search technique ?

a) BFS

b) Iterative deepening DFS

c) Generate and test

d) A*.

vi) Which of the following techniques does not require stack ?

a) Backtracking b) Recursion

c) Hill Climbing d) DFS.

vii) Frame contains

a) Slots b) Semantic net

c) Filler d) Class.

viii) Inheritable knowledge can be represented with

a) CSF b) Semantic net

c) FOPL d) Class.

ix) Maximum number of neighboring node (Child) of any node in 15 puzzle is

a) 4 b) 5

c) 15 d) 16.

x) Which Artificial Intelligence system mimics the structure and functioning of the human brain ?

a) Expert System

b) Decision Support System

c) Neural Network

d) Genetic Algorithm.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. 3 × 5 = 15

2. What are the disadvantages of Depth-First-Search (DFS) ? How Depth-Limited-Search overcomes the problem of DFS ?

2 + 3

3. Convert the following statements in First Order Predicate Logic :

a) If x is on top of y, then y supports x

b) If x is above y and they are touching each other, then x is on top of y.

c) A cup is above a book

d) A cup is touching a book

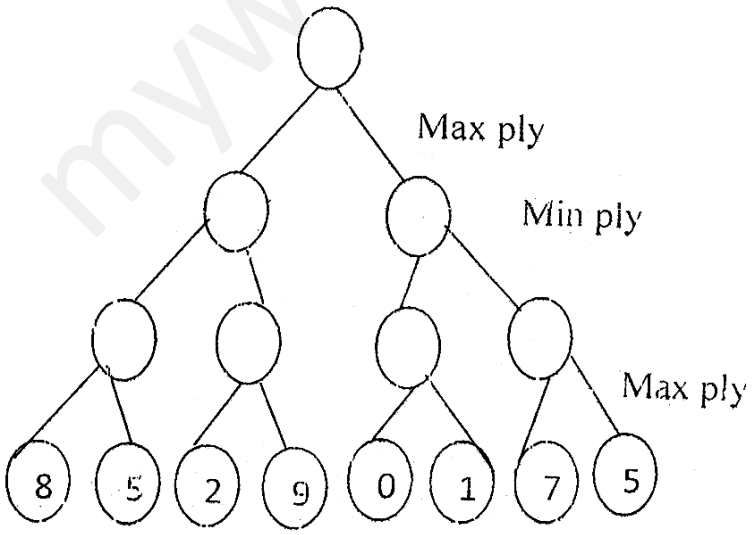
e) The Book supports the cup.

4. Represent the following by using semantic net :

Musical instruments are one special type of instruments. The speciality of musical instrument is it produces melodious sound. Sitar is one of the famous musical instruments. It consists of several strings and it is played by hand. Ravi Shankar is a famous Sitar player.

5. Draw the architecture of Expert System and explain each part briefly.

6. If Alpha-Beta pruning is used, then which sub-tree of the following tree should be pruned ? Justify your answer.



GROUP – C
(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

7. a) What is local maxima problem in simple Hill climbing method ? Explain with diagram. Which method overcomes this problem and how ?

   b) Why Steepest-Ascent Hill climbing method is called a heuristic search technique ?

   c) State the steps of A* algorithm. (3 + 3) + 3 + 6

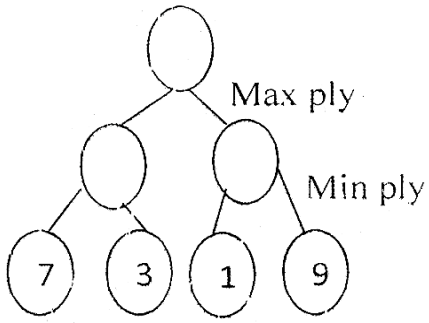
8. a) Explain Bayesian network with example.

   b) Two boxes contain respectively 4 white and 2 black balls, 1 white and 3 black balls. One ball is transferred from the first box into the second and then one ball is drawn from the later. It turns out to be black. What is the probability that the transferred ball is white ?

   c) What are the advantages of Breadth-First-Search ?

4 + 7 + 4

9. a) If minimax procedure is used, then is it possible to have value 9 at the root node of the following tree ? Give reason in favour of your answer.



b) Explain the characteristics of searching technique.

c) Write a PROLOG program to multiple 1st n natural numbers. Value of n will be given by user. 5 + 4 + 6

10. a) Prove by resolution — "Elvis will win" using the following :

(i) If a person is hard worker, he will win

(ii) A person who is lazy is not a hard worker

(iii) Elvis is a hard worker.

b) What is Natural language processing ?

c) Consider the following Predicate logic :

(i) $\forall \chi$: successful $(x) \rightarrow$ hardworker $(x) \vee$ intelligent (x)

(ii) $\forall \chi$: honest $(x) \rightarrow$ good person (x)

Can these be converted to Horn clause ? If possible, then covert. Give reasons in favour of your answers.

5 + 3 + (3 + 4)

11. a) Is Breadth-First-Search better than Depth-First-Search ? State reason with respect to your answer.

b) You are given two jugs whose capacity are 5 litre and 3 litre. No jugs have any measuring marks on it. You have one source of water. How can you measure 4 litre of water in 5 litre jug ? State the production rules and applying those rules, solve the problem.

c) State the task domain of Artificial Intelligence. 5 + 7 + 3