APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIRST SEMESTER M.TECH DEGREE EXAMINATION, DECEMBER 2015

Computer Science and Engineering

08CS 6051A Computational Intelligence

Max. Marks : 60   Duration : 3 Hours

Answer ALL six questions. Part (a) of each question is compulsory. Answer
EITHER part (b) or part (c) of each question.

Q.No.   Marks

Module I

1a.   Describe the advantages of predicate logic over propositional logic. Support your answer
with an example.   3

Answer b or c

b.   Translate the following English sentences into first-order logic formulas:
    i.   Every father is a male and every mother is a female
    ii.   At least two existing kinds of birds can fly
    iii.   Some birds are crows but no birds are squirrels   6

c.   There are three missionaries and three cannibals on the left bank of a river. They wish to
cross over to the right bank using a boat that can only carry two at a time. The number of
cannibals on either bank must never exceed the number of missionaries on the same bank,
otherwise the missionaries will become the cannibals' dinner.

    i.   Specify the representation of the states, operators, goal, start state and cost function.
    ii.   Represent the states using a graph.   6

Module 2

2a.   Give and describe the conditions for a heuristic function to be monotonic.   3

Answer b or c

b.   Describe in detail about admissibility, monotonocity and informedness with the help of
algorithms.   6

c. Consider the following familiar set of rules.

1	IF	green	THEN	walk
2	IF	red	THEN	wait
3	IF	green AND *blinking*	THEN	hurry
4	IF	red OR green	THEN	traffic light works

i. Which of the above rules will be put into a conflict set by the system if the working memory contains two facts: green, blinking? Explain why each rule is selected or not.

ii. Which of the rules would fire if we used the specificity conflict resolution strategy? Explain why. **6**

Module 3

3a. Which are the generalization operators used in machine learning. **3**

Answer b or c

b. For each of the truth tables below say whether it is possible for a perceptron to learn the required output. In each case, explain the reason behind your decision. **6**

i)
Input	0	0	1	1
Input	0	1	0	1
Required Output	1	0	0	1

ii)
Input	0	0	1	1
Input	0	1	0	1
Required Output	1	1	0	0

iii)
Input	0	0	1	1
Input	0	1	0	1
Required Output	1	1	1	1

c. Explain ID3 decision tree algorithm. Illustrate it with an example. **6**

Module 4

4a. Explain classifier systems. **3**

Answer b or c

b. Explain in detail about theorem proving by resolution. **6**

c. Briefly explain genetic algorithm with an example. **6**

Module 5

5a. Describe the role of inference engine in an expert system. **4**

Answer b or c

b. Explain the importance of syntax and semantics in NLP. Construct a grammar and draw the parse tree for the sentence *"The cat eats the rice"*. **8**

c. You are given a set of rules for this question as follows.

R1 : If inflation is low
THEN interest rates are low
ELSE interest rates are high.

R2 : If interest rates are high
THEN housing prices are high

R3 : If housing prices are high
THEN do not buy a house
ELSE buy it

Run a forward chaining with the fact : Low inflation rate as given   8

Module 6

6a. Define logic programming with example.   4

Answer b or c

b. Distinguish between declarative and procedural meaning of prolog programs   8

c. Describe about the data objects in prolog.   8