MCA (Revised)

Term-End Examination

December, 2009

09024

MCSE-003 : ARTIFICIAL INTELLIGENCE AND KNOWLEDGE MANAGEMENT

Time : 3 hours *Maximum Marks : 100*

Note : *Question **number 1** is **compulsory**. Attempt **any three** questions from the rest.*

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1. (a) What will be the output of the function when invoked with $n = 5$ and $n = 6$. Write each step, while calculating the result **5**

```
(defun myfun (n)
   (cond ((zerop n) -1)
      (t
         ( * (-0  n)
            myfun (-n  1) ) )
         ) ) )
```

(b) Transform the following into Disjunctive Normal Form (DNF) **5**

$$(P \rightarrow (\sim (Q \rightarrow R)))$$

(c) Represent the following sentence as a conceptual graph "cow has four legs and eats grass". 5

(d) Evaluate the following LISP expressions : 5

(i) (greaterp 18 151 76)

(ii) (reverse ((pq) r (st)))

(iii) (t (/95) 50)

(iv) (cadadr '(a (bc) d))

(v) (list `a `(bc))

(e) Consider the following PROLOG program say the knowledge base is : 10

sister (sue, bill)

parent (ann, sam)

parent (joe, ann)

male (joe)

female (ann)

the rule applicable to the knowledge base is say :

grandfather (X,Z) : - parent (X, Y),

parent (Y, Z),

male (X)

Now perform following tasks :

(i) Explain the actual meaning of above rule.

(ii) What will be the output when given knowledge base is inquired for

(A) ? - parent (X, sam)

(B) grandfather (X, Y)

(f) What do you mean by term "Agents" in Artificial Intelligence ? Classify the various types of agents. 5

(g) Briefly describe the term "Truth Maintainance System - TMS". 5

2. (a) Convert the following WFF into a set of clauses 5

$$\forall_x(\exists_y \text{postman}(y) \wedge \text{bites}(x, y) \rightarrow \text{dog}(x))$$

(b) Briefly describe the And-OR graph. How do they contribute to search and control strategy of an expert system ? 5

(c) Give conceptual dependency representation of the sentence given below : 5

"Mohan will eat pizza from the plate with fork and knife".

(d) Explain the following logic concepts, if required use suitable examples (***Any two***) : 5

(i) Modus Tollens

(ii) Satisfiable statement

(iii) Resolution principle in proposition logic

3. (a) Write a function Deep-Reverse in LISP which takes a single list as argument and then reverses the order of elements at the top most level of the list. Further, recursively reverses the order of elements in a list which are member of a higher level list. i.e. if we give (a(bc)d(e(fg))h) as input to the function developed by you then (h((gf)e)d((b)a) should be the output. **10**

(b) Represent the following situation with Associative networks. **10**

"IGNOU is an open university established by an act of parliament. It has various schools of studies and Divisions to support academic activities at the Head Quarters. IGNOU's regional centers are spread all over the country to manage the academic and administrative activities. Each School and Division is headed by a Director and each Regional Centre is headed by Regional Directors."

4. (a) Write a Prolog program to find factorial of a number given by the user. **7**

(b) Compare and contrast BFS i.e. Breadth First Search technique with following **5**

(i) DFS Depth First Search

(ii) Heuristic Search

(c) Express the following knowledge as a semantic network structure with Interconnected nodes and labeled arcs. 8

"Ram is Vice President of ABC Comp. He is married to Raj and has a male child Ars. Ars goes to school. Ram plays golf and owns a silver coloured German made car, Mecedes Benz".

5. (a) Compare and contrast the following (*Any two*) : 8

(i) A* and AO*

(ii) Conceptual graph and conceptual representation

(iii) Scripts and frames

(b) Write short notes on *any two* of the following : 7

(i) Expert systems

(ii) Methods to deal with Uncertainities in knowledge systems

(iii) Non Deductive Inference rules

(c) Explain the difference between Forward and Backward Chaining. Under which situation which mechanism is best to use, for a given set of problems ? 5

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