

**MCA (Revised)**

01783

**Term-End Examination**

**December, 2019**

**MCSE-003(S) : ARTIFICIAL INTELLIGENCE AND  
KNOWLEDGE MANAGEMENT**

*Time : 3 hours*

*Maximum Marks : 100*

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

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1. (a) Briefly discuss the S-expressions in LISP.  
What will be the output of the function when  
 $n = 5$  ? Write each step while calculating the  
result. 5

```
(defun myfun(n)
  (cond
    (
      ((= n 1) 1)
      (t (* n myfun(- n 1)))
    )
  )
)
```

- (b) How does Disjunctive Normal Form (DNF) differ from Conjunctive Normal Form (CNF) ? Transform the following well-form formula into DNF :  
 $(P \rightarrow (\sim(Q \rightarrow R)))$ . 5
- (c) What is Skolomization in predicate logic ? Skolomize the following Well-Formed Formula (WFF) :  
 $\exists x_1 \exists x_2 \forall y_1 \forall y_2 \exists x_3 \forall y_3 P(x_1, x_2, x_3, y_1, y_2, y_3)$ . 5
- (d) What do you mean by the term “Agents” in Artificial Intelligence (AI) ? Classify various types of Agents. 5
- (e) Discuss the ‘Cut’ and ‘Fail’ mechanism in Prolog. Give suitable example for each. 5
- (f) Briefly describe the term Truth Maintenance System (TMS) with the help of a suitable block diagram. 5
- (g) How do languages for Artificial Intelligence (AI) differ from other programming languages ? Give names of programming languages, which are frequently used to develop expert systems. 5
- (h) What do you understand by the term Uncertainty in AI ? How is uncertainty managed in Artificial Intelligence ? Briefly discuss the structures used to manage knowledge uncertainty. 5

2. Write short notes on following : 20
- (a) Turing Test
  - (b) Chinese Room Test
  - (c) Recursion in LISP
  - (d) Expert Systems
  - (e) Close World Assumption
3. Differentiate the following : 20
- (a) Static Task Environment and Dynamic Task Environment of Agents
  - (b) Monotonic Reasoning and Non-Monotonic Reasoning
  - (c) Forward Chaining and Backward Chaining
  - (d) Frames and Rule Based Systems
4. (a) What are Semantic Nets ? Briefly discuss the utility of semantic nets in knowledge management. Give suitable example in support of your answer. 7
- (b) Explain the following with the help of an example : 8
- (i) Modus Ponens
  - (ii) Modus Tollens
  - (iii) Syllogism
  - (iv) Disjunctive Syllogism
- (c) Write a program in LISP to calculate the area of the circle, whose radius is given by the user. Write proper comments to enhance readability of your code. 5

5. (a) Write a program in Prolog to find the factorial of a number given by the user. Write proper comments to enhance readability of your code. 6
- (b) What is Prenex Normal Form (PNF). Write the steps to transform a Well-Formed Formula (WFF) into PNF. Transform  $\forall x (Q(x) \rightarrow (\exists x) R(x, y))$ . 8
- (c) Discuss the utility of the following LISP functions : 6
- (i) Lambda function
  - (ii) Mapcar function
  - (iii) Cond function
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