

MCA (Revised)

Term-End Examination, 2019

MCSE-003 : ARTIFICIAL INTELLIGENCE AND
KNOWLEDGE MANAGEMENT

Time : 3 Hours

Maximum Marks: 100

Note : Question No.1 is compulsory. Attempt any three questions from the rest.

1. (a) State and justify the validity of following inference rules : [5]
- (i) Modus Tollens
- (ii) Modus Ponens
- (b) What are Learning Agents ? Briefly discuss their components. [5]
- (c) Translate the following sentences in to well form formulas (WFF) : [5]
- (i) Every person has mother



(ii) There is a woman and she is mother of
Veena

(d) Write a recursive program in LISP to find factorial of a number, given by user. Write suitable comments to explain your logic. [5]

(e) What is the difference between predicate and proposition ? Write De-Morgan's law for both predicate logic and proposition logic. The laws in these two domains are identical or interrelated, justify. [5]

(f) Obtain Conjunctive Normal Form (CNF) and Disjunctive Normal Form (DNF) for the following expression $\sim (A \rightarrow (\sim B \wedge C))$ [5]

(g) What is an expert system ? Briefly discuss the components of an expert system. [5]

(h) What is Skolomization ? Briefly discuss the steps to perform skolomization. Why do we need to skolomize ? [5]

2. (a) What is Imprecise Knowledge ? How fuzzy system are used to handle Imprecision in Knowledge Base ? [7]

Perform the Union and Intersection operation on the following two fuzzy set :

$A = \{ \text{Mohan}/.85; \text{Sohan}/.4; \text{John}/.6; \text{Abdul}/1 \}$

$B = \{ \text{Mohan}/.75; \text{Sohan}/.6; \text{John}/0; \text{Abdul}/.8 \}$

- (b) Write a LISP program to find GCD (Greatest Common Divisor) of two numbers. Write suitable comments to improve readability of your logic. [5]
- (c) Consider the following PROLOG program, where the knowledge base is : [8]

sister (Sue, bill)

parent (ann, sam)

parent (Joe, ann)

male (joe)

female (ann)

the rule applicable to knowledge base is :

grandfather (x,z) :- parent (x,y),

parent (y,z),

male (x).

now perform following tasks.

- (i) Explain the meaning of above rule.
- (ii) What will be the output when given knowledge base is required for :
 - (a) ?- parent (x, sam)
 - (b) grandfather (x,y)

3. Write short notes on the following : [20]

- (a) Turing test and objection to turing test
- (b) Framer in context of knowledge representation
- (c) Prenex Normal Form (PNF)
- (d) Validity and Inconsistency in propositional logic
- (e) LAMBDA Expression in LISP

4. (a) Compare Forward Chaining Systems and Backward Chaining Systems Support your comparison with suitable example of each. [5]
- (b) Briefly discuss the utility of Semantic Networks. Draw the semantic network for the statement given below :

"John presented a shining ring to Anna in the garden last week." [8]

(c) What is principle of resolution ? Apply the principle of resolution to prove the theorem "some who are intelligent cannot read" the given knowledge to the system is as follows : [7]

(i) Who ever can read is literate

(ii) Dolphins are not literate

(iii) Some Dolphins are intelligent

5. (a) Determine the standard form (Skolomize) of the following formulas : [5]

(i) $\exists_x \forall_y \forall_z \exists_u \forall_v \exists_w p(x, y, z, u, v, w)$

(ii) $\sim ((\forall_x) P(x) \rightarrow \exists_y \forall_z Q(y, z))$

(b) What do you mean by Non-Monotonic reasoning systems ? What are the constituent components of such system ? Describe the inter-relation between the components of such system. [5]

- (c) Describe the concept of Backtracking with the help of a suitable program in PROLOG. [5]
- (d) What is Chinese Room test ? What is the purpose of Chinese Room test ? [5]

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