

**MASTER OF COMPUTER
APPLICATION (MCA) (REVISED)**

Term-End Examination

December, 2024

**MCSE-003 : ARTIFICIAL INTELLIGENCE AND
KNOWLEDGE MANAGEMENT**

Time : 3 Hours

Maximum Marks : 100

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

1. (a) Derive DNF for the expression given as follows : 5

$$\neg(P \vee \neg Q) \wedge (R \rightarrow S)$$

- (b) Write a Well Formed Formula (WFF) for the following : 5

(i) God loves everyone who loves someone.

(ii) Every person has a mother.

- (c) What are Learning Agents ? Briefly discuss their components. 5
- (d) Prove that : 5
- $$(p \rightarrow q) \wedge (\sim r \rightarrow \sim q) \wedge \sim r \rightarrow \sim p$$
- is a tautology, without using truth table.
- (e) What is Skolomization ? Briefly discuss the steps to perform skolomization. Why do we need to skolomize ? 5
- (f) Briefly discuss the 'Script' as a knowledge representation technique. 5
- (g) Differentiate between monotonic reasoning and non-monotonic reasoning. 5
- (h) Develop the knowledge base in PROLOG, to identify the following relations : 5
- (i) BROTHER
- (ii) GRANDFATHER
2. (a) Write Chinese room test. Which limitations of turing test are addressed by Chinese room test ? 5
- (b) Translate the following statements to FOPL : 5
- (i) Every one who saves money earns interest.
- (ii) If there is no interest, then nobody saves money.

- (c) Explain the following with suitable examples for each : $2\frac{1}{2} \times 4 = 10$
- (i) Modus Ponens
 - (ii) Modus Tollens
 - (iii) LAMBDA expression
 - (iv) CUT and FAIL
3. (a) Write a program in LISP to find the factorial of a number, entered by the user. Give comments in the program to explain your logic. 7
- (b) Use Resolution method to solve the following logic problem : 8
- (i) Some patients like all doctors.
 - (ii) No patient likes any quake.
 - (iii) Therefore, no doctor is quake.
- (c) Describe the concept of Backtracking with the help of a suitable program in PROLOG. 5
4. (a) What is an Expert System ? Explain the architecture of an Expert System. Create an expert system to infer, whether a student has secured poor, good, average or excellent marks in the examinations. 10

- (b) Differentiate between forward and backward chaining. What factors affect the decision to choose forward or backward chaining ? 7
- (c) Define a fuzzy function “Tall-man”. 3
5. (a) Briefly discuss the utility of semantic networks. Draw the semantic network for the statement given below : 8
- “John presented a shining ring to Anna in the garden last week.”
- (b) What are Closed World Assumptions ? What is the requirement of having such assumptions ? 7
- (c) List the limitations of using propositional logic to represent the knowledge base. 5

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