

MCA (Revised)
Term-End Examination

08793

June, 2015

**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.*

1. (a) What is Turing test ? What are the objections to the Turing test ? 5
- (b) If the propositions are as follows :
- P : He needs a doctor S : He is sick
Q : He needs a lawyer U : He is injured
R : He has an accident
- Represent the following formulae in English :
- (i) $(S \rightarrow P) \wedge (R \rightarrow Q)$
(ii) $P \rightarrow (S \vee U)$ 5
- (c) What are Agents in A.I. ? Briefly discuss the properties possessed by Agents. 5
- (d) Develop the knowledge base in PROLOG, to identify the following relations : 5
- (i) BROTHER
(ii) GRANDFATHER

- (e) Verify whether the knowledge base given below is complete or not : 5
- (i) P(a)
- (ii) P(b)
- (iii) $P(a) \rightarrow Q(a)$
- (f) Determine whether each of the following sentences are satisfactory, contradictory or valid : 5
- (i) $\sim(\sim A \rightarrow B)$
- (ii) $G : ((A \rightarrow B) \wedge (A \vee \sim B))$
- (g) Translate the following statements into clausal form : 4
- A1 : if X is on top of Y, Y supports X.
- A2 : if X is above Y, and they are touching each other, X is on top of Y.
- A3 : A cup is above a book.
- A4 : A cup is touching a book.
- (h) Briefly discuss the 'Script' as a knowledge representation technique. 6
2. (a) Skolomize the following : 6
- $$(\exists X_1) (\exists X_2) (\forall Y_1) (\forall Y_2) (\exists X_3) (\forall Y_3)$$
- $$P(X_1, X_2, X_3, Y_1, Y_2, Y_3)$$
- (b) Transform the following FOPL formula to Prenex Normal Form : 6
- $$(\forall_x) (\forall_y) ((\exists_z) Q(x, y, z) \wedge ((\exists_u) R(x, u) \rightarrow (\exists_v) R(y, v)))$$
- (c) 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.

3. (a) Use Resolution Refutation mechanism to deduce "GOD IS LOVED BY EVERYONE", the knowledge given to the system is as follows : 10
- (i) Assume God is loved by everyone who loves someone.
- (ii) Also assume that no one loves nobody.
- (b) Explain how the PROLOG system may respond to the following query : 5
- (i) ? - member (pascal, [prolog, fortran, cobol])
- (ii) ? - member (X, [X | -]) : - !
- (iii) ? - member (X, [- | Y]) : - member (X, Y)
- (c) Define your own function LEN in LISP that returns the number of top-most elements in a given list say L. 5
4. (a) Briefly discuss the CUT and FAIL mechanism used in PROLOG. Use the CUT mechanism to write a program to find the factorial of a number. 7
- (b) What are Rule based systems ? Briefly discuss the advantages and disadvantages of rule based systems. 6
- (c) How does Knowledge acquisition subsystem differ from Explanation subsystem ? Give example of each category of subsystem. 7

5. (a) What are Closed World Assumptions ?
What is the requirement of having such assumptions ? 7
- (b) Write the propositional syntax of the following inference rules : 6
- (i) Syllogism
 - (ii) Dilemma
 - (iii) Modus Ponens
- (c) Briefly mention some characteristics of any *two* of the following : 7
- (i) MYCIN
 - (ii) COMPASS
 - (iii) EMYCIN
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