**53 (IT 715) ARIN**

**2014**

# ARTIFICIAL INTELLIGENCE

**Paper : IT 715**

*Full Marks : 100*

Time : Three hours

***The figures in the margin indicate full marks for the questions.***

*Attempt **all** questions.*

1. Translate the following logical formulas (compound propositions) to English sentences :

   Proposition $P$ : Alice is smart

   Proposition $Q$ : Alice is honest

   *(i)* $\neg P \wedge Q$ 2

   *(ii)* $P \vee (\neg P \wedge Q)$ 2

   *(iii)* $P \rightarrow \neg Q$ 2

2. What is an Expert System ? How can an Expert System be distinguished from conventional computer system ? 2+2=4

3. Translate the following English sentences into First Order Logic

   *(i)* Every gardener likes the sun. 3

   *(ii)* All purple mushrooms are poisonous. 3

   *(iii)* Every elephant is gray. 3

   *(iv)* Someone is liked by every one. 3

   *(v)* For every $x$, if $x$ is a philosopher, then $x$ is a scholar. 3

4. What is a production system ? Discuss the computational cost of an AI production system in terms of 'Rule application cost' and 'Control strategy cost'. Also draw the graphical representation of 'Informedues *Vs* Computational cost' for 'control strategy cost', 'Rule application cost', and 'Overall cost.' 2+5+3=10

5. What is meant by Adverserial search ? Discuss min-max algorithm for searching a graph. 2+8=10

***OR***

(a) Explain 'Tautology' and 'Contradiction' in the context of AI with the help of suitable examples.

(b) Compare depth-limited search and iterative deepening. 5+5

6. (a) When do we say two propositions are logically equivalent ? 3

(b) Prove that $[\neg P \wedge (P \vee Q)]$ is a tautology : 3+4=7

(i) Using truth table

(ii) Logic equivalence laws.

7. What do you mean by Backward chaining in the context of AI ? Explain with the help of an example. 5+5=10

***OR***

What do you mean by Forward chaining in the context of AI ? Explain with the help of an example. 5+5=10

8. Draw appropriate neural networks for the following :

*(i)* AND operator 3

*(ii)* OR operator 3

*(iii)* XOR operator 5

9. Compare Abduction, Deduction and Induction in the context of AI. 9

10. Write notes on the following : 5×3=15

*(i)* Region Connection Calculus (RCC-8)

*(ii)* Alpha-Beta pruning

*(iii)* A-star algebrithm.