



(Following Paper ID and Roll No. to be filled in your Answer Book)

**PAPER ID : 214563**

Roll No. 

--	--	--	--	--	--	--	--	--	--

**M. C. A.**

**(SEM. V) (ODD SEM.) THEORY  
EXAMINATION, 2014-15  
ARTIFICIAL INTELLIGENCE**

Time : 3 Hours]

[Total Marks : 100

**Note :** Attempt all questions.

1 Attempt any **four** of the following : **5×4=20**

- a) Define the terms: Knowledge, Intelligence and Artificial Intelligence. Write the various applications of Artificial Intelligence.
- b) What is Turing test? Suppose you design a machine to pass the Turing test then what are the capabilities such a machine must have?
- c) Differentiate between simple-reflex agent and utility agent.
- d) Discuss the basic element of natural language processing.
- e) State and explain the Min-Max algorithm of game playing.
- f) Prove that A\* algorithm is optimal and complete.

- 2 Attempt any **four** of the following : **5×4=20**
- a) Difference between declarative and procedural knowledge representations.
  - b) Describe, briefly the "Heuristic search strategy" by applying on Traveling Salesman Problem also write the heuristic function for TSP.
  - c) What is Production System? What are the main components of a Production System, Explain each with example?
  - d) Describe, briefly the "Hill Climbing" search strategy, problems and solutions. Which heuristic function is used?
  - e) Show the state space representation for the solution of water jug problem with the capacity of two jugs as 3 and 4 and fill 2 liter water in 4 liter jug. Devise all the production rules.
  - f) Give an example of a problem for which breath first search would work better than depth first search. Write the differences between these two approaches.

- 3 Attempt any **two** of the following : **10×2=20**
- a) Convert following sentence into predicate logic and then prove "Marcus is dead" using resolution :
    - Marcus was a man.
    - Marcus was a Pompeian.
    - Marcus was born in 40 AD
    - All men are mortal
    - All Pompeian's died when the volcano erupted in 1979
    - No mortal lives longer than 150 years
    - It is now 1991
    - Alive means not dead.

- b) Consider the following sentences :
- John likes all kinds of food.
  - Apples are food.
  - Chicken is food
  - Anything anyone eats and isn't killed alive.
  - Sue eats everything bill eats.
- (i) Translate these sentences into formulas in predicate logic.
- (ii) Prove that John likes peanuts using backward chaining.
- c) Describe Bayesian networks. How is the Bayesian networks powerful representation for representing knowledge ?

4 Attempt any **two** of the following : **10×2=20**

- a) What do you understand by pattern recognition? Differentiate between structured description and symbolic description.
- b) Describe the role of Hidden Markov Model (HMM) in probabilistic reasoning.
- c) Write short notes on any **two** of the following :
- i. Supervised and Unsupervised Learning
  - ii. Reinforcement learning
  - iii. Principle Component Analysis (PLA).

5 Attempt any **two** of the following : **10×2=20**

- a) Define the concept of Expectation Maximization Algorithm. Explain the role of E-step and M-step in EM algorithm.

- b) What is clustering ? Describe k-means clustering technique with example.
- c) Write short notes on any **two** of the following :
- i. Support Vector Machine (SVM)
  - ii. Linear Discriminant Analysis
  - iii. Bayesian Classifier.
-