ROLL NO. _____

# Code: AC74/AT74/AC123/AT123
# Subject: ARTIFICIAL INTELLIGENCE & NEURAL NETWORKS

## AMIETE – CS/IT (Current & New Scheme)

**Time: 3 Hours** **December -2016** **Max. Marks: 100**

***PLEASE WRITE YOUR ROLL NO. AT THE SPACE PROVIDED ON EACH PAGE IMMEDIATELY AFTER RECEIVING THE QUESTION PAPER.***

**NOTE: There are 9 Questions in all.**

- **Question 1 is compulsory and carries 20 marks. Answer to Q. 1 must be written in the space provided for it in the answer book supplied and nowhere else.**
- **The answer sheet for the Q.1 will be collected by the invigilator after 45 minutes of the commencement of the examination.**
- **Out of the remaining EIGHT Questions answer any FIVE Questions. Each question carries 16 marks.**
- **Any required data not explicitly given, may be suitably assumed and stated.**

**Q.1 Choose the correct or the best alternative in the following: (2×10)**

a. What is Artificial intelligence?
**(A)** Putting your intelligence into Computer
**(B)** Programming with your own intelligence
**(C)** Making a Machine intelligent
**(D)** Playing a Game

b. Which search method takes less memory?
**(A)** Depth-First Search **(B)** Breadth-First search
**(C)** Both **(A)** and **(B)** **(D)** Linear Search

c. In A* approach evaluation function is
**(A)** Heuristic function
**(B)** Path cost from start node to current node
**(C)** Path cost from start node to current node + Heuristic cost
**(D)** Average of Path cost from start node to current node and Heuristic cost

d. The term _____ is used for a depth-first search that chooses values for one variable at a time and returns when a variable has no legal values left to assign.
**(A)** Forward search **(B)** Backtrack search
**(C)** Hill algorithm **(D)** Reverse-Down-Hill search

e. Semantic Network represents
**(A)** Syntactic relation between concepts
**(B)** Semantic relations between concepts
**(C)** Both **(A)** and **(B)**
**(D)** Neither **(A)** nor **(B)**

f. Knowledge and reasoning also play a crucial role in dealing with _____ environment.
**(A)** Completely Observable **(B)** Partially Observable
**(C)** Neither **(A)** nor **(B)** **(D)** Only **(A)** and **(B)**

g. Which search is similar to minimax search?
**(A)** Hill-climbing search **(B)** Depth-first search
**(C)** Breadth-first search **(D)** All of these

h. What kind of clauses are available in Conjuctive Normal Form?
**(A)** Disjunction of literals **(B)** Disjunction of variables
**(C)** Conjuction of literals **(D)** Conjunction of variables

i. A perceptron is:
**(A)** a single layer feed-forward neural network with pre-processing
**(B)** an auto-associative neural network
**(C)** a double layer auto-associative neural network
**(D)** a neural network that contains feedback

g. Why is the XOR problem exceptionally interesting to neural network researchers?
**(A)** Because it can be expressed in a way that allows you to use a neural network
**(B)** Because it is complex binary operation that cannot be solved using neural networks
**(C)** Because it can be solved by a single layer perceptron
**(D)** Because it is the simplest linearly inseparable problem that exists.

**Answer any FIVE Questions out of EIGHT Questions.**
**Each question carries 16 marks.**

**Q.2** a. Explain Turing test. List major AI technologies. **(6+2)**

b. Explain in detail with examples supervised and unsupervised learning in neural networks. Illustrate feed forward neural network architecture with diagram. **(3+3+2)**

**Q.3** a. What is traveling salesperson problem? How can it be solved? Explain Heuristic function. **(3+3+2)**

b. What are expert systems? Explain the various components and give conceptual diagram for the same. **(2+6)**

**Q.4** a. Specify a global database, rules, termination condition and solution for a production system to solve the following water jug problem.

**Water Jug Problem:** Given an unmarked 4 litre jug filled with water and an empty unmarked 3 litre jug. How can one obtain precisely 2 litre water in 3 litre jug? Water may either be discarded or poured from one jug to another or fill with water pump. **(2+2+2+2)**

b. What are the desirable properties of knowledge representation systems? Explain Logical and procedural knowledge representation methods. **(2+3+3)**

**Q.5** a. What are semantic networks? Explain with an example. Give semantic network representation of the sentence: *John gave Mary the book.* **(3+2+3)**

b. What is uncertain reasoning? Explain with an example. Explain non-monotonic reasoning. **(4+4)**

**Q.6** a. A factory production line is manufacturing bolts using three machines, A, B and C. Of the total output, machine A is responsible for 25%, machine B for 35% and machine C for the rest. It is known from previous experience with the machines that 5% of the output from machine A is defective, 4% from machine B and 2% from machine C. A bolt is chosen at random from the production line and found to be defective. State Baye's theorem. What is the probability that it came from (i) machine A (ii) machine B (iii) machine C? **(2+2+2+2)**

b. Explain two blind search techniques. Illustrate in detail hill climbing strategy.**(2+2+4)**

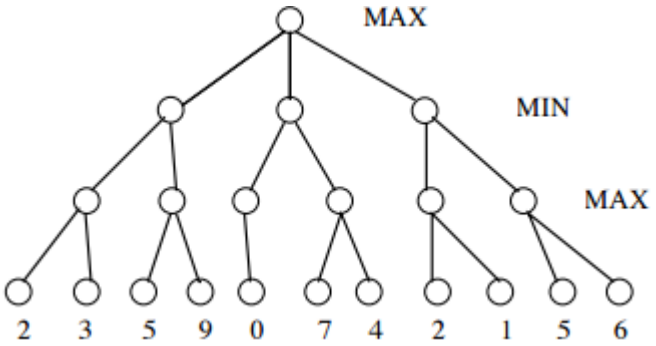
**Q.7** a. Consider the following axioms:

1. All hounds howl at night.
2. Anyone who has any cats will not have any mice.
3. Light sleepers do not have anything which howls at night.
4. John has either a cat or a hound.

Prove following using predicate logic resolution theorem:
"If John is a light sleeper, then John does not have any mice. **(8)**

b. Explain the perception training and learning algorithm with examples. **(4+4)**

**Q.8** a. A partial search tree for a two player game is given below.
(i) Find the best move for the MAX player using the minimax procedure.
(ii) Using alpha-beta pruning show which parts of the tree do not need to be searched. Indicate where the cutoffs occur. **(3+5)**




b. Give four prominent features of comparison between conventional computers and neural networks. **(8)**

**Q.9** a. Explain constraint satisfaction algorithm. Show the application of this algorithm in solving following crypt-arithmetic puzzle: (such that unique number is assigned to each alphabet between 0-9 ) **(8)**

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  TWO
  TWO+
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 FOUR
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b. Explain in detail how AI has contributed to medicine. Illustrate your answer with suitable examples. **(8)**