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

AMIETE – CS/IT (Current & New Scheme)

Time: 3 Hours | **June 2018** | 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) Making a Machine intelligent
   (C) Programming with your own intelligence
   (D) Playing a Game

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

c. The traveling salesman problem involves n cities with paths connecting the cities. The time taken for traversing through all the cities, without knowing in advance the length of a minimum tour, is
   (A) O(n)   (B) O(n2)
   (C) O(n/2)   (D) O(n!)

d. _____ is a structured representation describing a stereotype sequence of events in a particular context.
   (A) Frame   (B) Primitives
   (C) Script   (D) Task

e. What is called as exploration problem?
   (A) State and actions are known to the agent
   (B) State and action are unknown to the agent
   (C) Only actions are known to the agent
   (D) Both (B) & (C)

f. Which is the single processing operator with 2 inputs?
   (A) XOR   (B) OR
   (C) AND   (D) Both (B) and (C)

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g. A computer vision technique that relies on image template is
   (A) Model-based vision   (B) Binocular vision
   (C) Edge detection   (D) Robot vision

h. The field that investigates the mechanics of human intelligence is:
   (A) history   (B) psychology
   (C) cognitive science   (D) sociology

i. Let Love(y,x) represent y loves x in predicate calculus. If $\forall$(.) represents a universal quantifier and $\exists$(.) represents an existential quantifier, which one of the following will be a correct representation for *Everyone is loved by someone.*

   (A) $\forall$(y) $\exists$(x) Love (y,x)   (B) $\forall$(x) $\exists$(y) Love (y,x)
   (C) $\forall$(y) $\exists$(x) (x -> Love (y,x))   (D) $\forall$(y) $\forall$ (x) Love (y,x)

j. Let $P(G \wedge T) = 1/3$ and $P(T) = 2/3$, then $P(G/T) =$
   (A) 2/9   (B) 1/3
   (C) 1/2   (D) 2/3

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

Q.2 a. Discuss the term artificial intelligence as defined by various scientists and researchers. How it is useful in computer science? Explain. **(8)**

   b. Using Truth Table, Prove that $P \Leftrightarrow Q$ is equivalent to $(P \Rightarrow Q) \wedge (Q \Leftarrow P)$ **(4)**

   c. Assume the following facts: **(4)**
   If it is not humid then it will rain
   If it is humid, then it is hot.
   It is humid now.
   Using the propositional logic inference, answer the question, will it rain?

Q.3 a. Attempt to unify the following pairs of expression. Either show their most general unifiers or explain why they will not unify. **(8)**
   (i) p(X,Y) and p(a, Z)
   (ii) p(X,X) and p(a, b)
   (iii) ancestor (X, Y) and ancestor (bill, father (bill)
   (iv) ancestor (X, father (X)) and ancestor (david, George)
   (v) q(X) and ¬ q(a)
   (vi) p(X, a, Y) and p(Z, Z, b)

   b. Consider the following sentences: **(4+4)**
   (i)   John likes all kinds of food.
   (ii)   Apple is food.
   (iii) Chicken is food.
   (iv)   Anything anyone eats and is not killed by is food.
   (v)   Bill eats peanuts and is still alive.
   (vi)   Sue eats everything Bill eats.

   a. Translate these sentences into formulas in predicate logic.
   b. Covert the formula of (a) into clausal form.

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Q.4 a. Explain with the help of diagram the procedure for knowledge acquisition. **(8)**

b. Write short notes on the following:- **(8)**
   (i) Semantic Networks
   (ii) Conceptual Graphs

Q.5 a. Explain Hybrid representation systems. **(8)**

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

Q.6 a. Using Uniform Cost Search, find the shortest route from S to G of the following graph. Explain each step. **(8)**
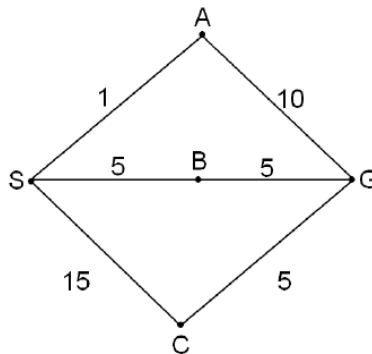
b. Explain heuristic search techniques briefly. Describe how it is applied in branch-and-bound search procedure? **(8)**

Q.7 a. How do expert systems differ from conventional programs? Discuss the architecture of Expert System and explain its components. **(4+4)**

b. Discuss the following learning situations of Artificial Neural Networks:
   (i) Supervised   (ii) Unsupervised Learning. **(4+4)**

Q.8 a. Write the description and their application for the following network architectures? **(3×4)**
   (i) ADALINE (Adaline Network)
   (ii)HOPFIELD (Hopfield Model)
   (iii)BAM (Bidirectional Associative Memory)
   (iv)CPN (Counter-Propagation Network)

b. Compare and contrast between Neural Networks and Expert systems in terms of knowledge representation, acquisition and explanation. **(4)**

Q.9 a. There are different types of clinical task to which Artificial Intelligence can be applied. Explain any such four tasks. **(8)**

b. Explain briefly, what you understand by the term 'Automony in the context of multiagent systems? **(8)**