ROLL NO. _____

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

AMIETE – CS/IT (Current & New Scheme)

Time: 3 Hours **DECEMBER 2015** **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. _____ was one of the first programs to address the problems of reasoning with uncertain or incomplete information.

(A) DENDRAL **(B)** MYCIN
(C) CYCORP **(D)** ELIZA

b. Consider the following facts where we represent them as:
"Humidity is high" by P,
"Temperature is high" by Q', and
"One feels comfortable" by C.
Then the sentence "If the humidity is high and the temperature is high, then one does not feel comfortable" may be represented by:

(A) $((P \wedge Q) \rightarrow (\sim C))$ **(B)** $((P \vee Q) \rightarrow (\sim C))$
(C) $((P \wedge Q) \rightarrow (C))$ **(D)** $((P \wedge \sim Q) \rightarrow (\sim C))$

c. _____ is a structured representation describing a stereotype sequence of events in a particular context.

(A) Frame **(B)** Primitives
(C) Task **(D)** Script

d. Knowledge in any speciality is usually of two types

(A) Private & Public Knowledge **(B)** Private & Protected Knowledge
(C) Public & Protected Knowledge **(D)** All of these

e. Name the frame-based knowledge representation, written in CommonLISP, which provides the basic mechanisms of frames, inheritance, demos, and views?

(A) FrameKit **(B)** Theo
(C) Krypton **(D)** Yak

f. Knowledge =

(A) Facts **(B)** Facts + Beliefs

(C) Facts + Beliefs + Success **(D)** Facts + Beliefs + Heuristics

g. In MINIMAX procedure, the process of determining the quality of the number is known as

(A) Static evaluation **(B)** Dynamic evaluation

(C) Searching **(D)** Minimizing

h. The decay of nerve cells does not seem to affect the performance significantly suggest which features of Biological Neural Networks?

(A) Robustness and fault tolerance

(B) Flexibility

(C) Ability to deal with a variety of data situations

(D) Collective computation

i. The SOM or Kohonen network uses _____, and hence is applicable to different types of problems

(A) Supervised learning **(B)** Structural learning

(C) Unsupervised learning **(D)** Temporal learning

j. ASIMO stands for

(A) Accurate Step in Innovative Mobility

(B) Advanced Step in Innovative Mobility

(C) Advanced Step in Innovative Mobile

(D) Advanced Start in Innovative Mobility

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

Q.2 a. Define Artificial Intelligence. What are the objectives of AI research? **(8)**

b. Briefly describe the following applications area of Artificial Intelligence: **(2×4)**

(i) Intelligent retrieval from Databases

(ii)Combinatorial and scheduling Problems

Q.3 a. Let G and H be two formulas. Consider the truth values of the formulas generated over G and H are given as:

- ~G is *true* when G is *false*, and is *false* when G is *true*. G is called the *negation* of G.
- (G ∧ H) is *true* if G and H are both *true*; otherwise, (G ∧ H) is *false*. (G ∧ H) is called the *conjunction* of G and H.
- (G ∨ H) is *true* if at least one of G and H is *true*; otherwise, (G ∨ H) is *false*. (G ∨ H) is called the *disjunction* of G and H.
- (G → H) is *false* if G is *true* and H is *false*; otherwise, (G → H) is *true*. (G → H) is read as "If G, then H", or "G implies H".
- (G ↔ H) is *true* whenever G and H have the same truth values; otherwise, (G ↔ H) is *false*.

Represent the above relations by means of truth-table. **(4)**

b. List and describe the properties of well-formed formulas (WFFs)? **(6)**

c. Write some strategies that are helpful in building rule-based expert systems. **(6)**

Q.4 a. With the help of a diagram, explain the procedure for knowledge acquisition. **(6)**

b. Discuss Semantic Networks. Draw the semantic network intended to represent the following data:

- Tom is a cat.
- Tom caught a bird.
- Tom is owned by John.
- Tom is ginger in colour.
- Cats like cream.
- The cat sat on the mat.
- A cat is a mammal.
- A bird is an animal.
- All mammals are animals.
- Mammals have fur. **(10)**

Q.5 a. What are the main features of Knowledge Representation Languages? **(4)**

b. Explain the following hybrid representation systems: **(2×4)**

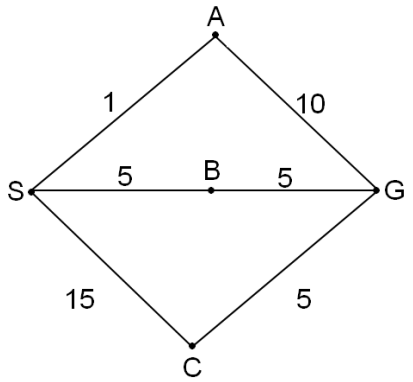
(i) COLAB

(ii) YAK

c. What are the basic ideas behind Bayesian Network? How it is implemented? **(4)**

Q.6 a. Explain the basic procedure for solving a problem in AI? **(5)**

b. Using Uniform Cost Search, find the shortest route from S to G of the following graph. Explain each step. **(6)**



c. Write the procedure for BRANCH-AND-BOUND with UNDERESTIMATES. **(5)**

Q.7 a. Differentiate between expert systems and conventional programs. **(4)**

b. Based on the characteristics, how the learning algorithms can be categorized? **(8)**

c. What are the features of Biological Neural Networks? **(4)**

Q.8 a. What are the limitations of Neural computing? **(4)**

b. Write the description and their application for the following network architectures?

(i) ADALINE (Adaline Network)

(ii)HOPFIELD (Hopfield Model)

(iii)BAM (Bidirectional Associative Memory)

(iv)CPN (Counter-Propagation Network) **(3×4)**

Q.9 a. Explain the different AI approaches for product selection and recommendation that are useful in B2C e-commerce. **(6)**

b. What are the different types of clinical task to which expert systems can be applied?**(6)**

c. Explain TravelPlan architecture that integrates different types of agents. **(4)**