END SEMESTER EXAMINATION, 2020
Semester: 6th
Subject code: CO-606
Subject: Artificial Intelligence
Full marks : (part A – 25 + part-- 45)
Duration : 3 hours

ALL QUESTIONS OF PART-A ARE COMPULSORY

ANSWER ANY FIVE QUESTIONS FROM PART-B

Part A- 25 MARKS

1. Fill in the blanks. $10 \times 1 = 10$

a) FOPL stands for .....
b) ..... and Test is an example of Heuristics Search algorithms
c) ..... Hill Climbing selects a neighbouring node at random.
d) AI learning models can be classified in two main types ..... and .....
e) There are ..... major classes of Production System in Artificial Intelligence.
f) ..... is the process of heating and cooling a metal to change its internal structure for modifying its physical properties.
g) In PROLOG, A compound term consists of a .....
h) A proposition formula which is always false is called .....
i) Two methods used in analogical problem solving are, transformational and ..... analogy.

2. State TRUE or FALSE. $10 \times 1 = 10$

a) DENDRAL is an example of Expert System.
b) PROLOG is an object oriented programming language.
c) Expert systems are highly reproducible.
d) FeedForward ANN contains feedback connections.
e) Meta Knowledge defines knowledge about other types of Knowledge.
f) Implications are also known as if-then rules.
g) Semantic networks work as an alternative of predicate logic for knowledge representation.
h) Markov algorithm is not a string rewriting system that uses grammar-like rules to operate on strings of symbols
i) The greedy best first algorithm is implemented by the priority queue.
j) A *heuristic* is a method that is not guaranteed to find a good solution in reasonable time

3 . Select the correct answer $5 \times 1 = 5$

i) What is AI?

a) Programming with your own intelligence
b) Putting your knowledge into computer
c) Making a machine intelligent
d) Playing a game

ii) What is the name of the computer program that contains the distilled knowledge of an expert ?

a) Management information system.
b) Expert system
c) Database management system

d) Artificial intelligence.

iii) Which is not the commonly used programming language for AI?
a) Prolog
b) LISP
c) Java script
d) Perl

iv) In a rule-based system, procedural domain knowledge is in the form of:
a) production rules
b) rule interpreters
c) meta-rules
d) control rules

v) Which of the following, is a component of an expert system ?
a) Inference engine
b) Knowledge base
c) User interface
d) All of the above

Part B – 45 marks

4. a) What is an Expert System ? Write the characteristics of an Expert System. 2+3=5
b) Define atoms, numbers, variables and compound terms used in PROLOG. 4

5 a) Define Heuristic search. 2
b) Write the Hill climbing heuristic search algorithm. 5
c) Define an artificial neuron network. 2

6 a) Write the Markov algorithm. 4
b) Express the following facts in clause form 5
a) Anyone whom Mary loves is a football star.
b) Any student who does not pass does not play.
c) John is a student.

7 a). Determine whether the following is a Tautology or not : 4
$(P \rightarrow Q) \vee (Q \rightarrow P)$
b) State the relationship between Intelligence and Knowledge. 5

8 a). Give an explanation on the difference between strong AI and weak AI? 4
b) . Define Discovery, analogy and formal learning theory 5
9. Consider the following axioms: 9

Every child loves Santa.
Everyone who loves Santa loves any reindeer.
Rudolph is a reindeer, and Rudolph has a red nose.
Anything which has a red nose is weird or is a clown.
No reindeer is a clown.
Scrooge does not love anything which is weird.
(Conclusion) Scrooge is not a child.

a) Represent these axioms in first order predicate logic.
b) Convert each formula to clause form.

c) Prove that "Scrooge is not a child" using resolution technique. Draw the resolution tree.

10. What are the elements of an Expert System ? Explain in details. 2+ 7 =9

11) What is Genetic Algorithm ? Explain the various phases of Genetic Algorithm. 2+7= 9

12) Given an initial state of a 8-puzzle problem and final state to be reached- 9

2	8	3
1	6	4
7		5

Initial State

1	2	3
8		4
7	6	5

Final State

Find the most cost-effective path to reach the final state from initial state using A* Algorithm.

Consider g(n) = Depth of node and h(n) = Number of misplaced tiles.

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