Uva Wellassa University of Sri Lanka
Faculty of Science and Technology
Department of Computer Science and Technology
300 level 1st Semester Examination – May/July 2017
CST361-3 Artificial Intelligent Systems

Uva Wellassa University

Instructions to candidates
Duration: Two (02) hours
Number of questions: Five (05)
Answer four (04) questions only
Mark allocation: 100

1.

a. Depict structures of Model-based reflex, Goal-based and Utility-based agents. (15 mark)

b. Give examples to performance measure, environment, actuators and sensors of an intelligent taxi driver agent. (4 mark)

c. Differentiate the following environment types of intelligent agents.
   i. Fully observable vs partially observable
   ii. Static vs dynamic
   iii. Episodic vs sequential

(6 mark)

2.

a. Describe initial state, actions, transition model, goal test and path cost by considering a real world example. (5 mark)

b. Differentiate depth-limit and iterative deepening depth-first search? (5 mark)

c. Critically evaluate completeness and optimality of breadth first and depth first search algorithms. (5 mark)

d. Describe how to work bidirectional search? (5 mark)

e. Explain advantages of Greedy search algorithm compared with A* search algorithm using an example. (5 mark)

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3.

a. Prove the implication elimination logical equivalence by a truth table of two (02) variables. (5 mark)

b. Define logical equivalence by entailment. (5 mark)

c. Giving all the steps, reduce the formula $(\neg p \rightarrow q) \rightarrow (q \rightarrow \neg r)$ to conjunctive normal form. (5 mark)

d. Draw a proof tree generated by forward chaining to the following paragraph for proving that Sirimal is a criminal.
The law says that it is a crime for a Sri Lankan to sell weapons to hostile nations. The country C1, an enemy of Sri Lanka, has some missiles, and all of its missiles were sold to C1 by Sirimal, who is a Sri Lankan. (10 mark)

4.

a. Differentiate supervised and unsupervised learning. (6 mark)

b. Explain main task of Train, Validation and Test data set used in machine learning algorithms. (6 mark)

c. Describe how to use entropy value in Decision Trees. (6 mark)

d. Depict main steps of K-means algorithm. (7 mark)

5.

a. Illustrate the basic structure of a rule-based expert system. (6 mark)

b. Compare forward and backward chaining rule-based expert systems. (4 mark)

c. Name five (05) conflict resolution strategies used in inference process of expert systems. (5 mark)

d. Consider the following expert systems whose database consists of the facts A, B, C, D, E and whose knowledge base is given by the rules below. Show how backward chaining can be applied to this system to reach the conclusion Z.

Rule 1: IF A is true
AND C is true
THEN B is true

Rule 2: IF C is true
AND D is true
THEN F is true

Rule 3: IF C is true
AND D is true
AND E is true
THEN X is true

Rule 4: IF A is true
AND B is true
AND X is true
THEN Y is true

Rule 5: IF D is true
AND Y is true
THEN Z is true

(10 mark)