Uva Wellassa University of Sri Lanka
Faculty of Science and Technology
Department of Science and Technology
400 level 1st Semester Examination – Jul./ Aug. 2016
SCT466-2 Intelligent Systems

Uva Wellassa University

Instructions to candidates:
Duration: 02 hours
Number of questions: Four (04)
Answer all questions
Mark allocation: 100

1.

a. Discuss why Artificial Intelligence (AI) approach is significant over traditional approaches. (3 mark)

b. Explain the concept of 'Four Schools of Thoughts' in AI using appropriate examples. (8 mark)

c. List five (05) key milestones found in the evolution of Artificial Intelligence during the 20th century. (5 mark)

d. Explain how the 'Turing Test' can be used to evaluate the 'intelligence' of intelligent systems. (4 mark)

e. Predict the possible social impacts of Artificial Intelligence in a future context of 'man-machine co-existence'. (5 mark)

2.

a. Distinguish between the uninformed and informed search algorithms. (6 mark)

b.

i. Specify the four (04) criteria used to evaluate a typical search algorithm. (4 mark)

ii. Compare and contrast the Breadth First Search (BFS) and Depth First Search (DFS) search algorithms according to the evaluation criteria written in part i. (8 mark)

c.

i. What is the major drawback of Depth First Search (DFS) search algorithm? (3 mark)

ii. Explain how the drawback identified in part i. can be rectified by introducing an alternative search algorithm called 'Depth – Limited Search'. (4 mark)

3.

a. Identify the major genetic operations in a typical Genetic Algorithm. (3 mark)

b. What are the key steps to be followed to implement a Genetic Algorithm as a computer program? (5 mark)

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c. Explain different types of cross-overs can occur in Genetic Algorithm using appropriate examples. (6 mark)

d. Discuss how to overcome the following issues encountered in Fitness Proportionate Selection (FPS) by taking due precautions in early stages.
   i. Pre-Mature convergence
   ii. Stagnation (6 mark)

e. How mutation contributes for the evolution by the meaning of reducing the error over time? (5 mark)

4.

a. A motor attached to an electric pump fixed on an automated fire control vehicle is driven based on the input fuzzy membership function (intensity of the fire) illustrated in Figure 01.

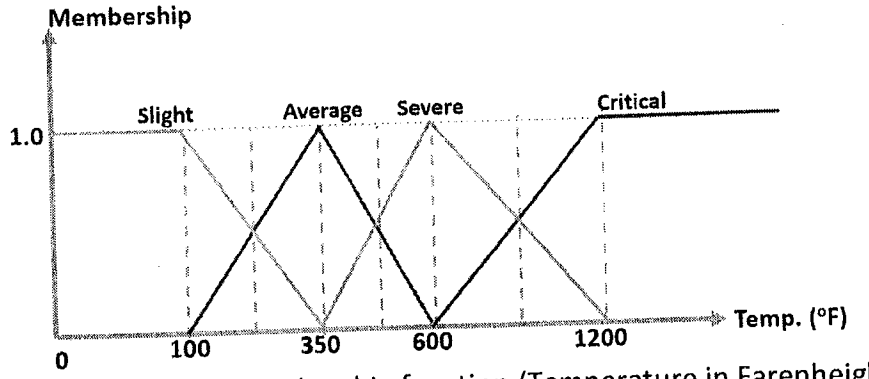

Figure 01: Input fuzzy membership function (Temperature in Farenheights)

The following set of fuzzy rules are used to determine the revolutions per minute (rpm) of the motor:

- IF **Slight** then **Slow**
- IF **Average** then **Medium**
- IF **Severe** then **Fast**
- IF **Critical** then **Utmost**

The corresponding rpm values for each input value is referred from an output fuzzy membership function given in Figue 02.

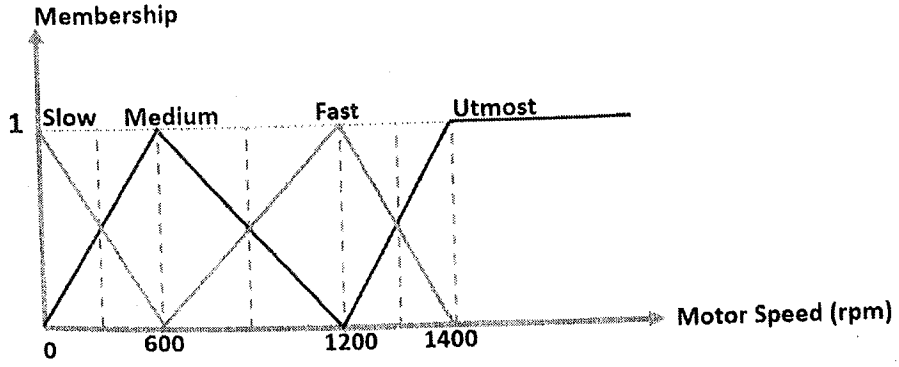

Figure 02: Output fuzzy membership function (speed of the motor)

Find the corresponding rpm values of the motor for the following temperature values:

i. 70 °F
ii. 200 °F
iii. 900 °F
iv. 1100 °F
v. 1200 °F

(15 mark)

b. Assess the feasibility of implementing a better and sophisticated motor control system by combining fuzzy logic and the control theory.
(Hint: focus on Proportional-Integral-Derivative (PID) controllers)

(10 mark)