

Bachelor Level / fourth-semester / Science  
Computer Science and Information Technology (CSC262)  
Theory of Computation

Candidates are required to give their answers in their own words as far as practicable.  
The figures in the margin indicate full marks.

### Section A

Attempt any Two questions. (2x10=20)

- 1** How can you relate synapse, dendrite, and axon in biological neural networks with the elements of artificial neural networks? Create a multi-layer ANN with input layer, hidden layer, and output layer. Assume necessary inputs and weights to the ANN and illustrate a single iteration of backpropagation algorithm to train the ANN.
- 2** What is Skolem constant? How is Skolemization done during resolution? Represent the following statements into FOPL. All movies are not hit. Sarangi is a movie. All movies which have good script are hit. Sarangi has a good script but Sarangi is sentimental. There is a movie which is comedy.
- 3** How is informed search different from uninformed search? Create a state space with appropriate heuristics, now illustrate how hill climbing search expands nodes to reach a goal. Modify the state space heuristics and demonstrate when the hill climbing will not be complete.

### Section B

Attempt any Eight questions. (8x5=40)

- 4** What is intelligence? Describe the foundation of AI.
- 5** What is reinforcement learning? Configure an ANN neuron to simulate OR gate.
- 6** How uniform cost search is used to search goal in the state space? Illustrate with example.
- 7** How can you represent knowledge using scripts? Create a knowledge base using script based on your own assumption.
- 8** What is reinforcement learning? Configure an ANN neuron to simulate OR gate.
- 9** What is robotics? How machine vision is used in robotics?
- 10** Define fuzzy logic. Construct a fuzzy rule base expert system with your own considerations of fuzzy set.
- 11** How is minmax algorithm used in game search? Consider state space is defined by a collection of pairs like (A, B) representing paths between states A and B. Construct state space for following and use a minmax algorithm (A, B), (A, C), (B, D), (D, E), (C, F), (C, G), (D, H), (D, I), (E, J), (F, K), (F, L), (G, M), (G, N). The utilities for states H, I, J, K, L, M, N are 1, 3, 2, 6, 3, 4, 1 respectively.