

2023

COMPUTER SCIENCE — HONOURS

Paper : DSE-B-3

(Introduction to Computational Intelligence)

Full Marks : 50

The figures in the margin indicate full marks.

*Candidates are required to give their answers in their own words
as far as practicable.*

Answer **question no. 1** and **any four** from the rest.

1. Answer **any five** questions : 2×5
- (a) Differentiate uninformed search and informed search techniques.
 - (b) Mention four uses of computational intelligence.
 - (c) Differentiate between weak AI and strong AI.
 - (d) Explain game tree, initial state, terminal state, utility function with respect to the context of minmax algorithm.
 - (e) How is game theory important in AI?
 - (f) Define Artificial neural network.
 - (g) Define rough set. Give an example.
 - (h) What do you understand by fuzzy logic?
2. Discuss the following search technique with the help of an example. Also discuss the benefits and short-coming of each.
- (a) Breadth first search
 - (b) Depth first search. (4+4)+2
3. (a) Write down the steps of A^* algorithm.
- (b) Why is A^* search algorithm preferred for goal state?
 - (c) What is heuristic function? 5+3+2
4. (a) Explain artificial neuron.
- (b) Explain about back propagation network.
 - (c) Why is Hopfield network called a recurrent neural network? 3+5+2

Please Turn Over

5. (a) Differentiate between fuzzy set and crisp set.
 (b) Explain the following components of fuzzy logic system.
 (i) Fuzzyfication
 (ii) Defuzzyfication.

2+4+4

6. Two fuzzy sets are given as—

$$\tilde{A} = \{(x, 0.4), (y, 0.6), (z, 0.8)\}$$

$$\tilde{B} = \{(x, 0.3), (y, 0.2), (z, 0.9)\}$$

Find the following :

(a) $\tilde{A} \cap \tilde{B}$

(b) $\tilde{A} \cup \tilde{B}$

(c) \tilde{A}^C

(d) \tilde{B}^C

(e) $(\tilde{A} \cup \tilde{B})^C$.

2×5

7. (a) Explain fuzzy relation with an example.

- (b) Prove that $(\tilde{A} \cap \tilde{B})^C = \tilde{A}^C \cup \tilde{B}^C$ and $(\tilde{A} \cup \tilde{B})^C = \tilde{A}^C \cap \tilde{B}^C$, where \tilde{A} and \tilde{B} are two fuzzy sets defined as

$$\tilde{A} = \{(x, 0.3), (y, 0.4)\}$$

$$\tilde{B} = \{(x, 0.6), (y, 0.2)\}$$

2+4+4

8. (a) Discuss iterative deepening search in artificial intelligence with an example.
 (b) Differentiate between iterative deepening search and depth first search.

7+3