

**INSTITUTE OF AERONAUTICAL ENGINEERING**

(Autonomous)

Dundigal-500043, Hyderabad

B.Tech VIII SEMESTER END EXAMINATIONS (REGULAR) - JUNE 2022

Regulation: R18

SOFT COMPUTING

Time: 3 Hours

(Common to CSE | IT)

Max Marks: 70

Answer FIVE Questions choosing ONE question from each module
(NOTE: Provision is given to answer TWO questions from any ONE module)

All Questions Carry Equal Marks

All parts of the question must be answered in one place only

MODULE – I

1. (a) Give brief description about fuzzy rules and fuzzy control. Determine the logics used in fuzzy computing. [BL: Understand| CO: 1|Marks: 7]
(b) Analyse the need of knowledge representation and reasoning with the suitable example. [BL: Understand| CO: 1|Marks: 7]
2. (a) What is soft computing? Summarize the fields that constitute soft computing and explain. [BL: Understand| CO: 1|Marks: 7]
(b) Point out components of evolutionary algorithms and explain it. Discuss the goals of soft computing. [BL: Understand| CO: 1|Marks: 7]

MODULE – II

3. (a) Elaborate the biological neuron with neat sketch. Describe delta learning rule for feed forward multilayer perceptron in detail [BL: Understand| CO: 2|Marks: 7]
(b) Find the weights required to perform the following classifications using perceptron network:
The vectors (1, 1, -1, -1) and (1, -1, 1, -1) are belonging to a class having target value 1. The vectors (-1, -1, -1, 1) and (-1, -1, 1, 1) are belonging to a class having target value -1. Assume learning rate 1 and initial weights as 0. [BL: Apply| CO: 2|Marks: 7]
4. (a) Demonstrate the types of activation functions with necessary diagram. List the difference between ADALINE and MADALINE. [BL: Understand| CO: 2|Marks: 7]
(b) Describe in detail the perceptron convergence theorem. Show that $w(k+1) = p(1)+p(2)+\dots+p(k)$ [BL: Understand| CO: 2|Marks: 7]

MODULE – III

5. (a) What is Fuzzy Inference System (FIS)? Describe an single-input Tsukamoto fuzzy model and sugeno fuzzy model with examples and neat sketch. [BL: Understand| CO: 3|Marks: 7]
(b) “Universal fuzzy set can also be called whole fuzzy set” Justify the statement. Discuss on Fuzzy set operations. [BL: Apply| CO: 3|Marks: 7]
6. (a) “The identification of the surface structure is the prior step to identification of deep structure”. State whether true or false. Justify the answer with the steps involved in both the tasks. [BL: Understand| CO: 4|Marks: 7]

(b) Consider 2 given fuzzy sets

[BL: Apply| CO: 4|Marks: 7]

$$B_1 = \frac{1}{1.0} + \frac{0.75}{1.5} + \frac{0.3}{2.0} + \frac{0.15}{2.5} + \frac{0}{3.0}$$

$$B_2 = \frac{1}{1.0} + \frac{0.6}{1.5} + \frac{0.2}{2.0} + \frac{0.1}{2.5} + \frac{0}{3.0}$$

Perform i) $B_1 \cup B_2$ ii) $B_1 \cap B_2$ iii) $\overline{B_1}$ iv) $\overline{B_2}$
v) $B_1 | B_2$ vi) $\overline{B_1} \cup \overline{B_2}$ vii) $\overline{B_1} \cap \overline{B_2}$ viii) $B_1 \cup \overline{B_1}$
ix) $B_1 \cap \overline{B_1}$

MODULE – IV

7. (a) Consider any fuzzy model and draw its equivalent ANFIS architecture and explain it.

[BL: Understand| CO: 5|Marks: 7]

(b) Demonstrate hybrid learning algorithm with the neat architecture diagram.

[BL: Understand| CO: 5|Marks: 7].

8. (a) Demonstrate the structure of sugeno ANFIS with the neat sketch. Mention any four applications of ANFIS and explain them.

[BL: Understand| CO: 5|Marks: 7]

(b) Construct an ANFIS that is equivalent to a two-input two-rule mamdani fuzzy model with min max composition and centroid defuzzification. Explain the function user use to approximate the centroid defuzzification.

[BL: Apply| CO: 5|Marks: 7]

MODULE – V

9. (a) What is computational intelligence? Demonstrate inverse kinematics problems of planar robot in detail.

[BL: Understand| CO: 6|Marks: 7]

(b) Describe in detail about single MLP approaches. List out the applications of soft computing in mobile-adhoc networks.

[BL: Understand| CO: 6|Marks: 7]

10. (a) Write about soft computing in semantic web. Discuss in detail about the evolutionary computing.

[BL: Understand| CO: 6|Marks: 7]

(b) Explain input-output relation in typical color recipe prediction. List out the applications of soft computing in software engineering.

[BL: Understand| CO: 6|Marks: 7]

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