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P111-234 (ISE/ESE)

December 2021 / INSEM+ENDSEM
F. Y. M. TECH. (COMPUTER ENGINEERING) (SEMESTER – I)

COURSE NAME: SOFT COMPUTING

COURSE CODE: CSPA-11204 A

(PATTERN 2020)

Time: [3 Hours]

[Max. Marks: 60]

- 1) **All Questions are compulsory**
- 2) **Figures to the right indicate full marks.**
- 3) **Use of scientific calculator is allowed**
- 4) **Use suitable data where ever required**

Q.1) a) What is soft computing? Indicate biological analogies of basic techniques of soft computing. Describe why soft computing is particularly useful in representing and reasoning with human-oriented knowledge. [4]
b) What is probabilistic reasoning? With suitable example, explain how Bay's theorem can be used for probabilistic reasoning. [6]

Q.2) a) How do Neural Networks get the optimal Weights and Bias values in Back Propagation Algorithm? [6]

b) What is Multilayer Perceptron? What are the advantages and limitations of MLP? [4]

Q.3) a) What is Hebb's learning rule? Why does Hebb's rule require bipolar input? [4]

b) Explain Hopfield network for synchronous and asynchronous update. How Hopfield network is used as auto-associative memory? [6]

Q.4) a) Explain fuzzification and defuzzification with suitable example. [4]

b) Three fuzzy sets are defined as follows:

$A = \{(0.1, 39), (0.2, 60), (0.3, 90), (0.4, 120)\}$

$B = \{(1, 1), (0.2, 2), (0.5, 3), (0.7, 4), (0.3, 5), (0, 6)\}$

$C = \{(0.33, 100), (0.65, 200), (0.92, 300), (0.21, 400)\}$

Find the following:

I) $R = A \times B$

II) $S = B \times C$

III) $T = R \circ S$ using min- max composition

IV) $T = R \circ S$ using max-product composition. [6]

- Q.5) a) Describe selection and crossover operators in genetic algorithms. [4]
b) Explain basic flow of particle swarm optimization. Compare particle swarm optimization and genetic algorithm. [6]
- Q.6) a) What soft computing techniques can be used to solve travelling salesman problem? Explain the algorithm in brief to solve it. [6]
b) Can we use any of the Soft computing techniques to solve inverse kinematics problem? How? [4]