**Punjab Engineering College (Deemed to be University), Chandigarh**

**End-Term Examination, Dec 2020**

Programme: **B.Tech. (CSE)** Year/Semester: **7th Sem.**

Course Name: **Soft Computing** Course Code: **CSN403**

Maximum Marks: **50** Time allowed: **2 Hours**

**Notes:**

1. All questions are compulsory.
2. Each mark translates to 20-25 words. Follow this rule while answering questions.
3. The candidates, before starting to write the solutions, should please check the question paper for any discrepancy, and also ensure that they have been delivered the question paper of right course code.
4. Make necessary assumptions and mention it clearly wherever needed.

| Q. No. | Question | Marks |
|---|---|---|
| 1. | (a) Comment on the similarity between biological neural networks and artificial neural networks. | 4 |
| | (b) Write short note on following properties of Artificial Neural Networks.<br>(i) Fault Tolerance<br>(ii) Evidential Response | 6 |
| 2. | (a) Neuro-fuzzy systems combine the power of reasoning from fuzzy system and power of learning from neural networks. Explain how such systems can be more useful in designing intelligent systems to solve real world problems. | 4 |
| | (b) Is it possible to implement 2-input XOR boolean function using single perceptron? Support your answer with appropriate reasoning. | 2 |
| | (c) Design a 3-input XOR function using Multilayered Perceptron Model with single hidden layer. Display weights of various connections clearly. | 4 |
| 3. | (a) Briefly explain any 3 characteristics of Associative Memory. | 3 |
| | (b) Explain with help of example applicability of Supervised Learning and Unsupervised Learning methods. | 6 |
| | (c) Write short note on Hebbian Learning mechanism. | 3 |
| | (a) Compare similarity and differences between fuzzy logic and probability. | 3 |
| | (b) With help of graph give example of<br>(i) Discrete membership function on discrete universe of discourse<br>(ii) Discrete membership function on continuous universe of discourse<br>(iii) Continuous membership function on continuous universe of discourse | 3 |
| | (c) Let A and B are two fuzzy sets defined as follows:<br>$A = \{(x_1, 0.7), (x_2, 0.2), (x_4, 0.9), (x_5, 0.5)\}$<br>$B = \{(x_2, 0.6), (x_4, 0.8), (x_6, 0.3)\}$<br>Compute the resultant fuzzy set for following operations:<br>(i) $A \cup B$<br>(ii) $A \cap B$<br>(iii) $A + B$<br>(iv) $A - B$ | 4 |

| | | |
|---|---|---|
| 5. | (a) Explain different steps of finding solution to any problem using Genetic Algorithms approach. | 4 |
| | (b) Solve the problem of finding number between 1-255 with highest count of prime factors using Genetic Algorithms. Use binary encoding to represent chromosomes. Keep the maximum population size of 4. In each iteration two least fit possible solutions gets deleted and two new child gets added to population by mutating any single bit at random in the remaining parent chromosomes. Show first two iteration of the process of finding solution using GA. | 4 |