

Note : Question No. 1 is compulsory.
 Assume suitable data if required
 Attempt any three questions from the remaining questions

- Q 1 Differentiate 20
 a. Hard and Soft computing
 b. Fuzziness and Probability
 c. Linear and Non linear Separability
 d. Crisp membership and Fuzzy membership
- Q 2 (a) What is the role of activation functions in a neural network? Explain 10
 commonly used functions with mathematical representation and graph.
- Q 2 (b) What is the role of membership functions? Give the mathematical model for 10
 Gaussian function. Show the effect of different transformations on it.
- Q 3 (a) Explain SOM architecture. With an example give the step by step learning 10
 by SOM.
- Q 3 (b) Explain the generalized delta rule and its role in the back propagation 10
 algorithm.
- Q 4 (a) Define composition relation for a Fuzzy set. 10

Given: $A = \{Jack, Lucy, Harry\}$, $B = \{Flute, Drum, Violin, Piano\}$, $C = \{String, Wind, Percussion\}$.

For the relation $R = \text{plays} \subseteq PXQ$ and $S = \text{instrument type} \subseteq QXR$ defined as follows, find $R \circ S$.

Relation matrix for R

	R			
	Flute	Drum	Violin	Piano
Jack	0	1	0	1
Lucy	1	0	1	1
Harry	1	1	1	0

Relation for S

	S		
	String	Wind	Percussion
Flute	0	1	0
Drum	0	0	1
Violin	1	0	0
Piano	1	0	0

- Q 4 (b) Define deep learning. Explain historical context of deep learning. 10
- Q 5 (a) Describe rough membership. List the properties satisfied by rough membership functions. 10
- Q 5 (b) What is perceptron? Explain. Design a multi-layer perceptron to solve the XOR problem. 10
- Q 6 Explain briefly any two 10
- Fuzzy-Neural systems
 - RBF
 - Fuzzy Inference Systems

Q. P. Code: 25074**[Total Marks 80]****(3 Hours)****N. B:**

1. Question No. 1 is Compulsory.
2. Solve any THREE from Question No. 2 to 6.
3. Draw neat well labeled diagram wherever necessary.

- Q. 1 a) What is Message Passing Interface? What are the principles of Message Passing Programming? 10M
- b) Define Network Topology and its types. 5M
- c) Distinguish between loosely coupled and tightly coupled multiprocessors. 5M
- Q. 2 a) Write a MPI program for Prime Number Generation. 10M
- b) Explain Granularity, Concurrency and Dependency Path. 10M
- Q. 3 a) Explain about process synchronization mechanism with Semaphore. 10M
- b) Short note on 'SIMD matrix multiplication'. 10M
- Q. 4 a) State Amdahl's law? 10M
Suppose a serial program reads n data from a file, performs some computation, and then writes n data back out to another file. The I/O time is measured and found to be $4500 + n$ μ sec. If the computation portion takes $n/200$ μ sec, what is the maximum speedup we can expect when $n=10,000$ and p processors are used?
- b) Explain the various levels of parallel processing. 10M
- Q. 5 a) Explain in brief Quantum Computers. 10M
- b) What is a Data-Race? Why Data-Races are Undesired? How Data-Races Can be Prevented? 10M
- Q. 6 a) What is meant by grain packing and scheduling in parallel Processing? 5M
- b) Explain the following : 5M
- i. Data driven computers.
 - ii. Data flow languages.
- c) Explain the pros and Cons of Open MP. 5M
- d) Give the advantages in using non-uniform memory access model. 5M
