Time: 3 Hours **Total Marks: 80**

N.B. : (1) Questions No.**1** is **compulsory**.
(2) Solve any **three** questions out of **remaining**
(3) Draw neat labeled diagram whenever necessary.
(4) Assume suitable data if necessary

Q1 Answer any four questions

a. What is the use of Activation functions in neural networks? Explain Sigmoidal activation function. **05**
b. With one example explain K-Means Algorithm **05**
c. What do you mean by strided convolution? Give the necessary equations. **05**
d. Define core, boundary and support of a fuzzy set. **05**
e. For the given two fuzzy sets, find out algebraic sum, algebraic product, bounded sum and bounded difference. **05**

$$\underset{\sim}{A} = \left\{\frac{0.2}{x1} + \frac{0.3}{x2} + \frac{0.7}{x3} + \frac{0.4}{x4}\right\} \quad \underset{\sim}{B} = \left\{\frac{0.8}{x1} + \frac{0.2}{x2} + \frac{0.5}{x3} + \frac{0.3}{x4}\right\}$$

Q2 a. Explain the concept of linear separability. Can we design XOR gate using MP neuron? Give a neural network architecture for XOR implementation. **10**
b. Implement AND Gate using Perceptron. **10**

Q3 a. With neat flow diagram, describe the training steps of Multi layer feed forward network . **10**
b. What do you mean by competitive learning? Explain Self organizing feature Map in detail. **10**

Q4 a. Construct a discrete Hopfield network to store the patterns x1= [1 -1 1 -1] & x2 =[1 1 1 -1]. Discuss the important features of Weight matrix. **10**
b. Explain SVM algorithm with necessary equations **10**

Q5 a. Draw a neat diagram of convolution neural network architecture. Analyse the working of the each layer. **10**
b. What do you mean by defuzification? Explain any two methods in detail. **10**

Q6 a. Design a fuzzy controller to decide the washing time of a washing machine. Dirt and grease are input variables. Consider three descriptors for inputs and four for output. Test the performance for one input conditions **10**
b. What is Mamdani based Fuzzy Inference System? With neat diagram, explain FIS. **10**

****