

(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. Compare biological neuron with artificial neuron **05**
 - b. For binary sigmoidal function prove that $f'(x)=f(x)(1-f(x))$ **05**
 - c. What do you mean by delta rule? Explain with equations. Which neural network used delta learning rule? **05**
 - d. What are the various components of fuzzy inference system? **05**
 - e. What is the use of pooling layer in CNN architecture? What are the various types of pooling? **05**
- Q2**
- a. Analyze the architecture of multilayer perceptron. **10**
 - b. Draw a basic CNN architecture. Giving examples, discuss strided convolution with necessary equations. **10**
- Q3**
- a. Draw the architecture of Kohonen Self Organizing network. Discuss the training steps of Kohonen network. **10**
 - b. What do you mean by machine learning? Discuss the working of SVM **10**
- Q4**
- a. Construct a discrete Hopfield network to store the patterns $[1 \ 1 \ 1 \ -1]$. Test discrete Hopfield network with missing values in first and second components of stored vector. **10**
 - b. Implement AND gate using MP Neuron. **10**
- Q5**
- a. With neat flow chart, discuss the various phases of error back propagation algorithm. **10**
 - b. What are the various steps involved in image classification using CNN? **10**
- Q6**
- a. Define a fuzzy set. What are the properties of fuzzy sets? **10**
 - b. Design a fuzzy controller to decide the washing time of a washing machine. Dirt and type of cloth fabric are input variables. Consider four descriptors for inputs and output **10**