Q.P. code : 12145

(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.	Write any four properties of fuzzy sets.	**05**
b.	With necessary equations, list the different types of activation functions used in Neural networks	**05**
c.	What do you mean by K means algorithm? Where is it used?	**05**
d.	If A and B are two fuzzy sets with membership functions: $\mu_a(\chi) = \{1, 0.2, 0.2, 0.7\}$ and $\mu_b(\chi) = \{0.2, 0.6, 0.4, 0.5\}$, find the union and intersection between two fuzzy sets.	**05**
e.	What is the use of pooling and padding in CNN architectures?	**05**
Q2.a.	Develop perceptron network to implement two input AND function. Consider inputs and the outputs as unipolar. Assume initial weights and bias value equal to zero. Consider learning rate equal to 1.	**10**
b.	Discuss linearly separable and linearly non-separable classification functions each with a graph.	**10**
Q3.a.	Construct a Kohonen Self Organizing map to cluster given vectors [0 0 1 1], [1 0 0 0], [0 1 1 0] and [0 0 0 1]. The number of clusters to be formed is 2. Consider the learning rate as 0.5. The weight matrix is given by $w_{ij} = \begin{bmatrix} 0.2 & 0.9 \\ 0.4 & 0.7 \\ 0.6 & 0.5 \\ 0.8 & 0.3 \end{bmatrix}$	**10**
b.	Draw the architecture of simple Convolution neural network. Discuss the use of CNN in deep learning	**10**
Q4.a.	Construct a discrete Hopfield network to store the patterns [1 1 1 1 1], [1 -1 -1 1 -1], [-1 1 -1 -1 -1]. Calculate the energy of the stored patterns.	**10**
b.	What are the various types of neural network architectures? With neat diagram, briefly discuss the architectures.	**10**
Q5.a.	With neat flow chart, describe the various steps used in the training process of error back propagation algorithm.	**10**
b.	What is Support Vector Machine (SVM)? Analyze binary classifier using SVM.	**10**
Q6.a.	What is defuzzification? Explain any two methods of defuzzification.	**10**
b.	Design a fuzzy controller to decide the wash time of a washing machine.	**10**

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15/12/22

TE/Sem VI/R19/EXTC/ANNFL @15