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*B. Sc. in CSE Semester Final Examination, Spring-2023*

**Course Code: CSE-4871 Course Title: neural network and Fuzzy System**

Total marks: 50

Time: 2 hours 30 minutes

[Answer *all* the questions. Figures in the right hand margin indicate full marks.

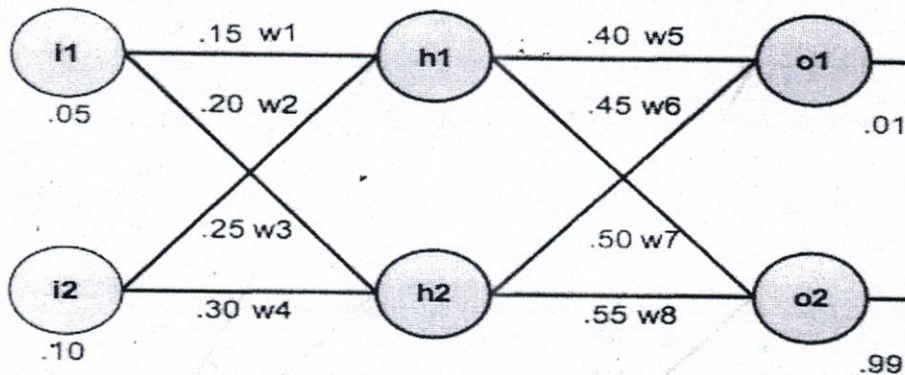
**Separate answer script must be used for Group A and Group B]**

**Group-A**

1. Explain the Back Propagation Training algorithm with the help of one hidden layer feed forward network. What is the Role of Activation Functions in a Neural Network? 10

Or

Find the updated the weights  $w_1$ ,  $w_2$  and  $w_3$  of figure..... choose learning rate 0.5



- 2.a) Training a NN is a optimization problem- do you agree or not. Justify your answer. 05
- b) In the assignments for this course you have trained networks by trying to minimize the cross-entropy loss function over the training data. But generally we measure the success of the network by measuring its accuracy on the test set. Why is it more appropriate to optimize the cross-entropy loss function as opposed to optimizing the accuracy on the training set? 05

**Group-B**

- 3.a) How can you handle from overfitting or underfitting a NN model ? 3
- b) Describe the dropout method and explain how is it used during training and during inference. 4

c) Are there any disadvantages associated with using LSTMs? 3

4.a) What is the difference between CNN and ANN? 2

b) Taking a sample of RGB briefly explain with necessary figures about the working procedure of CNN. 5

*Or*

Consider the following CNN architecture, and suppose you need to determine the activation shape. Find the value of any question marks you came across. In this case,  $f$  is the overall number of filters,  $s$  denotes the stride, and  $p$  denotes padding of zero.

Input:	Activation Shape
	(256,256,3)
Conv2D( $f=16, 3 \times 3, s=1, p=1$ )	?
Maxpooling2D( $2 \times 2, s=2$ )	?
Conv2D( $f=32, 3 \times 3, s=1, p=1$ )	?
Maxpooling2D( $2 \times 2, s=2$ )	?
Conv2D( $f=64, 3 \times 3, s=1, p=1$ )	?
Maxpooling2D( $2 \times 2, s=2$ )	?
Flatten	?

c) What is auto encoder? When and why is it applied in CNN? 3

5. Define Fuzzification process. What is the necessity to convert the fuzzy quantities into crisp quantities? 3

a) Design a fuzzy logic controller(FLC) for an Automated Air Conditioner with proper membership function. Consider three input and one output. 5

*Or*

Write the name of methods of Defuzzification. Explain Center of Sums(COS) method with example.

c) Describe the following membership functions: 2

- i) Gaussian
- ii) Sigmoid