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**MANIPAL INSTITUTE OF TECHNOLOGY**  
**MANIPAL**  
 (A constituent unit of MAHE, Manipal)

**II SEMESTER M.TECH. (COMPUTER SCIENCE AND ENGINEERING)**

**END SEMESTER [MAKEUP] EXAMINATIONS, JUNE 2022**

**DEEP LEARNING [CSE 5051]**

**(OPEN ELECTIVE)**

**Date: 29/08/2022**

Time: 3 Hours

MAX. MARKS: 50

*Instructions: Answer ALL the questions.*

- 1A.** Sketch the Biological neurons and its equivalent artificial neural network with two neurons at input and one neuron at the output. **2M**
- 1B.** Interpret the following activation functions with their activation formulae and related graphs:  
 i) Sigmoid **3M**                      ii) Hyperbolic tangent
- 1C.** Using McCulloch Pitt model principles, design a neural network with XNOR gate functionality. Use the combination of available neural networks with functionalities OR, AND and NOR gates.  $x_1$  and  $x_2$  are the two inputs and  $Y$  is the output of the neural network. Analyze the complete neural network how it works. **5M**

**2A.**

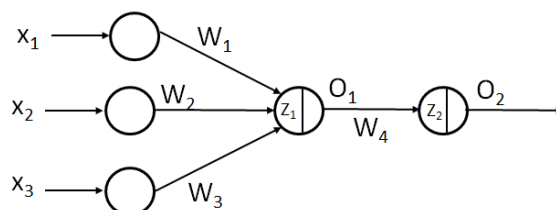


Fig. Q2A

For the neural network given in Fig. Q2A, examine and write down the equations and related derivative using chain-rule of differentiation to update the weight  $W_4$  during Back propagation. The deduced derivative in your equations must be ready to substitute the numeric values directly. Assume that  $Y$  is the target output,  $\hat{y}$  is the predicted value,  $\eta$  is the learning rate,  $O_i$  is the neuron output after applying activation function and  $L$  is loss seen at neuron at the output layer. **4M**

- 2B.** How do you organize the distribution of data among the large available data set in Artificial neural network for training and testing purposes? **4M**
- 2C.** Sketch the flow diagram of back propagation algorithm of a neural network. **2M**
- 3A.** Distinguish the methods to handle the underfitting and overfitting problems in deep neural network? **4M**

- 3B.** Recognize an algorithm with the steps involved in training a generalized Restricted Boltzmann Machine neural network (RBM). **3M**
- 3C.** Relate with the mathematical equations to explain the general architecture of unfolded Recurrent neural network. **3M**
- 4A.** How do you differentiate parameters, hyperparameters and hyperparameters tuning in a neural network? **2M**
- 4B.** Use the supporting graph and explain how the Gradient descent optimizer works in a neural network. **4M**
- 4C.** What is Padding in Convolutional neural network? Relate the types in Padding with example to explain how it works? **4M**
- 5A.** Demonstrate how the Auto encoder works with appropriate diagram. **5M**
- 5B.** Sketch the relevant diagram and explain how the Generator and the Discriminator training is done in Generative adversarial network. **5M**