



(Knowledge for Development)

KIBABII UNIVERSITY

**UNIVERSITY EXAMINATIONS
2020/2021 ACADEMIC YEAR**

**SPECIAL/SUPPLEMENTARY EXAMINATIONS
YEAR FOUR SEMESTER TWO EXAMINATIONS**

**FOR THE DEGREE OF BACHELOR OF SCIENCE
COMPUTER SCIENCE**

COURSE CODE : CSC 468E

COURSE TITLE : NEURAL NETWORKS

DATE: 19/01/2022

TIME: 08:00 A.M – 10:00 A.M

INSTRUCTIONS TO CANDIDATES

ANSWER QUESTIONS ONE AND ANY OTHER TWO.

QUESTION ONE (COMPULSORY) [30 MARKS]

- a)
- i. Model compilation involves two parts. Name and Explain the TWO parts. **[4 Marks]**
 - ii. Describe the Features of PyTorch Framework used in deep learning **[6 Marks]**
 - iii. With the Aid of a diagram Describe the refractory period in a Biological Neuron Networks **[4 Marks]**
 - iv. Explain the Merit and Demerit of AdaGrad Optimizer **[2 Marks]**
- b)
- i. Researchers have proposed many effective technologies to prevent over-fitting, State and Explain any **TWO** technologies used to prevent overfitting. **[4 Marks]**
 - ii. With the Aid of diagram describe the Long Short-term Memory Network. **[4Marks]**
 - iii. With the aid of a diagrams Describe the Types of Recurrent Neural Networks **[4 Marks]**
 - iv. Neural network applications fall into two basic types. State and Explain any TWO types **[2 Marks]**

QUESTION TWO [20 MARKS]

- a) One of the common Problems in Deep learning is Data Imbalance. Explain the problem and Solutions for Data Imbalance **[4 Marks]**
- b) Describe the application areas of Convolutional Neural Networks and Recurrent Neural Networks **[4 Marks]**
- c) With the Aid of a diagram describe the Single layer Perceptron **[4 Marks]**
- d) There a number of important practical/implementational considerations that must be taken into account when training neural networks. Explain any Eight Practical considerations for Gradient Descent Learning **[8 Marks]**

QUESTION THREE [20 MARKS]

- a) Determine if the following statements are **TRUE/ FALSE** **[6Marks]**
- i. Some conflicts among training exemplars in a BPN can be resolved by adding features to the input vectors and adding input- layer neurons to the network.
 - ii. The backpropagation learning algorithm is based on the gradient- descent method.
 - iii. Supervised learning like in the BPN is biologically plausible
 - iv. A single perceptron can compute the AND function.
 - v. Typically, Adaptive Linear Neuron or later Adaptive Linear Element produce better results for new (untrained) inputs than do perceptron.
 - vi. In backpropagation learning, we should start with a small learning parameter η and slowly increase it during the learning process.
- b) Write a code TensorFlow-based SoftMax regression model **[4 Marks]**
- c) In Tensor Flow, tensors are classified into TWO. Describe the TWO types of Tensors **[4 Marks]**
- d) Describe the Mini-Batch Gradient Descent Algorithm (MBGD) **[6 Marks]**

QUESTION FOUR [20 MARKS]

- a) Distinguish between Tanh and Sigmoid Function **[4 Marks]**
- b) Describe the procedure for training a two-layer Multilayer perceptron Network **[6 Marks]**
- c) i. Describe the RMSProp Optimizer **[4 Marks]**
- ii. The self-organizing process is implemented in the SOM algorithm. Describe the Self Organizing Map Algorithm **[6 Marks]**

QUESTION FIVE [20 MARKS]

- a) Describe the Main Concepts of CNN **[4 Marks]**
- b) Describe the application areas of Neural Networks **[5 Marks]**
- c) Describe the Training Rules of GAN **[5 Marks]**
- d) With aid of a diagram describe the Gated Recurrent Unit (GRU) **[6 Marks]**