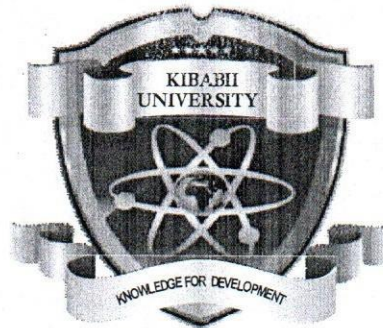


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(Knowledge for Development)

KIBABII UNIVERSITY

**UNIVERSITY EXAMINATIONS
2020/2021 ACADEMIC YEAR**

YEAR FOUR SEMESTER TWO EXAMINATIONS

**FOR THE DEGREE OF
(COMPUTER SCIENCE)**

COURSE CODE : CSC 468E

COURSE TITLE : NEURAL NETWORKS

DATE: 01 / 10 / 2021

TIME: 02:00 P.M – 04:00 P.M

INSTRUCTIONS TO CANDIDATES

ANSWER QUESTIONS ONE AND ANY OTHER TWO.

QUESTION ONE (COMPULSORY) [30 MARKS]

- a)
- i. Describe the Networks of McCulloch-Pitts Neurons. Draw appropriate Diagram [4 Marks]
 - ii. Describe between Traditional Machine Learning and Neural Networks [6 Marks]
 - iii. Describe the XOR Problem and the Solution to XOR problem [4 Marks]
 - iv. Explain the purpose of optimizers in Neural Networks [2 Marks]
- b)
- i. Describe the Generative Adversarial Network. Draw appropriate diagram [4 Marks]
 - ii. With the Aid of diagram describe the Architecture of Convolutional Neural Network. [4Marks]
 - iii. Describe the meaning of the following Code [4 Marks]

```
import numpy as np
train_x = np.random.random((1000, 36))
train_y = np.random.random((1000, 10))
val_x = np.random.random((200, 36)) val_y = np.random.random((200, 10))
model.fit(train_x, train_y, epochs=10, batch_size=100, validation_data=(val_x, val_y))
```
 - iv. Neural network applications fall into two basic types. State and Explain the TWO types [2 Marks]

QUESTION TWO [20 MARKS]

- a) Describe how Back Propagation is used to train the network [4 Marks]
- b) Describe the purpose and limitation of Extrema of the Loss Function [4 Marks]
- c) With the Aid of a diagram describe Development History of Neural Networks [4 Marks]
- d) Describe the **FOUR** components of self-Organization Maps [8 Marks]

QUESTION THREE [20 MARKS]

- a) Determine if the following statements are **TRUE/ FALSE** [6Marks]
- i. A perceptron is guaranteed to perfectly learn a given linearly separable function within a finite number of training steps.
 - ii. For effective training of a neural network, the network should have at least 5-10 times as many weights as there are training samples.
 - iii. A single perceptron can compute the XOR function.
 - iv. The more hidden-layer units a BPN has, the better it can predict desired outputs for new inputs that it was not trained with.
 - v. In backpropagation learning, we should start with a small learning parameter η and slowly increase it during the learning process.
 - vi. A three-layer BPN with 5 neurons in each layer has a total of 50 connections and 50 weights.
- b) Please describe the main differences between the human brain and today's computers (such as your desktop PC) in terms of information processing. [4 Marks]
- c) With the aid of diagram describe Biological Neuron Action Potential [4 Marks]
- d) Describe the SoftMax and Soft plus activation functions [6 Marks]

QUESTION FOUR [20 MARKS]

- a) Distinguish between L1 and L2 regularization [4 Marks]
- b) Describe the Vanishing Gradient and Exploding Gradient Problem and its Solution [6 Marks]
- c) i. Describe the Recurrent Neural Network Architecture [4 Marks]
- ii. Describe the advantages and disadvantages of Momentum Optimizer [6 Marks]

QUESTION FIVE [20 MARKS]

- a) Describe the features of Tensor Flow **[4 Marks]**
- b) Describe the Disadvantages of TensorFlow 1.0. **[4 Marks]**
- c) Describe Eager Execution Mode of TensorFlow 2.x **[4 Marks]**
- d) Keras is a high-level API used to build and train deep learning models. It can be used for rapid prototype design, advanced research, and production. Describe the three advantages of Keras **[4 Marks]**
- e) Describe the TensorFlow Development Process **[4 Marks]**