MACHAKOS UNIVERSITY

University Examinations for 2022/2023

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY

FOURTH YEAR SUPPLEMENTARY EXAMINATION FOR

BACHELOR OF SCIENCE COMPUTER SCIENCE

SCO 411: NEURAL NETWORKS

DATE:10/3/2023 **TIME:2:00-4:00 P.M**

INSTRUCTIONS:

*This paper consists of **FIVE** questions.*
*Answer **QUESTION ONE** and other **TWO** questions in this paper.*

QUESTION ONE (COMPULSORY 30 MARKS)

a) Differentiate between neural networks (NN) and Artificial Neural Networks (ANN) (2 marks)

b) Using McCulloch-Pitts Neuron model, explain THREE features of Artificial Neural Networks. (6 marks)

c) Describe the step-by-step procedure of how a perceptron model operates. (5 marks)

d) Learning and adaptation is important in Artificial Neural Networks, using an example explain (5 marks)

e) One practical example of Artificial Neural networks Learning problems is predicting house prices.

   i. State the most appropriate learning method to use (2 marks)

   ii. Discuss how it works to this achieved (4 marks)

f) Explain the activation function $f(x) = max\ (0, x)$. (3marks)

g) Using a typical example, explain the application of ANN in Computer Games (3 marks)

QUESTION TWO (20 MARKS)

a) State any five reasons for studying ANN (5 marks)

b) Explain the following neural network tasks (6 marks)

i. Control

ii. Classification

iii. Prediction

c) A student would like to decide whether to attend a wedding party or not. The decision variables are weather condition, availability of transport, and completion of assignment. Model the decision with respect to Artificial Neural Network. (9 marks)

QUESTION THREE (20 MARKS)

a) Given the following points (x1 = -1, x2 = 1) with target 1, (x1 = 1, x2 = 1) with target 1, and (x1 = 0, x2 = 2) with target 0. If the classifier has a bias term with a value is fixed at 1, write down the inequalities, represent them in weight space and indicate the feasible region. (8 marks)

b) Describe the four differences between the human brain and today's computers (8 marks)

c) Explain Hopfield learning algorithm (4 marks)

QUESTION FOUR (20 MARKS)

a) Discuss three types of learning rules (6 marks)

b) Using diagrams, describe the types of artificial neural networks (architectures) (7 marks)

c) Using a typical example, explain the application of ANN in Data analysis (7 marks)

QUESTION FIVE (20 MARKS)

a) Using diagrams, demonstrate the implementation of the logic gates below using McCulloch-Pitts neurons (9 marks)

i. AND
ii. OR
iii. NOT

b) Explain the applications of Neural Networks in Pattern recognition (5 marks)

c) Discuss the THREE phases of training ANN by back propagation (6 marks)