



MAASAI MARA UNIVERSITY

REGULAR

UNIVERSITY EXAMINATIONS

2019/2020 ACADEMIC YEAR

THIRD YEAR SECOND SEMESTER

SCHOOL OF SCIENCE AND INFORMATION SCIENCES

DEPARTMENT OF COMPUTING AND INFORMATION

SCIENCE

BACHELOR OF SCIENCE IN INFORMATION

SCIENCES

COURSE CODE: COM - 4114

COURSE TITLE: ARTIFICIAL NEURAL NETWORK

DATE: 9TH DEC 2019

TIME: 14:30- 16:30

INSTRUCTION TO CANDIDATE

- i. Question ONE in section A is compulsory
- ii. Answer any OTHER Two (2) Questions from section B
- iii. Use diagrams, example and illustration where necessary
- iv. All questions in section B have equal marks

SECTION A (COMPULSORY – 30 MARKS)**SECTION A: COMPULSORY****QUESTION ONE [30 MARKS]**

- a) Define the term
 - i. Neural Networks [2 Marks]
 - ii. Artificial neurons [2 Marks]
 - iii. Artificial Neural Network [2 Marks]
- b) State six importance of Neuron Network [6 Marks]
- c) Derive the learning rule for the following algorithms:
 - i. Perceptron Learning Rule [4 Marks]
 - ii. The Backpropagation Algorithm [5 Marks]
- d) Discuss three broad types of learning in NN [9 Marks]

SECTION B [40 MARKS]**QUESTION TWO [20 MARKS]**

- a) Draw a detailed diagram of NN according to ‘The McCulloch-Pitts Neuron’ [6 Marks]
- b) **Derive** The McCulloch-Pitts Neuron algorithm [4 Marks]
- c) Explain Hopfield Network [2 Marks]
- d) Derive Hopfield Network activation function [2 Marks]
- e) Discuss Bidirectional associative memory (BAM) [6 Marks]

QUESTION THREE [20 MARKS]

- a) Consider the loan approval table Attached and answer the following question
 - i. State the type of learning and explain why [4 Marks]
 - ii. Provide the Neural Network architecture for classification (APPROVED/NO APPROVED) [6 Marks]
 - iii. Derive the Neural Network model (Algorithm) for classification (APPROVED/NO APPROVED) and give your conclusion on this model [10 Marks]

QUESTION FOUR [20 MARKS]

- a) Write down the equation for the output Y_j of a McCulloch-Pitts neuron as a function of its inputs I_i . [4 Marks]
- b) Explain any four the properties of ANN [8 Marks]
- c) Given the following set
 - Training set S of examples $\{\mathbf{x}, \mathbf{t}\}$
 - i. \mathbf{x} is an input vector and

- ii. **t** the desired target vector
- iii. Example: Logical And

Where:

$$S = \{(0,0),0\}, \{(0,1),0\}, \{(1,0),0\}, \{(1,1),1\}$$

- i. Provide the iterative process function **[3 Marks]**
- ii. State the Learning rule **[3 Marks]**

An example: data (loan application)

ID	Age	Has_Job	Own_House	Credit_Rating	Class
1	young	false	false	fair	No
2	young	false	false	good	No
3	young	true	false	good	Yes
4	young	true	true	fair	Yes
5	young	false	false	fair	No
6	middle	false	false	fair	No
7	middle	false	false	good	No
8	middle	true	true	good	Yes
9	middle	false	true	excellent	Yes
10	middle	false	true	excellent	Yes
11	old	false	true	excellent	Yes
12	old	false	true	good	Yes
13	old	true	false	good	Yes
14	old	true	false	excellent	Yes
15	old	false	false	fair	No

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