

**CHUKA**



**UNIVERSITY**

**UNIVERSITY EXAMINATIONS**

**EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF  
SCIENCE (ACTUARIAL SCIENCE)**

**ACMT 211: COMPUTATIONAL METHOD AND DATA ANALYSIS II**

**STREAMS: BSC (ACMT)**

**TIME: 2 HOURS**

**DAY/DATE: WEDNESDAY 08/04/2020**

**2.30 P.M. – 4.30 P.M.**

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**INSTRUCTIONS**

- Answer questions **ONE (compulsory)** and any other **TWO** questions.

**QUESTION ONE (30 MARKS)**

- a) Find the eigenvalues and eigenvectors of this 3 by 3 matrix A

$$A = \begin{bmatrix} 1 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & -1 & 1 \end{bmatrix}$$

(5 marks)

- b) When designing a questionnaire, describe five key section that are mandatory in a questionnaire

(5 marks)

- c) State five reason why tables and figures are used in most fields of study

(5 marks)

- d) Define the following term below

- I. Stacks
- II. Queues
- III. List

(3 marks)

- e) Discuss the four main activities in data processing for any survey research

(4 marks)

f) The stack implementation using arrays may run out of space if its capacity is exceeded. Can you think of a way of implementing unbounded stacks stored in an array?

(3 marks)

g) Define tabulation stating six major objectives of tabulation

(5 marks)

**QUESTION TWO (20 MARKS)**

h) Given the matrix below that is already singular (zero determinant). Find its eigenvalues  $\lambda$ 's and eigenvectors  $x$ 's.

$$A = \begin{bmatrix} 1 & 2 \\ 2 & 4 \end{bmatrix}$$

(10 marks)

i) Find the eigenvalues and eigenvectors of  $A$  and  $A^2$  and  $A^{-1}$  and  $A + 4I$

$$A = \begin{bmatrix} 2 & -1 \\ -1 & 2 \end{bmatrix} \text{ and } A^2 = \begin{bmatrix} 5 & -4 \\ -4 & 5 \end{bmatrix}$$

(10 marks)

**QUESTION THREE (20 MARKS)**

a) Highlight four people you should take into consideration when designing a questionnaire

(4 marks)

b) Discuss eight key principles of effective questionnaire design

(16 marks)

**QUESTION FOUR (20 MARKS)**

a) Describe general considerations concerning table when constructing a survey table

(10 marks)

b) Discuss five major parts of tables that are used in most fields of study to provide a visual presentation of important information to the reader.

(10 marks)

**QUESTION FIVE (20 MARKS)**

Describe the process of questionnaire design for a survey research in a detailed illustration and use of tables

(20 marks)

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