

**SECOND YEAR SECOND SEMESTER EXAMINATION FOR DEGREE OF  
BACHELOR OF SCIENCE IN ACTUARIAL SCIENCE  
ACMT 211 – COMPUTATIONAL METHODS AND DATA ANALYSIS II  
DURATION: 2 HOURS**

**DATE:**

**TIME:**

**Instructions to Candidates:**

1. Answer **Question 1** and **Any Other Two** questions.
2. Mobile phones are not allowed in the examination room.
3. You are not allowed to write on this examination question paper.

## SECTION A – ANSWER ALL QUESTIONS IN THIS SECTION

### QUESTION ONE

a) Define what an array is and explain the basic operations supported by an array.(6 marks)

b) Solve the following system of equations using LU decomposition.(6 marks)

$$\begin{bmatrix} 1 & 3 & 2 \\ 2 & 8 & 5 \\ 1 & 11 & 4 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} 2 \\ 3 \\ 0 \end{bmatrix}$$

c)What function do the following strings perform? (3 marks)

- i. strchr(s1, ch);
- ii. strstr(s1, s2);
- iii. strcmp(s1, s2);

d)Define the following. (3 marks)

- i. Stacks
- ii. Queues
- iii. Linked list

e) Find all eigenvalues of B (6 marks)

$$B = \begin{bmatrix} 11 & -8 & 4 \\ -8 & -1 & -2 \\ 4 & -2 & -4 \end{bmatrix}$$

f) List the six factors that the flow of an effective questionnaire is dependent Upon? (6 marks)

## SECTION B – ANSWER ANY TWO QUESTIONS IN THIS SECTION

### QUESTION TWO

a)What is cross tabulation.(2 marks)

b)Using the power method obtain the dominant eigenvalue and associated eigenvector of the below matrix(11 marks)

$$A = \begin{bmatrix} 3 & -1 & 0 \\ -2 & 4 & -3 \\ 0 & -1 & 1 \end{bmatrix} \text{ using a starting column vector } X^{(0)} = \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$$

c) Data editing is first done prior to imputation. List the features that the data has to be checked for and edited if errors are detected.(7 marks)

### QUESTION THREE

Discuss the ten different phases in developing a questionnaire.(20 marks)

### QUESTION FOUR

a)List 3 limitations of tabulation .(3 marks)

b)Calculate **LU** decompositions for the matrix below (6 marks)

$$A = \begin{bmatrix} 2 & 1 & -4 \\ 2 & 2 & -2 \\ 6 & 3 & -11 \end{bmatrix}$$

c) Check your answer in part b, by multiplying out **LU** to show that the product equals A( 4 marks)

d)Highlight 7 key parts of an ideal table.(7 marks)

### QUESTION FIVE

a) What is the difference between a poll and a survey? (2 marks)

**b)** Discuss the steps involved in conducting a complete and effective survey. (18 marks)