UNIVERSITY EXAMINATIONS
2023/2024 ACADEMIC YEAR

END OF SEMESTER EXAMINATIONS
YEAR FOUR SEMESTER ONE EXAMINATIONS

FOR THE DEGREE OF
(COMPUTER SCIENCE)

COURSE CODE: CSC 451E

COURSE TITLE: DIGITAL SIGNAL PROCESSING II

DATE: 14/12/2023 TIME: 09:00 HRS – 11:00 HRS

INSTRUCTIONS TO CANDIDATES

ANSWER QUESTIONS ONE AND ANY OTHER TWO.

QUESTION ONE (COMPUSORY-30 Marks)

a) State **TWO** reasons why Discrete Fourier Transform (DFT) is important. [4 Marks]

b) Find the 4-point DFT of $x(n) = \{1, -2, 3, 2\}$ using matrix method. [6 Marks]

c) Find the IDFT of $X(k) = \{1, 0, 1, 0\}$ using the matrix method. [8 Marks]

d) Outline **THREE** benefits of using Digital Signal Processors compared to analogue signal processors? [6 Marks]

e) Outline **THREE** advantages of FIR filters over IIR filters [6 Marks]

QUESTION TWO (20 Marks)

a) Find the 4-point DFT of $x(n) = \{1, -1, 2, -2\}$. [10 Marks]

(b) Find the IDFT of $X(k) = \{4, 2, 0, 4\}$. [10 Marks]

QUESTION THREE (20Marks)

a) Find the linear convolution of the sequences x(n) and h(n) using DFT.

$x(n) = \{1, 0, 2\}$, $h(n) = \{1, 1\}$ [15 Marks]

b) Outline the difference between OVERLAP-SAVE and OVERLAP-ADD methods [5 Marks]

QUESTION FOUR (20 Marks)

a) Outline the meaning of the following terms as used in signal processing?

i) Sampling [3 Marks]

ii) Sampling interval [3 Marks]

b) Compute the DFT of the 3-point sequence $x(n) = \{2, 1, 2\}$. Using the same sequence, compute the 6-point DFT and compare the two DFTs. [14 Marks]

QUESTION FIVE (20 Marks)

a) Outline **FOUR** differences between analog Digital signal processing [8 Marks]

b) Distinguish between circular and linear convolution [4mks]

c) Explain with the aid of a block diagram showing the essential elements of a Digital Signal processing system. [8 Marks]