



(University of Choice)
**MASINDE MULIRO UNIVERSITY OF
SCIENCE AND TECHNOLOGY
(MMUST)**

**MAIN CAMPUS
UNIVERSITY EXAMINATIONS
2021/2022 ACADEMIC YEAR**

FOURTH YEAR FIRST SEMESTER

MAIN EXAMINATIONS

**FOR THE DEGREE
OF
BACHELOR OF TECHNOLOGY EDUCATION IN ELECTRICAL AND ELECTRONIC
ENGINEERING**

COURSE CODE: TEE 412

COURSE TITLE: DIGITAL ELECTRONICS

DATE: WEDNESDAY, APRIL 27TH, 2022.

TIME: 12:00 – 2:00 PM

INSTRUCTIONS TO CANDIDATES

Question ONE (1) is compulsory
Answer Any Other TWO (2) questions

TIME: 2 Hours

MMUST observes ZERO tolerance to examination cheating

This Paper Consists of 5 Printed Pages. Please Turn Over.



QUESTION THREE

- a) Find the decimal equivalent of the Hexadecimal number 3BC7.46 (2mks)
b) Convert the decimal number 567_{10} into octal (2mks)
c) Convert the following decimal number 98765_{10} into hexadecimal (2mks)
d) Find the binary equivalent of the gray code numbers (3mks)
101010101
e) State and explain THREE categories of binary codes (6mks)
f) Define the Karnaugh Map (2mks)
Simplify using k-map the algebraic expression (3mks)

$$f = \bar{a} \cdot b \cdot \bar{d} + b \cdot c \cdot d + \bar{a} \cdot b \cdot \bar{c} \cdot d + c \cdot d$$

QUESTION FOUR

- a) Define a combinational circuit (3mks)
b) Explain the following in relation to combinational circuit (5mks)
i) Adders
ii) Half Adder
c) Name TWO commonly used Boolean circuits (2mks)
d) Draw the truth table of a Boolean function given by: (4mks)
 $F = \bar{A} \cdot B + C$
e) Using the theorems of Boolean algebra, prove the following (4mks)
identities
f) State two methods of minimizing Boolean expressions- (2mks)

QUESTION FIVE

- a) With the aid of a diagram, explain the construction of a simple (6mks)
state machine in hardware, using two edge-triggered Dflip-flops
connected to the same clock.
i) Write a table of the possible state transitions