(University of Choice)

MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY (MMUST)

MAIN CAMPUS

UNIVERSITY EXAMINATIONS 2021/2022 ACADEMIC YEAR

THIRD YEAR SECOND SEMESTER EXAMINATIONS

FOR THE DEGREE OF BACHELOR OF SCIENCE IN ELECTRICAL AND COMMUNICATIONS ENGINEERING

COURSE CODE: ECE 324

COURSE TITLE: DIGITAL ELECTRONICS II

DATE: FRIDAY, APRIL, 29TH, 2022. **TIME:** 8:00 – 10:00 AM

INSTRUCTIONS TO CANDIDATES

ANSWER QUESTION ONE AND ANY OTHER TWO QUESTIONS.
QUESTION ONE CARRIES 30 MARKS AND ALL OTHERS 20 MARKS EACH.

MMUST observes ZERO tolerance to examination cheating

This Paper Consists of 4 Printed Pages. Please Turn Over.

QUESTION ONE

(a) Explain the following terms as they are applied in the manufacture of integrated circuits

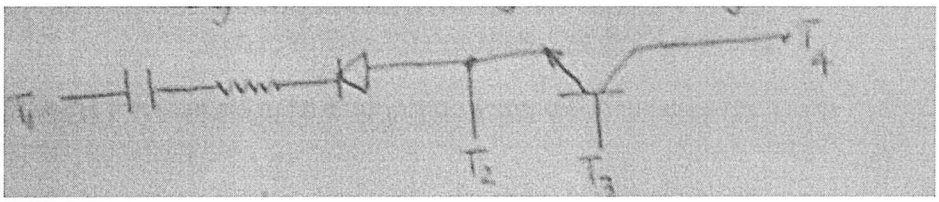
(i) Insulating layer

(ii) Etching

(2marks)

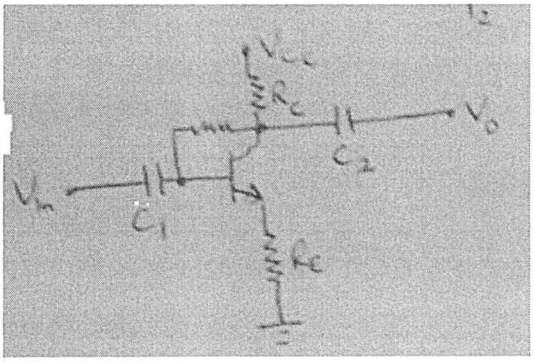
(b) Draw the integrated circuit form of the following circuits

(i)



(3 marks)

(ii)



(3 marks)

(c)(i) Draw the truth table for 4:1 multiplexer with low input at E

(2marks)

(ii) Write the expression of the output

(1mark)

(d) Represent a 32:1 multiplexer using two 16:1 multiplexer and one 2:1 multiplexer

(3marks)

(e) Define the following terms as they are applied to memories

(i) Read only memory

(1mark)

(ii) Non-volatile memory

(1mark)

(iii) Access time memory

(1mark)

(iv) Bit (1 mark)

(f) Draw a block diagram of a micro-computer

(4marks)

(g) Explain the following terms as they are applied to microcomputers

(i) Program counter

(2marks)

(ii) Stack pointer

(2marks)

(iii) Interrupt control

(2marks)

(h) State any two applications of DEMUX

(2marks)

QUESTION TWO

(a) Write the truth table of a full subtractor and derive the Boolean expressions

(5marks)

(b) Draw and explain the ROM READ operation timing diagram

(8marks)

(c) Differentiate between combinational logic circuit and sequential logic circuit

(2marks)

(d) Explain any two advantages of circuit design

(2marks)

(e) (i) state the main advantage of flash Analogue to Digital converter

(1mark)

(ii) Draw a 3 bit flash Analog to Digital converter

(2marks)

QUESTION THREE

(a) Basing on transistors categories, Name and explain the two types of integrated circuits

(3marks)

(b) Implement the expression f (A, B, C, D) =$\sum$m (0, 3, 4, 8, 11, 12) using a multiplexer where the output is active high (1)

(4marks)

(c) Implement the following Boolean functions using PROM

A(X, Y, Z,) = $\sum$m (5, 6, 7)

B(X, Y, Z,) = $\sum$m (3, 5, 6, 7)

(4marks)

(d) (i) Draw the block diagram of the programmable Array (PLA)

(3marks)

(ii) Implement the following Boolean function using PLA

A=XY+XŹ

B= XŶ+ YZ +XŹ

(4marks)

(e) Explain how the following word can be stored

Address	data
0000	00001111

(2marks)

QUESTION FOUR

(a) (i) with the aid of a dynamic Random Access Memory (RAM) explain how storage of one bit can be achieved

(4marks)

(ii) State the main disadvantage of a dynamic RAM (2 marks)

(b) given the address switch register as A3A2A1 A0 and D7 D6 D4 and D3 D2 D1 D0 as data switches for upper input and lower input respectively, use a well labelled diagram to explain how addressing the memory and setting up data can be achieved

(10marks)

(c) Draw a truth table of a two bit comparator

(4marks)

QUESTION FIVE

(a) (i) Define the term READ as its applied to memories

(1mark)

(ii) With the aid of a diagram, show a one byte ROM that fits the following description

R0 register containing 3 diodes; R0=0111

R1 register containing 2 diodes; R1 = 1001

R2 register containing 4 diodes; R2 =1111

R3 register containing 3 diodes; R3=1110

R4 register containing 2 diodes; R4=1001

R5 register containing 1 diodes; R5 =1000

R6 register containing 2 diodes; R6 = 1100

R7 register containing 3 diodes; R7= 1011

(4marks)

(b) Name and explain with examples the five set of instructions groups of the 8085 microprocessor

(12marks)

(c) With the aid of a diagram explain the operation and use of a bistable multivibrator

(3marks)