PAPER 1

TECHNICAL UNIVERSITY OF MOMBASA

School of Engineering & Technology

Department of Electrical & Electronics

UNIVERSITY EXAMINATION FOR:

Certificate in Electrical and Electronic Engineering

EEE 1102 DIGITAL ELECTRONICS 1

END OF SEMESTER EXAMINATION

SERIES: MAY 2025

TIME: Two HOURS

Instructions to Candidates

You should have the following for this examination

Answer Booklet, examination pass and student ID, Scientific Calculator & No Mobile Phone.

This paper consists of five questions. Attempt any THREE questions.

Maximum marks for each part of a question are as shown.

This paper consists of **THREE** printed pages

Do not write on the question paper.

QUESTION ONE

(a) Show the truth tables of NAND, NOR and XOR gates and

(i) Show the symbols of the NAND, NOR and XOR gates with two inputs each

(ii) Draw a switching circuit to express F = xϴyϴZ using two inputs per switch

Z = A + B (10 marks)

(b) (I) Simplify the following Boolean functions
(i) A + A'B
(ii) A (A'+B)
(iii) A'B'C + A'BC + AB'

(II) Find the complement of the functions.

Z_1 = A'BC' + A'B'C and
Z_2 = A(B'C' + BC).
Applying De Morgan's theorem as many times as necessary (10 marks)

QUESTION TWO

(a) (i) Using 10's compliment subtract
72532 – 3250

(ii) Using 2's compliment perform M-N given binary numbers
M = 1010100
N = 1000100 (10 marks)

(b) Convert the following
(i) Decimal 0.734 to binary
(ii) Binary 1011 1011 1011 to decimal (10 marks)

QUESTION THREE

(a) I. Convert to binary
(i) 41
(ii) 150

II. Convert to decimal (denary)
(i) $(1010.011)_2$
(ii) $(630.4)_8$ 12 marks

(b) Evaluate
(i) 101110 + 1011 + 111011
(ii) 11011 ÷ 11 8 marks

QUESTION FOUR

(a) (i) Why is NOT gate sometimes referred to as inverter circuit?
(ii) Represent L = (A+B).C using logic gates, switches and the
the truth table (10 marks)

(b) (i) Manipulate Z = AB + C to a sum of minterms
(ii) Using Karnaugh map simplify
Z = AB' + AB
(iii) Draw the circuit of the expression
Z = A.B+C using NAND gates only (10 marks)

QUESTION FIVE

(a) (I) Draw the truth table for three variables i.e. 3 combinations A, B and C as
(i) Minterms
(ii) Maxterms

(II) Given Z = C+ A.B. use Demorgans theorem to negate Z and show the logic networking circuitry (10 marks)

(b) (i) Represent the decimal numbers 8620
(i) In BCD
(ii) In exess 3 code
(iii) In 2421 code
(iv) As a binary number

(ii) Simplify A" (10 marks)