KISII UNIVERSITY

UNIVERSITY EXAMINATIONS

SECOND YEAR EXAMINATION FOR THE AWARD OF THE DEGREE OF BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY
SECOND SEMESTER 2023/2024
[JAN – APRIL, 2024]

COMP 201: BASIC CIRCUIT SYSTEMS

STREAM: Y2 S2 **TIME: 2 HOURS**

DAY: FRIDAY, 12:00 - 2:00 P.M. **DATE: 19/04/2024**

INSTRUCTIONS

1. ***Do not write anything on this question paper.***
2. ***Answer question ONE (Compulsory) and any other TWO questions.***

QUESTION ONE

a. Briefly explain the following terms as used in basic circuit design

i. Digital system (2 marks)
ii. Basic latch (2 marks)
iii. Boolean algebra (2 marks)

b. Discuss the following types of Error – Detecting codes

i. Checksums (3 marks)
ii. Parity (3 marks)
iii. Block parity (3 marks)

c. (i) Explain five characteristics of digital system (5 marks)

(ii) Briefly explain four advantages of digital system over Analog system (4 marks)

e. Simplify F = x'yz + x'yz' + xz (3 marks)

f. Draw a truth table for F1 where F1= x + y'z (4 marks)

QUESTION ON TWO

a. Write short notes on the following:

i. Decimal numbers (3 marks)
ii. Binary numbers (3 marks)
iii. Octal numbers (3 marks)
iv. Hexadecimal numbers (3 marks)

b. Use two's complement to perform the following arithmetic operation (4 marks)

c. Differentiate between a full adder and half adder. (4 marks)

QUESTION ON THREE

a. By the help of a diagram discuss a combinational circuit and list its design procedure. (8mks)
b. By the help of graphical symbols explain the following types of gates
   i. AND (3mks)
   ii. OR (3mks)
   iii. NOR (3mks)
   iv. NAND (3mks)

QUESTION FOUR

a. Explain capabilities of a general shift register. (6 marks)

b. Memory structures are crucial in digital design. Discuss the following types of memories used in basic circuit design.

(i) PROM (2 marks)

(ii) EPROM (2 marks)

(iii) SRAM (2 marks)

(iv) DRAM (2 marks)

c. Briefly explain how communication is achieved between memory and its environment. (6 marks)

QUESTION FIVE

a. Express the Boolean function F = A + B'C as a sum of minterms (4 marks)

b. Express the Boolean function F = xy + x'z as a product of maxterms. (4 marks)

c. (i) List two limitations of Karnaugh maps (2 marks)
(ii) Reduce the expression f=(A+B)(A+B')(A'+B') using mapping (5 marks)

d. Prove that x'y'z' + x'yz' + xyz' = x'z' + yz' (5 marks)