KIRIRI WOMENS' UNIVERSITY OF SCIENCE AND TECHNOLOGY
UNIVERSITY EXAMINATION, 2022/2023 ACADEMIC YEAR
FOR THE CERTIFICATE IN INFORMATION TECHNOLOGY
CIT 1009 - BASIC ELECTRONICS

Date: 28TH JULY 2022
Time: 11:30AM – 1:30PM

INSTRUCTIONS TO CANDIDATES
ANSWER QUESTION ONE (COMPULSORY) AND ANY OTHER TWO QUESTIONS
QUESTION ONE (30 MARKS)

a) Define the following terms as used in electrical circuit and state their SI units? (6 Marks)
   i) Voltage
   ii) Current
   iii) Electric charge
b) Differentiate;
   i) Electron current and Conventional current   (4 Marks)
   ii) AC and DC currents   (2 Marks)
c) State any **four** characteristics of primary memory   (4 Marks)
d) Define what is a set and give the difference between universal set and empty set. (2 Marks)
e) Prove that: $A+AB = A$ (4 Marks)
f) Calculate the binary equivalent of each of the following number systems.
   i) $CA6_{16}$ (2 Marks)
   ii) 254_8 (2 Marks)
   iii) 254_{10} (4 Marks)

QUESTION TWO (20 MARKS)

a) Define Integrated circuit (IC) and give four advantages of using integrated circuit over discrete circuits.   (6 Marks)
b) Mention **four** commonly used electrical components in electric circuits.   (4 Marks)
c) Three resistors $R_1 = 2\Omega$, $R_2 = 4 \Omega$ and $R_2 = 6 \Omega$ are connected in series in a circuit with a 24V voltage source.
   i) Compute the total resistance (R_T).   (4 Marks)
   ii) Calculate the total current across the circuit?   (2 Marks)
   iii) Compute the voltage across R2 and R3 resistors.   (4 Marks)

QUESTION THREE (20 MARKS)

a) Describe the following types of number system. (4 Marks)
    i) Binary Number System
    ii) Octal Number System

b) Calculate sum of the following binary numbers. (6 Marks)
    i) 10010101 + 00111011;
    ii) 001101111 + 101011010;

c) An alarm clock is controlled by a microprocessor. It uses the 24-hour clock. The hour is represented by an 8-bit register A, and the number of minutes is represented by 8-bit register B. Identify what time is represented by the following two 8-bit registers.

(4 Marks)

| 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | : | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 |

d) Define logic gate? (2 Marks)
e) Draw a well labeled symbols for the following logic functions (4 Marks)
    i) AND gate
    ii) OR Gate
    iii) NOT gate
    iv) NOR gate

QUESTION FOUR (20 MARKS)

a) U Using Simplify the expression and show minimum gate implementation diagram
$Y=ABC'D'+A'BC'D'+BC'D$ (6 Marks)
b) Simplify the below expressions using the truth table provided. (4 Marks)

A	B	A'	B'	A' + B	A' + B'
0	0				
0	1				
1	0				
1	1				

c) Using a suitable example, illustrate the use of union and intersection as used in set theory. (6 Marks)
d) Prove that: (4 Marks)
    $x \cdot (x + y) = x$

QUESTION FIVE (20 MARKS)

a) Define the following terms and give an example for each? (6 Marks)
    i) Conductor
    ii) Insulator
    iii) Semi-conductor

b) Binary codes are classified into different categories. What are the four main categories of binary codes? (4 Marks)

c) Given that the universal set U = {2, 4, 6, 7, 8, 9, 10} and A = {2,7, 8, 10}and B = {8, 9, 10}. Find? (6 Marks)
    i) the complement of A
    ii) complement of B
    iii) complement of A union B

d) Given below is two octal numbers, find their equivalent hexadecimal numbers. (4 Marks)
    i) 75_8
    ii) 725_8