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KIRIRI WOMENS' UNIVERSITY OF SCIENCE AND TECHNOLOGY
UNIVERSITY EXAMINATION, 2023/2024 ACADEMIC YEAR
FOR THE CERTIFICATE IN INFORMATION TECHNOLOGY
CIT 1009 – BASIC ELECTRONICS

Date: 14TH APRIL 2023
Time: 11:30AM – 1:30PM

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

QUESTION ONE (30 MARKS)

a) Name any four passive electrical components used in electrical circuits. (4 Marks)
b) Define the following electrical quantities.
   i) Electric current
   ii) Electromotive force (4 Marks)
c) Differentiate between resistance and capacitance as used in electrical circuit. (4 Marks)
d) Convert the following numbers into their equivalent decimal values:
   i) $CA5_{16}$
   ii) $1001\ 0011_2$ (6 Marks)
e) Define Integrated Circuits (IC). (2 Marks)
f) Define and give three advantages of cache memory. (4 Marks)
g) State and explain Ohm's law. (2 Marks)
h) An electric heater draws 3.5A from a 110V source. The resistance of the heating element is approximately how many ohms? (4 Marks)

QUESTION TWO (20 MARKS)

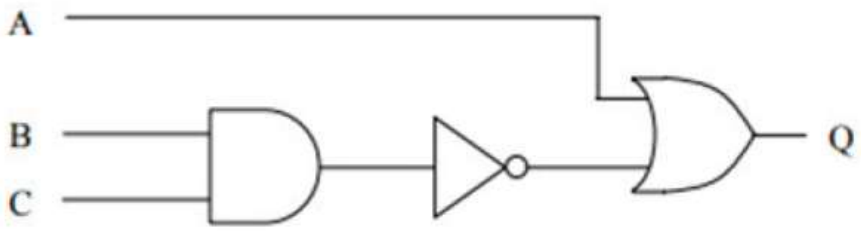
a) Define binary code. (2 Marks)
b) Binary codes are classified into different categories. What are the four main categories of binary codes? (4 Marks)
c) Three capacitors $C_1 = 2\ \mu F$, $C_2 = 4\ \mu F$ and $C_3 = 6\ \mu F$ connected in parallel in a circuit with a 24V voltage source.

   (i) Find the equivalent capacitance (3 Marks)
   (ii) Find the charge across each capacitor. (4 Marks)
   (iii) What is the total charge (Q_T) in micro coulombs? (3 Marks)

d) Briefly explain why an insulator is a poor conductor of electricity, give two examples of insulators. (4 Marks)

QUESTION THREE (20 MARKS)

a) Mention and draw the three main logic gates? (6 Marks)
b) The figure below shows a logic circuit.



Complete the truth table below for the logic circuit shown above. write the correct value of the out Q for each of the listed sets of inputs. (4 Marks)

A	**B**	**C**	**Q**
1	0	1	
0	1	0	
0	1	1	
1	0	0	

c) Proof the Boolean algebra. (4 Marks)

$$(A + B)(A + C) = A + BC$$

d) Using the truth table for a logic gate represented below.

A	B
0	1
1	0

i) Draw the logic gate and label it appropriately. (4 Marks)
ii) Name the logic gate obtained. (2 Marks)

QUESTION FOUR (20 MARKS)

a) Briefly explain the following electrical quantities and state their SI units. (6 Marks)

i) Resistance
ii) Capacitance

b) The resistors $R_1 = 20\Omega$, $R_2 = 40\Omega$ and $R_3 = 10\ \Omega$ 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)

c) Show that:

$$A \cdot (A + B) = A$$ (4 Marks)

QUESTION FIVE (20 MARKS)

a) A computer memory can be volatile or non-volatile, explain the difference between the two. (2 Marks)

b) Describe the following categories of secondary memory. (6 Marks)

i) Magnetic disks
ii) Solid state disks
iii) Optical disks

c) Define number system. (2 Marks)

d) Convert the following numbers into their equivalent binary numbers.

i) $EA5_{16}$ (3 Marks)
ii) 125_{8} (3 Marks)
iii) 125_{10} (4 Marks)