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KIRIRI WOMEN'S UNIVERSITY OF SCIENCE AND TECHNOLOGY
UNIVERSITY EXAMINATIONS, 2023/2024 ACADEMIC YEAR
END OF SEMESTER EXAMINATIONS
FOR THE CERTIFICATE OF INFORMATION TECHNOLOGY

CIT 1009: BASIC ELECTRONICS

Date: April 2024

Time: 2 Hrs

INSTRUCTIONS TO CANDIDATES

ANSWER QUESTION ONE (COMPULSORY) AND ANY OTHER TWO QUESTIONS

QUESTION ONE - COMPULSORY (30 MARKS)

- a) Define an electrical circuit. (2 marks)
- b) Draw an open and closed circuits connected to a battery with a lamp connected to it. (6 marks)
- c) State the purpose of the following electrical components (4 marks)
- i) Battery
 - ii) Resistor
 - iii) Fuse
 - iv) Switch
- d) Logic gates important components used in construction of logic circuits used in digital systems. Identify three logic gates in the following Boolean expression and draw a logic diagram for the expression. (6 marks)

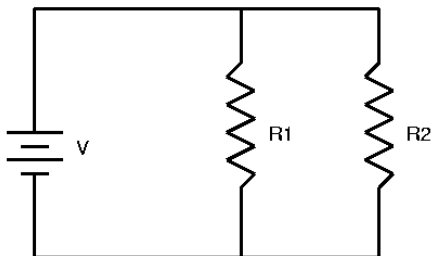
$$Y = AB + \bar{C}$$

- e) State two characteristics of each of the following number systems. (4 marks)
- i) Binary number System.
 - ii) Octal number System

- f) Convert the following to their equivalent decimal numbers. (6 marks)
- i) 1010_2
 - ii) 101_8
- g) Most of electrical wires used for domestic wiring are covered with an insulator material. State the importance of insulation. (2 marks)

QUESTION TWO (20 MARKS)

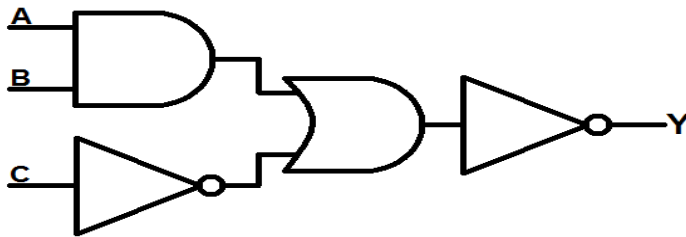
- a) Using a suitable diagram, show how a voltmeter and ammeter are connected in a circuit to measure the voltage and current passing through a resistor in an electrical circuit. (6 marks)
- b) State and explain any two electrical quantities. (4 marks)
- c) The figure below shows an electrical circuit with voltage source $V = 24V$ and resistors $R_1 = 30 \text{ Ohms}$ and $R_2 = 20 \text{ Ohms}$. Find



- i) Equivalent resistance in the circuit. (4 marks)
- ii) Current flowing through the circuit. (2 marks)
- iii) Current passing across R_1 (4 marks)

QUESTION THREE (20 MARKS)

- a) The following diagram shows a logic circuit.



- i) List the three logic gate used in the construction of this logic gate. (3 marks)
- ii) Write a logic expression for the output Y. (4 marks)
- iii) Which two logic gates can be replaced with a single gate from the above logic circuit without affecting the output. Draw the new logic circuit. (3 marks)

- b) Define truth table. (2 marks)
- c) Show that $A+AB = A$ using Boolean laws and theorems. (4 marks)
- d) Draw a truth table to support your answer in c above. (4 marks)

QUESTION FOUR (20 MARKS)

- a) Define memory and state three characteristics of computer memory. (4 marks)
- b) Primary memories are said to be volatile memories. What do we mean by volatile memory? (4 marks)
- c) State three advantages and three disadvantages of cache memory over primary memory. (6 marks)
- d) Classify the following examples of secondary storage as magnetic disk, solid state disk of optical disk. (6 marks)
 - i) Hard disk drive
 - ii) Pen drive
 - iii) Compact Disk
 - iv) Floppy disk
 - v) Flash disk
 - vi) Blue ray disk

QUESTION FIVE (20 MARKS)

- a) A 20 Ohm resistor is in series with two resistors that are connected in parallel. The series-parallel combination is connected to a 5V battery. The two resistors in parallel are 15 Ohms each.
 - i) Draw a well labeled circuit to illustrate the above circuit. (4 marks)
 - ii) Calculate the total resistance in the circuit and the current passing through the circuit above. (6 marks)

- b) Explain step wise the process of converting a decimal number to any other base number system. (4 marks)
- c) Convert the following numbers into their equivalent binary numbers. (4 marks)
- i) 701_8
 - ii) $A05_{16}$

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