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**KIRIRI WOMENS' UNIVERSITY OF SCIENCE AND TECHNOLOGY**  
**UNIVERSITY EXAMINATION, 2024/2025 ACADEMIC YEAR**  
**FIRST YEAR, SECOND SEMESTER EXAMINATION**  
**FOR THE CERTIFICATE IN INFORMATION TECHNOLOGY**  
**CIT 1009 BASIC ELECTRONICS**

Date: 5<sup>TH</sup> AUGUST 2024

Time: 11:30AM - 1:30PM

**INSTRUCTIONS TO CANDIDATES**

**ANSWER QUESTION ONE (COMPULSORY) AND ANY OTHER TWO QUESTIONS**

**QUESTION ONE (30 MARKS)**

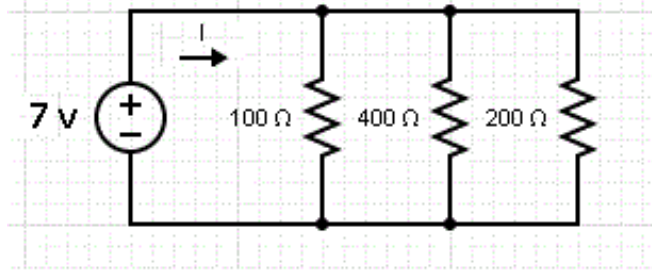
- a) State ohms' law. (2 Marks)
- b) State and explain the three main quantities of electricity. (3 Marks)
- c) Explain the role of electric circuit breakers in domestic wiring. (4 Marks)
- d) Semiconductor materials are very important in making electrical conducting materials, explain the two main types of semiconductor. (4 Marks)
- e) Cache memory is very useful in speeding up the functioning of CPU in computers. How does cache memory speed up the CPU? (4 Marks)
- f) Give two examples of each of them the following categories of secondary memory.
  - i) Hard disk memories (1 Mark)
  - ii) Optical memories (1 Mark)
  - iii) Solid state memories (1 Mark)
- g) Using truth table, proof that  $A+AB = A$ . (4 Marks)
- h) Perform the following number conversion.
  - i)  $A6_{16}$  to Binary (2 Marks)
  - ii)  $100_8$  to decimal (2 Marks)
  - iii)  $10110110$  to Octal (2 Marks)

**QUESTION TWO (20 MARKS)**

- a) You are given an ammeter and a voltmeter to measure the current and voltage passing through a resistor connected to a circuit. Using a suitable diagram(s), illustrate how you can determine these two electrical quantities across that resistor. (8 Marks)
- b) Explain the role of the following electrical components as used in different electronic devices for domestic purposes;
  - i) Fuse (2 Marks)
  - ii) Light Emitting Diode (LED) (2 Marks)
  - iii) Resistor (2 Marks)
- c) Binary codes are classified into different categories. State and briefly explain any categories of binary codes? (6 Marks)

### QUESTION THREE (20 MARKS)

- a) Three resistors  $R_1 = 100\Omega$ ,  $R_2 = 400\Omega$  and  $R_3 = 200\Omega$  are connected in parallel in a circuit with a 7 V voltage source as shown in the figure below



- i) Calculate the total resistance ( $R_T$ ). (4 Marks)  
ii) Calculate the current across the circuit. (2 Marks)  
iii) Calculate the current across the **100  $\Omega$**  resistor. (4 Marks)
- b) State the characteristics of each of the following number systems;  
i) Decimal Number System. (2 Marks)  
ii) Octal Number System (2 Marks)
- c) Perform the following binary number addition.  
i)  $100100 + 0111001$  (3 Marks)  
ii)  $10001111 + 10101010$  (3 Marks)

### QUESTION FOUR (20 MARKS)

- a) Draw the three commonly used logic gates and show their truth tables. (6 Marks)  
b) Using Boolean algebra laws and theorems, simplify the expression and show the logic circuit of the simplified expression.  
$$Y = ABC\bar{D} + \bar{A}B\bar{C}D + \bar{B}\bar{C}D$$
 (6 Marks)  
c) Simplify the below expressions using the truth table provided. (4 Marks)

A	B	$\bar{B}$	$\bar{A}\bar{B}$	$A\bar{B}$
1	0			
1	1			
0	0			
0	1			

- d) Define computer memory and explain the difference between volatile and non-volatile memories. (4 Marks)

### QUESTION FIVE (20 MARKS)

- a) 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.

0	0	0	0	1	1	0	1
A							
:	0	0	1	0	1	1	0
B							

(8 Marks)

- b) Using the concept of electric charges explain why an insulator is said to be poor conductor of electricity. (4 Marks)
- c) Given below is two octal numbers, find their equivalent hexadecimal numbers.  
i)  $25_8$  (4 Marks)  
ii)  $725_8$  (4 Marks)