

Basic Electronics for Computer Science - Q&A with Calculations

1. Ohm's Law

Formula: $V = I \times R$

Example: If current = 2A and resistance = 5Ohm, then:

$$V = 2 \times 5 = 10V$$

2. Power in an Electric Circuit

Formula: $P = V \times I$

Example: $V = 10V, I = 3A \rightarrow P = 10 \times 3 = 30W$

3. Resistors in Series and Parallel

Series: $R_m = R + R$

Example: $10\text{Ohm} + 20\text{Ohm} = 30\text{Ohm}$

Parallel: $1/R_m = 1/R + 1/R$

Example: $1/10 + 1/20 = 0.15 \rightarrow R_m = 6.67\text{Ohm}$

4. Capacitor Charge Formula

$Q = C \times V$

Example: $C = 100F = 100 \times 10^{-6} F, V = 5V \rightarrow Q = 0.0005 C$

5. Logic Gates Truth Table

A B | AND OR XOR

0 0 | 0 0 0

0 1 | 0 1 1

1 0 | 0 1 1

1 1 | 1 1 0

6. Binary to Decimal Conversion

Binary: $1010 \rightarrow 1 \times 2^3 + 0 \times 2^2 + 1 \times 2^1 + 0 \times 2^0 = 8 + 0 + 2 + 0 = 10$

7. Digital Storage Sizes

1 KB = 1024 bytes

1 MB = 1024 KB

1 GB = 1024 MB

1 TB = 1024 GB

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8. Transistor Use in Computers

Transistor acts as a switch/amplifier in digital circuits. Used in CPUs, RAM, and logic gates.

9. LED Circuit Current Calculation

Supply = 9V, LED Drop = 2V, Resistor = 330Ohm

Voltage across R = 7V -> Current = $7 / 330 = 21.2\text{mA}$

10. Frequency Formula

$f = 1 / T$

Example: $T = 0.01\text{s} \rightarrow f = 1 / 0.01 = 100\text{Hz}$