VTI1J2 – Bengkel Elektronika

Pertemuan#2

Pengenalan Komponen Elektronika I

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Doa sebelum belajar

الصَّالِحِيْنَ مِنَ وَاجْعَلْنِيْ فَهْمًا وَارْزُقْنِيْ عِلْمًا،زِدْنِي رَبِّ

الْعَالَمِيْنَ رَبَّ يا آمين

ROBBII ZIDNII 'ILMAA WARZUQNII FAHMAA WAJ'ALNII MINASH-SHOOLI_HIIN AMIIN YA ROBBAL 'AALAMIIN

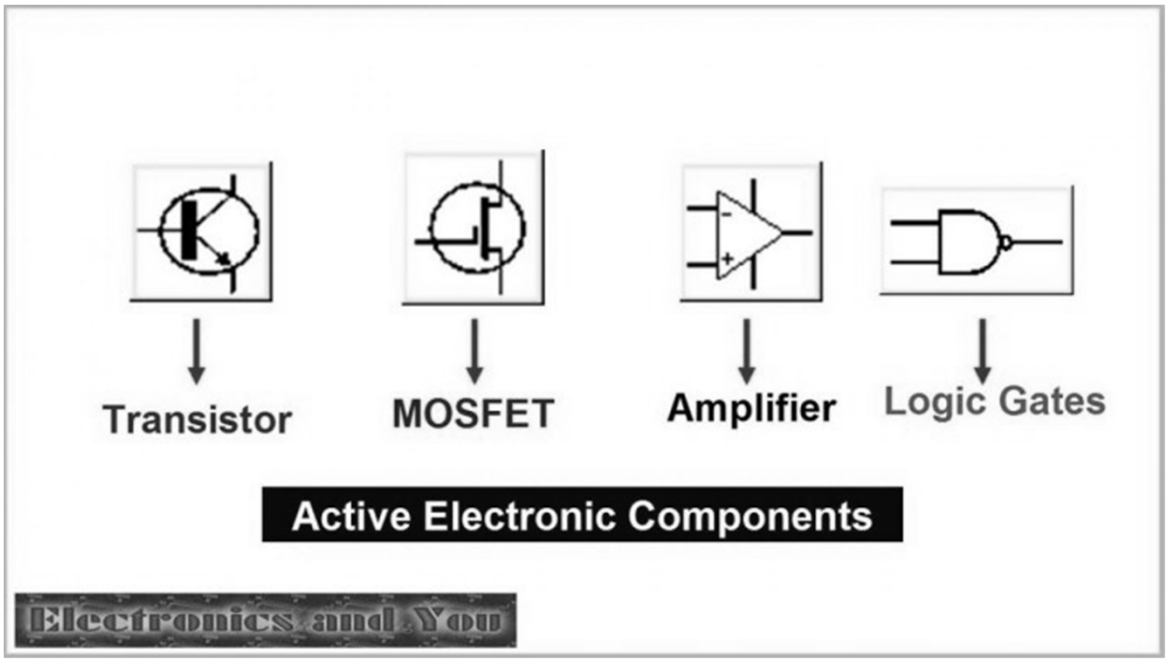
Terjemahan artinya :

Ya Allah Tambahkanlah aku ilmu, serta berilah aku karunia untuk dapat memahaminya Dan jadikanlah aku termasuk golongan orang-orang shaleh Ya Allah kabulkanlah do'aku ini.

Rangkaian Elektronika

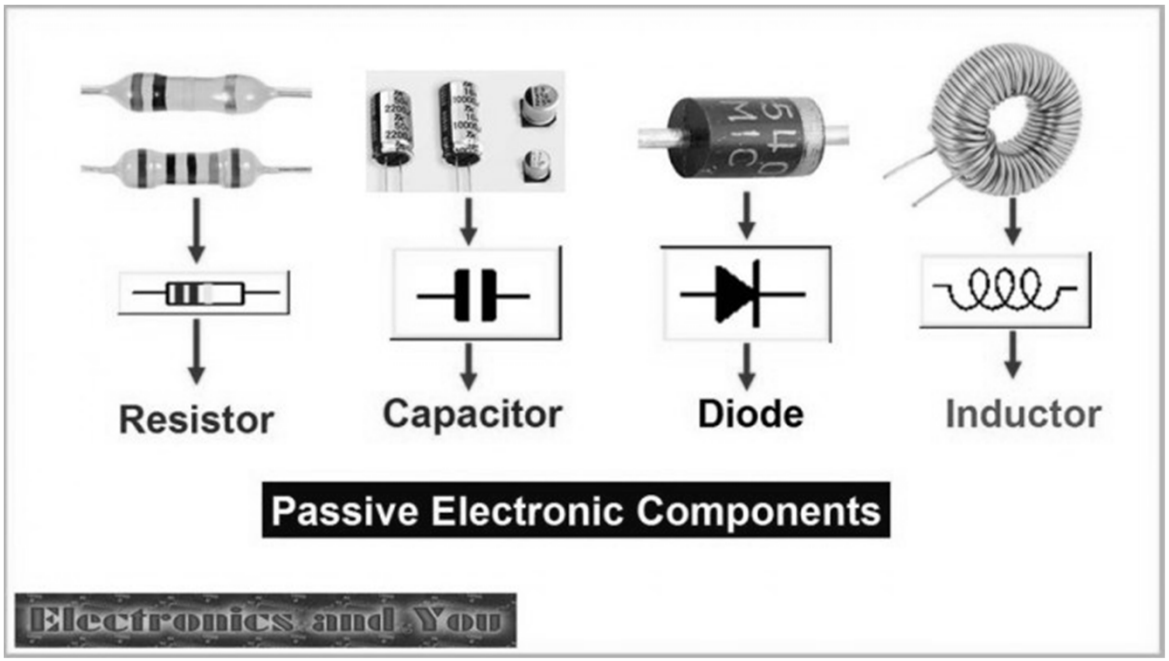
- Rangkaian Elektronika adalah sekumpulan bahan konduktor, isolator dan semikonduktor yang dihubungkan/dirangkai membentuk aliran listrik arus lemah untuk fungsi tertentu
- **Rangkaian Elektronika** adalah sebuah struktur untuk mengarahkan dan mengendalikan arus listrik agar dapat melakukan beberapa fungsi yang berguna.
- Rangkaian elektronik terdiri dari komponen elektronik berdiri sendiri, seperti resistor, transistor, kapasitor, induktor dan dioda, yang dihubungkan oleh kabel konduktif atau jalur sehingga arus listrik dapat mengalir mellauinya.
- Komponen-komponen ini dapat berupa through-hole atau SMD.
- Sebutan “rangkaian" menyiratkan bahwa strukturnya tertutup, seperti loop.
- Kombinasi komponen dan kabel memungkinkan berbagai operasi sederhana dan kompleks untuk dilakukan seperti: sinyal dapat diperkuat, komputasi dapat dilakukan, dan data dapat dipindahkan dari satu tempat ke tempat lain.
- Agar disebut sebagai elektronik, bukan listrik, umumnya setidaknya satu komponen aktif harus ada.

Komponen Elektronika Aktif



- Active electronic components are those that can control flow of electricity. Most PCB (***P**rinted **C**ircuit **B**oard*) have at least one active component.
- **Example**: Transistors, Integrated Circuits or ICs, Logic Gates, Vacuum Tubes, Silicon-Controlled Rectifiers (*SCRs*).

Komponen Elektronika Pasif

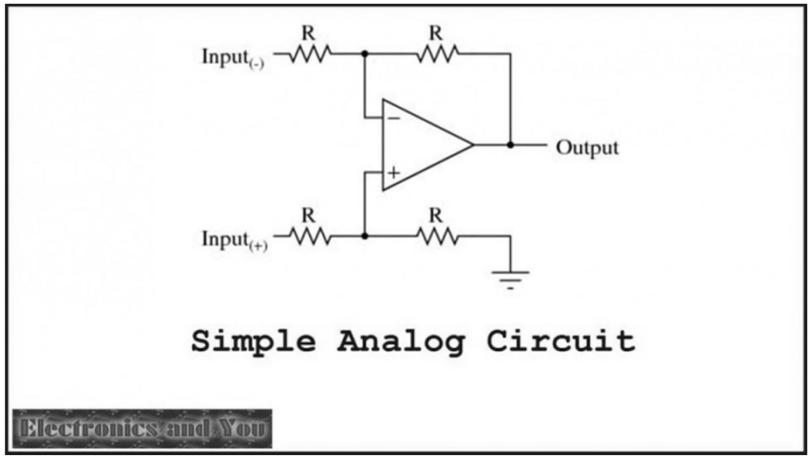


- Passive components are those that do not have gain or directionality. They are also called Electrical elements or electrical components.
- **Example**: Resistors, Capacitors, Diodes, Inductors.

Jenis Rangkaian Elektronika

- An electronic circuit can usually be categorized as an analog circuit, a digital circuit, or a mixed-signal circuit (a combination of analog circuits and digital circuits).
- The most widely used semiconductor device in electronic circuits is the MOSFET (metal-oxide-semiconductor field-effect transistor).[3]

Rangkaian Elektronika Analog

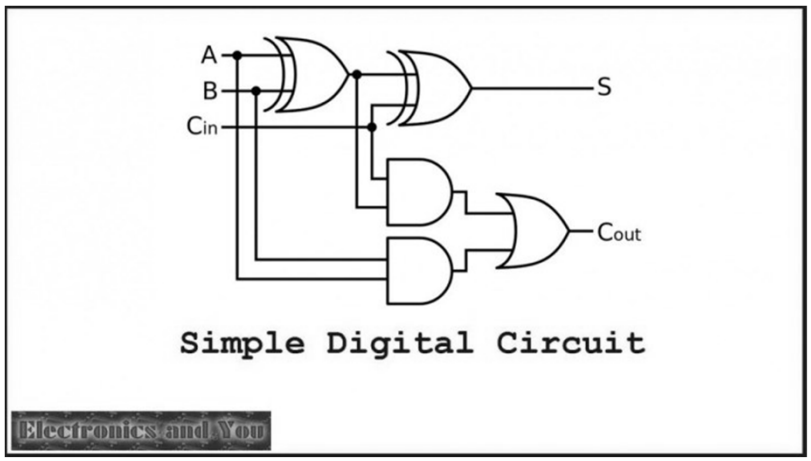


- Analog electronic circuits are those in which current or voltage may vary continuously with time to correspond to the information being represented.
- **Example**: Electronic Equipment like voltage amplifiers, power amplifiers, tuning circuits, radios, and televisions are mainly analog.
- Analog circuitry is constructed from two fundamental building blocks: series and parallel circuits.
- In a series circuit, the same current passes through a series of components. A string of Christmas lights is a good example of a series circuit: if one goes out, they all do.
- In a parallel circuit, all the components are connected to the same voltage, and the current divides between the various components according to their resistance.

Rangkaian Elektronika Analog

- The basic components of analog circuits are wires, resistors, capacitors, inductors, diodes, and transistors.
- (In 2012 it was demonstrated that memristors can be added to the list of available components.)
- Analog circuits are very commonly represented in schematic diagrams, in which wires are shown as lines, and each component has a unique symbol.
- Analog circuit analysis employs Kirchhoff's circuit laws: all the currents at a node (a place where wires meet), and the voltage around a closed loop of wires is 0.
- Wires are usually treated as ideal zero-voltage interconnections; any resistance or reactance is captured by explicitly adding a parasitic element, such as a discrete resistor or inductor.
- Active components such as transistors are often treated as controlled current or voltage sources: for example, a field-effect transistor can be modeled as a current source from the source to the drain, with the current controlled by the gate-source voltage.

Rangkaian Elektronika Digital



- In digital electronic circuits, electric signals take on discrete values, to represent logical and numeric values.[4]
- These values represent the information that is being processed. In the vast majority of cases, binary encoding is used: one voltage (typically the more positive value) represents a binary '1' and another voltage (usually a value near the ground potential, 0 V) represents a binary '0'.
- Digital circuits make extensive use of transistors, interconnected to create logic gates that provide the functions of Boolean logic: AND, NAND, OR, NOR, XOR and combinations thereof. Transistors interconnected so as to provide positive feedback are used as latches and flip flops, circuits that have two or more metastable states, and remain in one of these states until changed by an external input.
- Digital circuits therefore can provide logic and memory, enabling them to perform arbitrary computational functions. (Memory based on flip-flops is known as static random-access memory (SRAM). Memory based on the storage of charge in a capacitor, dynamic random-access memory (DRAM) is also widely used.)

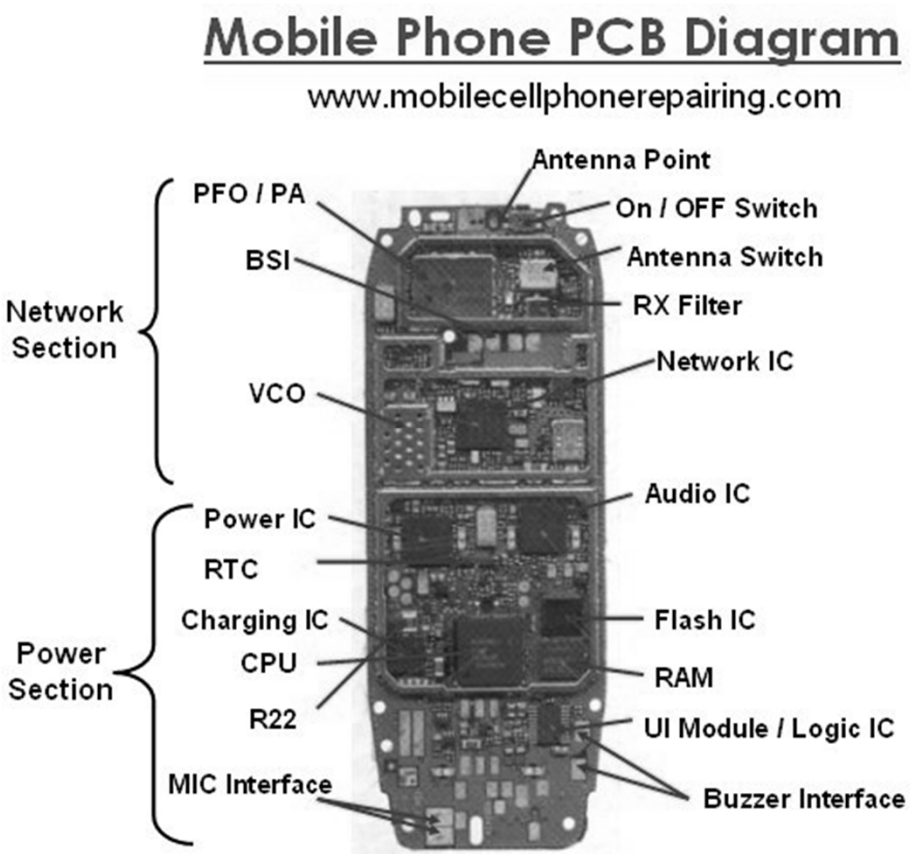
Rangkaian Elektronika Digital

- The design process for digital circuits is fundamentally different from the process for analog circuits.
- Each logic gate regenerates the binary signal, so the designer need not account for distortion, gain control, offset voltages, and other concerns faced in an analog design. As a consequence, extremely complex digital circuits, with billions of logic elements integrated on a single silicon chip, can be fabricated at low cost.
- Such digital integrated circuits are ubiquitous in modern electronic devices, such as calculators, mobile phone handsets, and computers. As digital circuits become more complex, issues of time delay, logic races, power dissipation, non-ideal switching, on-chip and inter-chip loading, and leakage currents, become limitations to circuit density, speed and performance.

Rangkaian Elektronika Digital

- Digital circuitry is used to create general purpose computing chips, such as microprocessors, and custom-designed logic circuits, known as application-specific integrated circuit (ASICs). Field-programmable gate arrays (FPGAs), chips with logic circuitry whose configuration can be modified after fabrication, are also widely used in prototyping and development.

Rangkaian Elektronika *Mixed-Signal*



NOTES:

1. **UEM** = Logic IC + Charging IC + Audio IC + Power IC
2. **PFO** = Antenna Switch + PFO
3. **Flash IC** = RAM + Flash IC

- Mixed-Signal Circuit, are also called hybrid circuits, contain elements and properties of both Analog Circuit and Digital Circuit.
- A mixed-signal IC or Chip is an IC with both Analog Circuits and Digital Circuits on the same semiconductor die.
- Mixed-signal or hybrid circuits contain elements of both analog and digital circuits. Examples include comparators, timers, phase-locked loops, analog-to-digital converters, and digital-to-analog converters.
- Most modern radio and communications circuitry uses mixed signal circuits. For example, in a receiver, analog circuitry is used to amplify and frequency-convert signals so that they reach a suitable state to be converted into digital values, after which further signal processing can be performed in the digital domain.
- These Mixed-signal ICs does processing of analog and digital signals together.
- Example: Modern 3G, 4G and 5G Smartphones, Wireless Communication, Data converters, Analog-to-digital converter, Digital-to-analog converter, Digital Radio, LAN, WAN.

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TERIMA KASIH

Ada Pertanyaan?