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(1)One key factor that differentiates types of electronic components from each other is whether they are passive or active. (2)However, many people are unsure of exactly what that difference involves.

(3)*Active components* are parts of a circuit that rely on an external power source to control or modify electrical signals. (4)Active components such as transistors and silicon-controlled rectifiers (SCRs) use electricity to control electricity.

(5)*Passive components* like resistors, transformers, and diodes don't need an external power source to function. (6)These components use some other property to control the electrical signal. (7)As a result, they only require the current traveling through the connected circuit. (8)Resistors impede the flow of electrons without introducing more electricity into the system.

(9)Passive components can't process and can't amplify the electrical signal. (10)Passive component don't supply or control the power, it consumes the power. (11)Those elements can't change the waveform of electrical energy, called Passive elements.

(12)Example – Resistor (R), Inductor (L), and Capacitor are Passive components. (13)All possible electrical components except R, L and C are active components.

(14)Only nine types of elements (memristor* not included), five passive and four active, are required to model any electrical component or circuit. (15)Each element is defined by a relation between the state variables of the network: current, voltage, charge, and magnetic flux.

(16)There are two sources: current source and voltage source. (17)Current source, measured in amperes – produces a current in a conductor. (18)It affects charge according to the relation. (19)Voltage source, measured in volts – produces a potential difference between two points. (20)It affects magnetic flux* according to the relation.

(21)This relationship does not necessarily represent anything physically meaningful. (22)In the case of the current generator, the time integral of current, represents the quantity of electric charge physically delivered by the generator. (23)Here is the time integral of voltage that represents a physical quantity and depends on the nature of the voltage source. (24)For a voltage generated by magnetic induction it is meaningful, but for an electrochemical source, or a voltage that is the

output of another circuit, no physical meaning is attached to it. (25)Both these elements are necessarily non-linear elements.

(26)Three passive elements:

Resistance, measured in ohms – produces a voltage proportional to the current flowing through the element. (27)Relates voltage and current according to the relation.

(28)Resistors are the passive components used in the electrical circuits to reduce the flow of electric current to certain level. (29)The ability to restrict the flow of electric current is called resistance. (30)The resistors with high resistance value will restrict large amount of electric current whereas the resistors with low resistance value will restrict only a small amount of electric current.

(31)*Capacitance*, measured in farads – produces a current proportional to the rate of change of voltage across the element. (32)Relates charge and voltage according to the relation.

(33)A capacitor (formerly known as condenser) is a passive electronic component consisting of a pair of conductors separated by a dielectric (insulator). (34)When a potential difference (voltage) exists across the conductors, an electric field is present in the dielectric. (35)This field stores energy and produces a mechanical force between the conductors. (36)The effect is greatest when there is a narrow separation between large areas of conductor, hence capacitor conductors are often called plates.

(37)*Inductance*, measured in henries – produces the magnetic flux proportional to the rate of current change through the element. (38)Relates flux and current according to the relation.

(39)An inductor's ability to store magnetic energy is measured by its inductance. (40)The inductance of a coil is directly proportional to the number of turns in the coil. (41)Inductance also varies with the coil's radius and the material (or "core") around which the coil is wound.

(42)Inductors are used in electronic circuits to reduce or oppose the change in electric current. (43)In a DC circuit, an inductor looks like a wire. (44)It has no effect when the current is constant. (45)Inductance only has an effect when the current is changing as in an AC circuit.

*memristor = memory resistor - мемристор, запоминающий резистор

*flux - поток