1. What were the most important facts for the development of electronics? microelectronics?
2. What is the major difference between electronic systems and microelectronic devices?

The major difference between electronic systems and microelectronic devices is the integration and scale of components. Electronic systems are assembled from separately manufactured components wired together, whereas(поскольку) microelectronic devices integrate all circuit elements and their interconnections on a single substrate in one series of operations. This integration in microelectronic devices results in greater compactness, improved performance, and faster speed due to the reduced size and distance between components.

 **Electronic Systems**: "The components were manufactured separately and then the complete device was assembled by wiring the components together with metallic conductors. It was no good: the more components and interactions, the less reliable the system"​​.

 **Microelectronic Devices**: "Due to that technology all circuit elements and their interconnections were fabricated on а single substrate in а single series of operations"​​.

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1. **What is a transistor? When was the first practical transistor built?**

A transistor is defined as "an electronic component used in a circuit to control a large amount of current or voltage with a small amount of voltage or current. This means that it can be used to amplify or switch (rectify) electrical signals or power".

The first practical point-contact transistor was built in 1948 by William Bradford Shockley, John Bardeen, and Walter House Brattain.

1. **Why could not early transistors satisfy the needs of the growing high-speed computers industry and microwave communication systems?**

Early transistors "could respond at a rate of a few million times a second; this was fast enough to serve in radio and hearing-aid circuits but far below the speed needed for high-speed computers or for microwave communication systems"

1. What are the advantages of transistors compared to vacuum tubes?

Compared to the vacuum tubes that were used previously, the transistor was an amazing advance. Smaller in size, the transistor could easily be manufactured cheaply in large quantities. They had various operational advantages, as well, which are too numerous to mention here

1. "Exceedingly low power consumption"

2. "Greater reliability"

3. "Longer life"

1. What new possibilities did the advent of the transistor open

По смыслу 5ого

1. What are the main types of transistors? Where are transistors used?

• Bipolar junction transistor (BJ T)

• metal-oxide-semiconductor field-effect transistor – MOSFET.

The npn and pnp transistors make up the class of devices

called junction transistors.

Virtually every modern electronic device has a transistor as one of its primary active components. Computers, phones, and other devices couldn't exist without transistors as they are the building blocks of microchips

1. Why is the size of transistors of prime importance?

The speed of response and performance depends primarily on the size of the transistor: the smaller the transistor, the faster it is

1. What are the principal elements of electronic circuits?

The principal elements of electronic circuits are resistors, capacitors, transistors.

1. What technological processes are used in the fabrication of integrated circuits?

In the fabrication are used Deposition, Lithography, Photoresist coating, Exposure, Etching, Spin, rinse, and dry, Ion implantation, Ashing and Packaging.

1. Why does the IC package play a fundamental role in the operation and performance of a component?

The IC package plays a fundamental role because it protects the internal circuit from physical damage and contamination, provides the necessary electrical connections to external circuits, and helps in the dissipation of heat generated by the circuit during operation.

1. What IC packaging techniques are used nowadays?

IC packaging techniques used nowadays include

 **Surface-mount**: This approach has replaced traditional dual-in-line, through-hole mounted packages.

 **Ball-grid array**: Another modern technique mentioned as an alternative to older methods.

 **Multichip module techniques**: This is also listed as one of the contemporary packaging methods.

1. What are the main requirements for a good IC package?

 **Mechanical Protection**: To protect the die from physical damage.

 **Thermal Dissipation**: To effectively dissipate the heat generated by the IC.

 **Electrical Connection**: To ensure reliable electrical connections between the IC and the external circuit.

 **Low cost​**

1. What are the most common materials used for the IC package body?

The most common materials used for the IC package body are ceramics (AL2O3) and polymers(plastic)

1. What interconnection strategy does the traditional packaging approach use?

The traditional packaging approach uses a two-level interconnection strategy. The die is first attached to a chip carrier or substrate, mounted in a cavity within the package body. The leads then connect the chip to the global interconnect medium, typically a PC board.

1. How does the packaging technology influence the performance of a processor?

good packaging technology reduces internal signal delay and this increases performance

the more heat is dissipated, the greater the performance so

1. What can you say about the steady reduction of IC feature sizes

I can say that steady reduction of IC sizes is the key to higher performance but we have limit of size the transistor

1. What has allowed the integration of more and more devices on the same chip?

The integration of more and more devices on the same chip is allowed by the increasing pin count and advancements in packaging technology.

1. What are the dominant factors limiting device performance?

The dominant factors limiting device performance include packaging delays and inductive or capacitive parasitic.

1. **L**
2. **Lll**
3. **L**
4. **L**
5. **L**
6. **L**
7. **L**
8. **L**