Exam topic

Microelectronics

Microelectronics is a result of electronic technology evolution. Smaller and smaller electronic components perform increasingly complex electronic functions at higher speeds. Microelectronic is applied to the realization of electronic circuits, subsystems, or the entire systems from extremely small electronic devices. The terms "microelectronics" and "integrated circuits" are sometimes used interchangeably, but this is not correct.

Microelectronics is a name for extremely small electronic components and circuit assemblies, made by thin-film, thick-film or semiconductor techniques.

An integrated circuit is a special kind of microelectronics. It is a circuit that has been fabricated as an inseparable assembly of electronic elements in a single structure. It cannot be divided without destroying its planned electronic function. Thus, all ICs come under the general category of microelectronics, but all microelectronic units are not necessarily ICs.

The potential of ICs is so wide that they are responsible for creating a completely new technology of circuit design.

There are two basic approaches to modern microelectronics - monolithic ICs and film circuits.

In monolithic ISs all circuit elements, active and passive, are simultaneously formed in a single small wafer of silicon. The elements are interconnected by metallic stripes deposited onto the oxidized surface of the silicon wafer.

Film circuits are made by forming the passive electronic component and metallic interconnections on the surface of an insulation substrate. Then the active semiconductor devices are added. There are two types of film circuits, thin and thick film circuits.

In thin film circuits the passive component and interconnections are formed on glass or ceramic substrates, using evaporation technique. The active components (transistors and diodes) are fabricated as separate semiconductor wafers and assembled into the circuit.

Thick film circuits are prepared in a similar manner except that the passive components and wiring are formed by silk-screen techniques on ceramic substrates.

There are many instances where the microelectronic circuit may combine more that one of these approaches in a single structure, using a combination of techniques.

Integrated circuit technology is evolving so rapid that even a period of six months can produce a significant change in this field.