

BAPIAHT 4

1. Read the text and decide if the statements below are true or false.

The fastest bipolar transistors contain germanium in their bases, which lets them run in excess of 350 GHz, which is much faster than ordinary silicon bipolar devices can go. Built perpendicular to the substrate, they consist of the emitter on top, the base in the middle, and the collector at the bottom. Below the collector is a heavily doped region called the subcollector that provides a low-resistance path to the collector contact on the chip surface. This vertical structure allows the base to be very thin and to be doped with germanium to get the highest speeds. Ideally, designers would like to put these devices on the same SOI wafers as the digital CMOS devices. But to do that, the bipolar transistor must fit into the thin layer of silicon at the top of the chip. The basic problem is that the basic bipolar device is about 2 nm thick, with most of that thickness due to the subcollector. That's far too thick to build into an SOI wafer, where the top silicon layer is only about 0.1 nm thick. The last attempts to build bipolar transistors on SOI wafers have turned the devices on their sides so that the emitter, base, and collector are built into the substrate. In these lateral transistors, the bases are thicker than those in the vertical devices and, most important, cannot be doped with germanium. As a result, they are slower and consume more power.

1. The fastest bipolar transistors can run in excess of 350 mHz. **T**
2. Due to germanium doping, the highest transistor speeds can be achieved. **T**
3. Efforts made to build bipolar transistors on SOI wafers have turned the devices on their sides. **F**
4. Bipolar devices consist of the emitter on top, the collector in the middle, and the base at the bottom. **F**
5. The fastest unipolar transistors contain germanium in their bases. **F**

2. Read the text and fill in the gaps with the appropriate words.

Ambrose Fleming was born in Lancaster and educated at University College School, London, and University College London. In 1892, Fleming presented an important **paper** on electrical transformer theory to the Institution of Electrical Engineers in London. In November 1904, Ambrose Fleming **invented** and patented the two-electrode vacuum-tube rectifier, which he called the oscillation valve. It was also called a thermionic valve, vacuum diode, kenotron, thermionic tube, or Fleming valve. The Supreme Court later **certified** the patent because of an improper disclaimer. This invention is often considered to have been the beginning of electronics, for this was the first vacuum tube. Fleming's diode was used in radio receivers and radars for many decades afterwards, until solid-state electronic technology took over more than 50 years later. Fleming also **known** in the fields of photometry, electronics, wireless telegraphy (radio), and electrical measurements. He was knighted in 1929, and he died at his home in Sidmouth in 1945. His contributions to electronic communications and radar were of vital importance in winning World War II. Fleming was **awarded** the IRE Medal of Honor in 1933 for "the conspicuous part he played in introducing physical and engineering principles into the radio art."

1. a) news
b) studies
c) paper
2. a) invented
b) conceived
c) imagined
3. a) legalized
b) certified
c) invalidated
4. a) supplied
b) known
c) contributed
5. a) congratulated
b) awarded
c) praised

3. Fill in the gaps in the sentences with the appropriate words.

1. The p-n junction possesses some interesting properties which have useful **applications** in modern electronics.
a) purposes
b) stages
c) applications
2. The term **junction** refers to the region where the two regions of the semiconductor meet.
a) connection
b) transition
c) junction
3. A common type of transistor, the bipolar junction transistor, consists of two p-n junctions in series, for example in the form n-p-n; no current can **flow** through it unless a separate small voltage is applied to the middle layer.
a) flow
b) run
c) carry
4. Steinmetz made a key **contribution** to the profession.
a) deposit
b) investment
c) contribution
5. NPN transistors consist of a **layer** of P-doped semiconductor (the "base") between two N-doped layers.
a) coating
b) covering
c) layer
6. Most bipolar transistors are designed to afford the greatest common-emitter current **gain**.
a) impulse
b) gain
c) load
7. Electrons flow from the source terminal towards the drain terminal if influenced by an applied **voltage**.
a) voltage
b) force
c) resistance
8. When the p-n junction is forward-biased, electric **power** flows freely due to reduced resistance of the p-n junction.
a) power
b) charge

c) stream

9. N-type semiconductor has a(n) **surplus** of free electrons compared to the P-type region.

a) overload

b) surplus

c) excess

10. The electric field created by the space charge region opposes the diffusion process for both electrons and **holes**.

a) vents

b) holes

c) openings

4. Fill in the gaps in the sentences with the appropriate forms of the verb.

1. After _____ to California Institute of Technology for a short while, in 1956 Shockley moved to Mountain View, California and created Shockley Semiconductor Laboratory.

a) returned

b) returning

c) being returned

2. Cathode ray tubes _____ still as display devices in television sets, video monitors, and oscilloscopes.

a) are used

b) will be used

c) were used

3. The gate terminal _____ to control the opening and closing of a physical gate.

a) is thought

b) was thought

c) thinks

4. Electronics engineers _____ with using electricity to transmit information.

a) are concerned

b) concern

c) concerning

5. Julius Edgar Lilienfeld is believed _____ field-effect transistors in 1925.

a) to have invented

b) to invent

c) to be invented

6. A p-n junction is a junction formed by _____ P-type and N-type semiconductors together in very close contact.

a) to combine

b) being combined

c) combining

7. Biosensors can monitor rapid changes in concentrations of sugars if the interaction with the biological molecule in the sensor _____ fast enough.

a) will be

b) is

c) was

8. Careful attention is expected _____ to the construction of low-power wireless communication ICs.

a) to be paid

b) to pay

c) to have paid

9. The frequency at which the quartz crystal vibrates would change if anything _____ to the crystal's surface.

a) stuck

b) sticks

c) will stick

10. Semiconductor doping was developed by John Robert Woodyard _____ at Sperry Gyroscope Company during World War II.

a) being worked

b) working

c) worked

5. Choose the correct translation of the following sentences.

1. Відомо, що КМОН це технологія побудови інтегральних схем.

a) CMOS is known a technology for constructing integrated circuits.

b) CMOS known to be a technology for constructing integrated circuits.

c) CMOS is known to be a technology for constructing integrated circuits.

2. Біполярний транзистор це трьохелектродний напівпровідниковий прилад, виготовлений з легованого напівпровідникового матеріалу.

a) A bipolar transistor is a three-terminal electronic device constructed of doped semiconductor material.

b) A bipolar transistor is a three-terminal electronic device being constructed of doped semiconductor material.

c) A bipolar transistor is a three-terminal electronic device constructed of doping semiconductor material.

3. Якби на цьому тижні у нас було достатньо часу, ми б повторили цей експеримент.

a) If we have enough time this week, we will repeat this experiment.

b) If we had enough time this week, we would repeat this experiment.

c) If we had had enough time this week, we would have repeated this experiment.

4. Шоклі у 1953 р. почав організовувати дослідну команду, щоб створити кремнієвий транзистор.

a) In 1953 Shokley started to build a new research team fabricating silicon transistors.

b) In 1953 Shokley started building a new research team to fabricate silicon transistors.

c) In 1953 Shokley started building a new research team to fabricating silicon transistors.

5. Речовини, що були протестовані, описані у звіті.

a) Substances tested are described in the report.

b) Substances being tested are described in the report.

c) Substances testing are described in the report.

6. Choose the correct translation of the following sentences.

1. The scientists are reported to be able to build their circuits on wafer to eliminate the thick subcollector layer.

a) Вчені повідомили, що вони мають можливість побудувати схеми на підкладці для усунення товстого шару субколектора.

b) Повідомляють, що вчені мають можливість побудувати схеми на підкладці для усунення товстого шару субколектора.

c) Вчених повідомили, що є можливість побудувати схеми на підкладці для усунення товстого шару субколектора.

2. NiCad cells are known to be used in many cordless appliances such as portable phones.

a) Відомо, що нікель-кадмієві батареї використовуються в багатьох бездротових пристроях, таких як портативні телефони.

b) Нікель-кадмієві батареї відомі завдяки використанню в багатьох бездротових пристроях, таких як портативні телефони.

c) Знають, що нікель-кадмієві батареї використовуються в багатьох бездротових пристроях, таких як портативні телефони.

3. Silicon Valley is considered to be home to a rapidly growing electronics industry.

a) Силіконова долина вважається будинком для електронної промисловості, що швидко зростає.

b) Кремнієва Силіконова долина вважається будинком для електронної промисловості, що швидко зростає.

c) Силіконова долина вважалася будинком для електронної промисловості, що швидко зростає.

4. The Memex is a conceptual precursor of hypertext.

a) Мемекс є концептуальним послідовником гіпертексту.

b) Мемекс є концептуальним продовжувачем гіпертексту.

c) Мемекс є концептуальним попередником гіпертексту.

5. If the lecture is not very interesting, students won't listen to it with great attention.

a) Якщо лекція не дуже цікава, студенти не будуть слухати її уважно.

b) Якщо лекція не дуже цікава, студенти не слухають її уважно.

c) Якщо лекція не була б цікавою, студенти не слухали б її уважно.