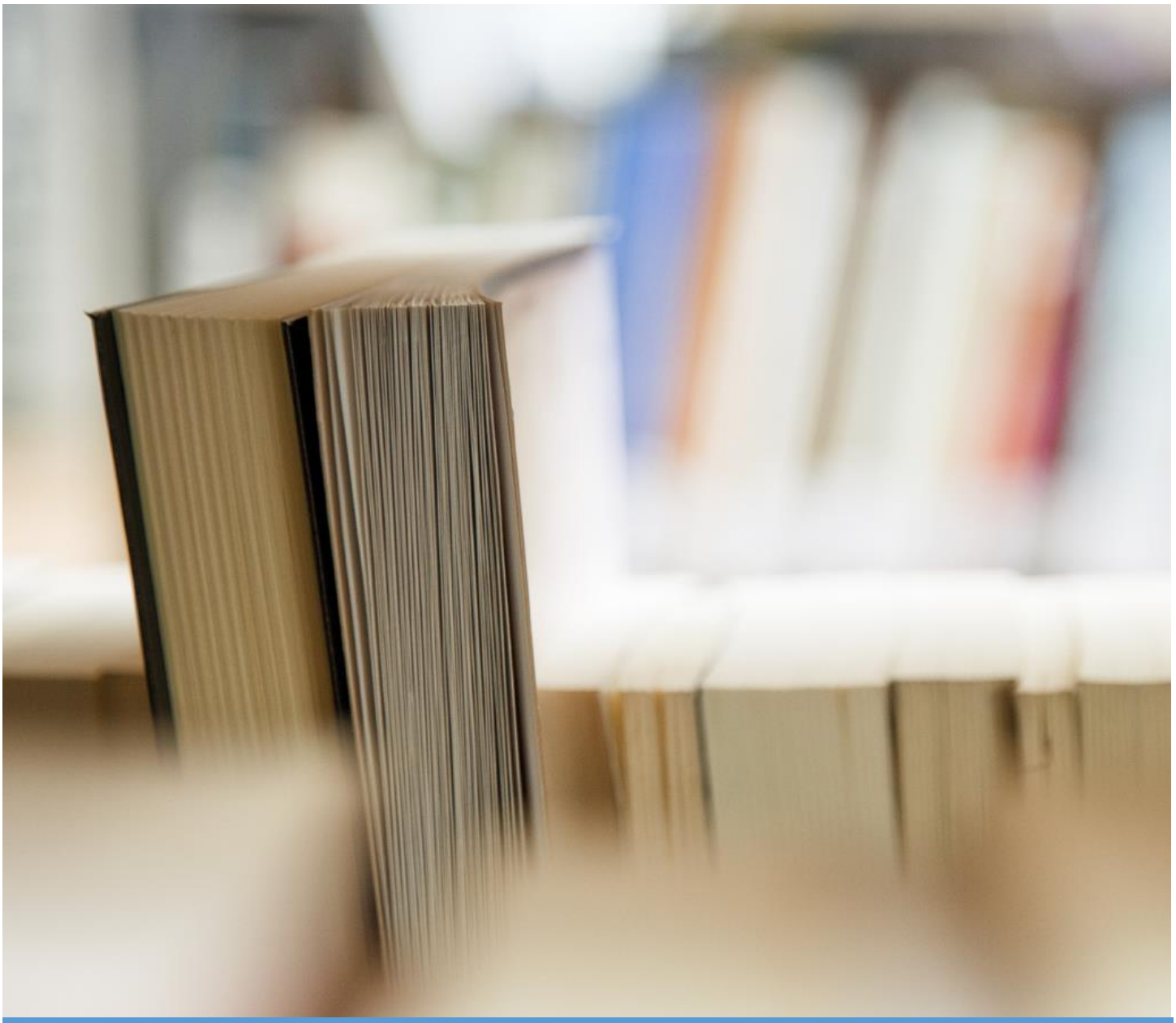


FUNDAMENTALS OF ELECTRICAL AND ELECTRONICS ENGINEERING

2 MARKS IMP QUESTIONS

PARUL UNIVERSITY

DIPLOMA STUDIES

ELECTRICAL ENGINEERING DEPATEMENT

2 MARKS IMP QUESTIONS

2 MARKS QUESTIONS

1. What are the active components? Give example of it.

Answer: An active component is an electronic component which supplies energy to a circuit or ability to control electron flow (i.e., the flow of charge). All electronic circuits must contain at least one active component.

Active component has two types:

- Energy source: Voltage source and current source.
- Signal processing component which can process the electrical signal.
- All different types of transistors (BJT, FET, MOSFET, JFET)
- Diodes (Zener diode, photo diode, LED etc.)

2. Define SCR and give application of it.

Answer: **Silicon Controlled Rectifiers or SCRs** for short is a type of power electronics switch. It has three terminals called Anode, Cathode, and Gate. By default, the switch is open and no current flows between the Anode and Cathode terminals of the SCR. When a small current is applied to the gate pin, the switch is closed and a large amount of current can be allowed to pass between the Anode and Cathode terminals.

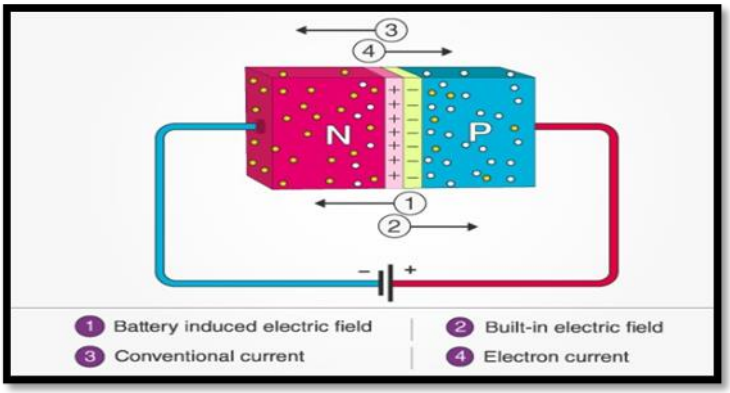
SCRs are mainly used in devices where the control of high power possibly coupled with high voltage, is demanded. Their operation makes them suitable for use in medium – to – high voltage AC Power control applications, such as lamp dimming, power regulators and motor control.

3. Define forward bias with diagram.

Answer: When the p-type is connected to the battery's positive terminal and the n-type to the negative terminal, then the P-N junction is said to be forward-biased. When the P-N junction is forward biased, the built-in electric field at the P-N junction and the applied electric field are in opposite directions.

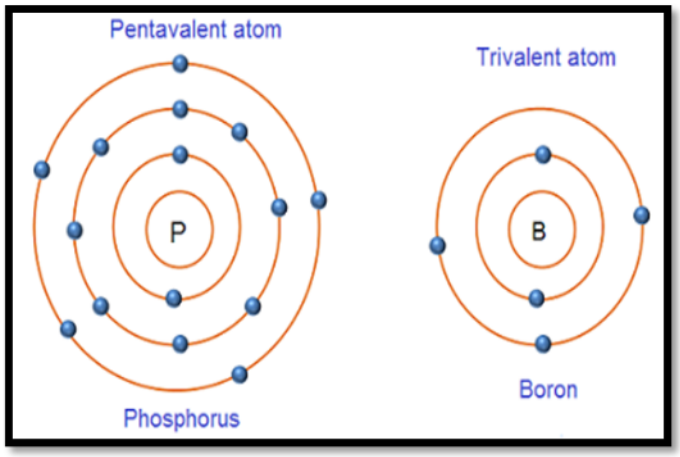
When both the electric fields add up, the resultant electric field has a magnitude lesser than the built-in electric field.

This results in a less resistive and thinner depletion region. The depletion region's resistance becomes negligible when the applied voltage is large. In silicon, at the voltage of 0.6 V, the resistance of the depletion region becomes completely negligible, and the current flows across it unimpeded.



4. Give example of pentavalent impurities.

Answer: Pentavalent impurity atoms have 5 valence electrons. The various examples of pentavalent impurity atoms include Phosphorus (P), Arsenic (As), Antimony (Sb), etc. The atomic structure of pentavalent atom (phosphorus) and trivalent atom (boron) is shown in below fig.



Phosphorus is a substance consisting of atoms which all have the same number of protons. The atomic number of phosphorus is 15 i.e. 15 protons. The number of protons in the nucleus of an atom is called atomic number.
Phosphorus atom has 15 electrons (2 electrons in first orbit, 8 electrons in second orbit and 5 electrons in the outermost orbit).

5. Convert (11010110) binary to octa.

Answer:

$(11010110)_2 = (326)_8$

Step by step solution

Step 1: Write down the binary number

$(011010110)_2$

Group all the digits in sets of three starting from the LSB (far right). Add zeros to the left of the last digit if there aren't enough digits to make a set of three.

011 010 110

Step 2: Use the table below to convert each set of three into an octal digit. In this case,

011=3, 010=2, 110=6.

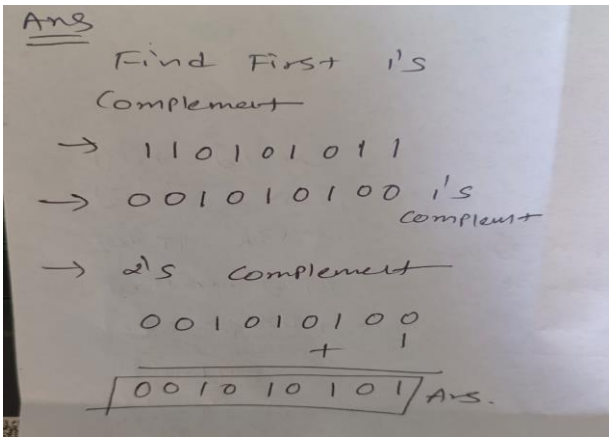
So, the number 326 is the octal equivalent to 11010110 in binary.

To convert from binary to octal use the following table:

Bin:	000	001	010	011	100	101	110	111
Octal:	0	1	2	3	4	5	6	7

6. Find 2's complement of (110101011)2.

Answer:



7. Define the following terms 1) Electric current 2) Potential Differences.

Answer: Electric current: If there are less than 4 electrons in the outer orbit of the atomic structure they are known as free electrons, this free electron is having tendency to move from one atom to another atom when they experience any external force. Free electrons are electrically charged. This movement of free electrons are termed as electric current.

Potential Difference: Work required to be done (or energy needed) to move unite positive charge from one point to another in the circuit is called voltage or the potential difference.

Voltage = work or energy/charge. (Voltage = W/Q)

8. Define the term 1) e.m.f 2) Resistance.

Answer: E.M.F: Flow of electric charge is essential to make current to flow through a conductor. So, it is necessary to do work. And to do work, energy is required. This energy is supplied by battery. This is called electro motive force.
The force required to move the electrons from one point to another point is called electro motive force. **Its unit is volt and represented by a letter E.**

Resistance: The property of a material to oppose the flow of electric current through it is called resistance. When a conductor is given emf, electric current flows due to the flow of free electrons. When these electrons move, they collide with the atoms. So, flow of electric current is opposed. Due to this Collison, some kinetic energy is converted in to heat energy. Crystalline structures of different materials are different. So, all materials do not oppose the flow of electric current equally. That means resistance of different material is different.

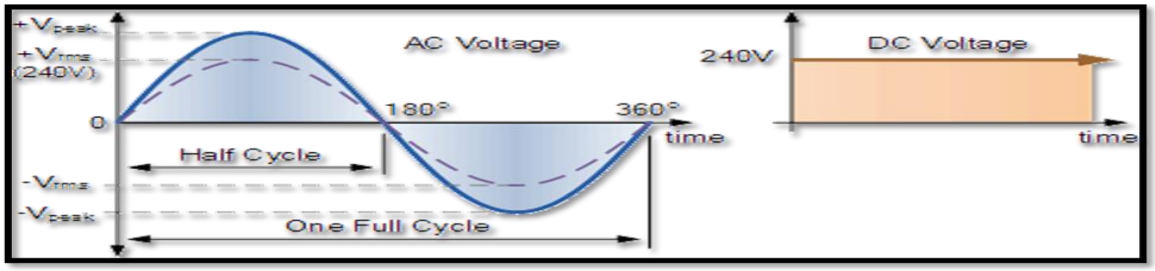
It is denoted by letter R. Its unit is ohm (Ω).

R= V/I

9. Define the term 1) Cycle 2) Frequency.

Answer: Cycle: The emf induced increases from zero in one direction, becomes maximum and then reduce to zero. Afterwards, it increases in

opposite direction, becomes maximum and then becomes zero. Afterwards it is repeated. This one complete alternation is called the cycle.



Frequency: it is the number of cycles completed in one second. It is represented by symbol f and its unit is Hertz. in our country frequency used is 50Hz, while in USA it is 60Hz. In electronic oscillators very high frequency is used. it is in the range of KHz and MHz.

$$f = \frac{1}{T}$$

10. Define R.M.S value of A.C quantity.

Answer: R.M.S Value: We have seen that the value of the alternating quantity changes instantaneously. Its effective value is represented by RMS value. For this heating effect of electric current is taken in to account.

Let us assume that certain value of alternating current flows through a resistor for some period and as a result certain amount of heat is generated. Now we pass direct current through the same value of the resistor for the same time period to produce the same amount of heat. Then this value of direct current is known as effective value or RMS value of the alternating current.

"Thus, RMS value of the alternating current is defined as that value of the direct current which is required to be passed through a resistor to produce the same amount of heat produced by the alternating current when passed for the same period through the same value of resistor."

I RMS = 0.707 Im

11. Define Transformer.

Answer: A transformer is a device used in the power transmission of electric energy. The transmission current is AC. It is commonly used to increase or decrease the supply voltage without a change in the frequency of AC between circuits. The transformer works on basic principles of electromagnetic induction and mutual induction.

12. Give working principle of induction motor.

Answer: The motor which works on the principle of electromagnetic induction is known as the induction motor. The electromagnetic induction is the phenomenon in which the electromotive force induces across the electrical conductor when it is placed in a rotating magnetic field.

13. Define average value of A.C quantity.

Answer: **Average Value:** Average value is found by considering the charge transfer. **Average value of electric current is defined as that value of direct current which transfer the same amount of charge in a circuit which is transmitted by an alternating current flowing through the same circuit for the same period.**

The average value is fund by taking the area under the curve and dividing it by the base. Now for alternating waveform the sum of areas becomes zero, as there are two loops of equal area in positive and negative direction. So the average value is found by taking the area of one loop and dividing it by the corresponding base.

$$I_{avg} = 0.637\ I_m$$

14. Define the term 1) Inductor 2) Capacitor. Draw its symbol.

Answer: **Inductor:** Inductors much like conductors and resistors are simple components that are used in electronic devices to carry out specific functions. Normally, inductors are coil-like structures that are found in electronic circuits. The coil is an insulated wire that is looped around the central core.

Inductors are mostly used to decrease or control the electric spikes by storing energy temporarily in an electromagnetic field and then releasing it back into the circuit.

The S.I. unit of inductance is henry (H) and when we measure magnetic circuits it is equivalent to weber/ampere. It is denoted by the symbol L.

Capacitor: A capacitor is a little like a battery but they work in completely different ways. A battery is an electronic device that converts chemical energy into electrical energy whereas a capacitor is an electronic component that stores electrostatic energy in an electric field.

capacitor is a two-terminal electrical device that possesses the ability to store energy in the form of an electric charge. It consists of two electrical conductors that are separated by a distance. The space between the conductors may be filled by vacuum or with an insulating material known as a dielectric. The ability of the capacitor to store charges is known as capacitance.

15. What is knee voltage? Give its value for germanium and silicon.

Answer: The voltage is cross toward the barrier potential, the diode current raises quickly and diode performs greatly. This barrier voltage at which the flow of current will increase is known as knee voltage.

The knee voltage for a silicon diode is approximately 0.7 volt and for a germanium diode 0.3 volt.