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Subject: Electronic Device
and Circuit.

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19-04-20.

Department of Electrical Engineering
Electronic device and circuit
Paper Assignment

Answer 1. Electronic Components and Equipments:

Electronics or starting to build electronic circuits, then the important thing to do is to get familiar with few Basic Electronic Components and Equipment. Without understanding these basic electronic components i.e. their values, ratings, purpose etc. your circuit design might not function as expected.

Basic Electronic Components

There are many ways to classify different types of electronic components but the most common way is to classify them in to three types:

- 1) Active Electronic Components.
- 2) Passive Electronic Components.
- 3) Electromechanical Components.

1) Active Electronic Components:

- Diodes
- Transistors
- Integrated Circuits (ICs)
- Vacuum Tubes
- Power sources
 - DC Power Supply
 - Batteries
- Display Devices
 - 16 x 2 LCD
 - 7 – Segment Display

2) Passive Electronic Components

- Resistors
- Capacitors

- Inductors

3) Electromechanical Components.

- Oscilloscope
- Multimeter
- Function Generator or Signal Generator.

Describe the role of electronics in modern world technology.

Electronics plays a major **role** in designing and developing circuits which consist of diodes, transistors, microchips etc. ... The **electronics** industry is growing very fast and is creating good job opportunities in industries like mobile phones, IT industry, television, computers, laptops, tablets and palmtops.

Here is a list of Electronic devices include televisions, **DVD** players, laptops, desktop computers, mobile phones, iPods, iPads, cameras, fans, ovens, washing machines, game consoles, **printers** and radios. That should give you a simple reference point in understanding the term Electronic devices.

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Answer 2.

Forward Biased Pn Junction Diode:

With the externally applied voltage, a potential difference is altered between the P and N regions. When positive terminal of the source is connected to the P side and the negative terminal is connected to N side then the **junction diode** is said to be connected in **forward bias condition**.

The pn Junction Under Forward-Bias Conditions:

- The *pn* junction excited by a constant-current source supplying a current / in the forward direction.
- The depletion layer narrows and the barrier voltage decreases by V volts, which appears as an external voltage in the forward direction.

Reverse Biased PN Junction:

When positive terminal of a voltage source is connected to the n-type region and the negative terminal of the source is connected to the p-type region then the **pn junction** is said to be in **reverse biased condition**. ... Hence, the **pn junction** is widened.

The pn Junction Under Reverse-Bias Conditions:

- The *pn* junction excited by a constant-current source I in the reverse direction.
 - To avoid breakdown, I is kept smaller than I_S .
 - Note that the depletion layer widens and the barrier voltage increases by V_R volts, which appears between the terminals as a reverse voltage.
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Answer3.

Basic Semiconductor Concepts:

- 1) Intrinsic Semiconductor.
- 2) Doped Semiconductor.
- 3) Carriers movement.

1) Intrinsic semiconductor :

An **intrinsic semiconductor** is an undoped **semiconductor**. This means that holes in the valence band are vacancies created by electrons that have been thermally excited to the conduction band, as opposed to doped **semiconductors** where holes or electrons are supplied by a “foreign” atom acting as an impurity.

- A crystal of pure and regular lattice structure is called intrinsic semiconductor.
- Materials;
 - ✓ Silicon; today's IC technology is based entirely on silicon.
 - ✓ Germanium; early used.

- ✓ Gallium arsenide; used for microwave circuits.

2) Doped Semiconductor:

In **semiconductor** production, **doping** is the intentional introduction of impurities into an intrinsic **semiconductor** for the purpose of modulating its electrical, optical and structural properties. The **doped** material is referred to as an extrinsic **semiconductor**.

- Doped semiconductors are materials in which carriers of one kind predominate.
- Only two types of doped semiconductors are available.
- Conductivity of doped semiconductor is much greater than the one of intrinsic semiconductor.
- The *pn* junction is formed by doped semiconductor.

3) Carriers Movement

- Carriers move freely about the semiconductor lattice in a random direction at a certain velocity determined by the temperature and the mass of the carrier.
- Carriers will continue in that direction until they collide with another semiconductor lattice atom.
- There is no net overall movement of carriers in any direction.

There are two mechanisms by which holes and free electrons move through a silicon crystal;

- ✓ Drift;
 - The carrier motion is generated by the electrical field across a piece of silicon.
 - This motion will produce drift current.
- ✓ Diffusion;
 - The carrier motion is generated by the different concentration of carrier in a piece of silicon.
 - The diffused motion usually carriers diffuse from high concentration to low concentration will give rise to diffusion current.

.....THE END.....