



## **Innovation in Teaching**

**Subject: Analog and Digital Electronics Engineering (ADE-309)**

**Odd Sem: 2018-19 (3<sup>rd</sup>Sem/IIInd Year -EE)**

**Learning by Exploring:** Some topics are outlined and given to students from each chapter/unit and are asked to present the topic. Discussion and cross questioning is also done.

**Impact:** Students are able to understand that topic in depth.

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### **Different Types of Diodes**

There are several types of diodes available for use in electronics design, namely; a Backward diode, BARITT diode, Gunn Diode, Laser diode, Light emitting diodes(LEDs), Photodiode, PIN diode, PN Junction, Schottky diodes, Step recovery diode, Tunnel diode, Varactor diode and a Zener diode.

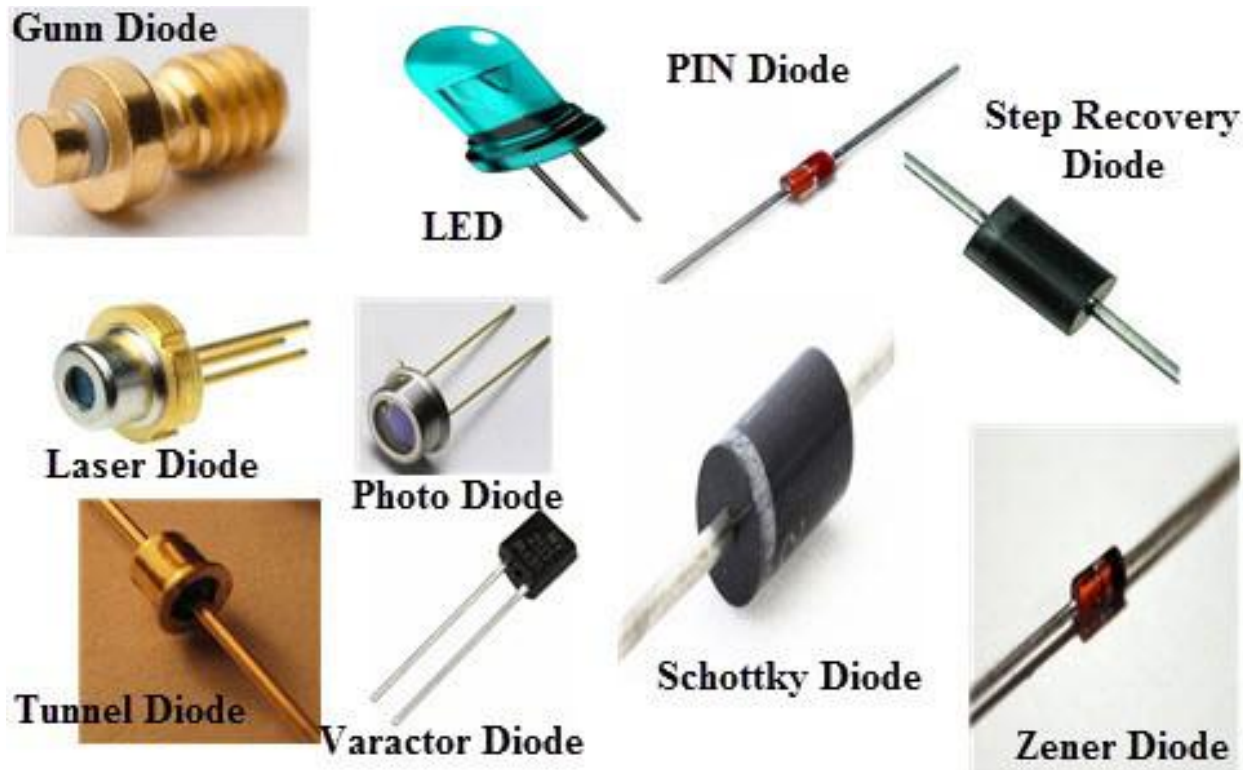


Fig: Different types of Diodes



➤ Light Emitting Diode

The term LED stands for light emitting diode is one of the most standard types of the diode. When the diode is connected in forwarding bias, then the current flows through the junction and generates the light. There are also many new LED developments are changing they are LEDs and OLEDs.



Fig: Light Emitting Diode (LED)

➤ Photodiode

The photodiode is used to detect light. It is found that when light strikes a PN-junction it can create electrons and holes. Typically, photodiodes operate under reverse bias condition where even a small amount of flow of current resulting from the light can be simply noticed. These diodes can also be used to produce electricity.



Fig: Photodiode



➤ PIN Diode

This type of diode is characterized by its construction. It has the standard P-type & N-type regions, but the area between the two regions namely intrinsic semiconductor has no doping. The region of the intrinsic semiconductor has the effect of increasing the area of the depletion region which can be beneficial for switching applications.



Fig: PIN diode

➤ Backward Diode

This type of diode is also called the back diode, and it is not widely used. The backward diode is a PN-junction diode that is similar to the tunnel diode in its process. It finds a few special applications where its specific properties can be used.

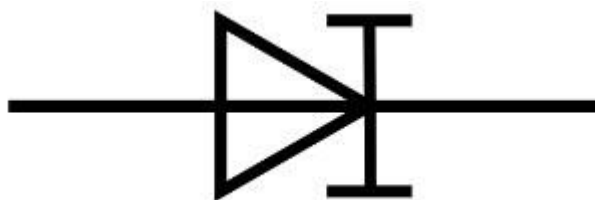


Fig: Symbol of Backward Diode



➤ **BARITT Diode**

The short term of this diode Barrier Injection Transit Time diode is BARITT diode. It is applicable in microwave applications and allows many comparisons to the more widely used IMPATT diode.

➤ **Gunn Diode**

Gunn diode is a PN junction diode, this sort of diode is a semiconductor device that has two terminals. Generally, it is used for producing microwave signals.

➤ **Laser Diode**

The laser diode is not the similar as the ordinary LED (light emitting diode) because it generates coherent light. These diodes are extensively used in many applications like DVDs, CD drives and laser light pointers for PPTs. Although these diodes are inexpensive than other types of laser generator, they are much more expensive than LEDs. They also have a partial life.



Fig: Laser Diode



Electronic circuit diagram components (symbols)					
Symbol	Component	Symbol	Component	Symbol	Component
	Joined conductors		Crossing conductors -no connection		Single-Pole-Single-Throw switch (SPST) (normally open)
	Fixed resistor		Diode		Single-Pole-Single-Throw switch (SPST) (normally closed)
	Potentiometer		Light-Emitting Diode (LED)		Single-Pole-Double-Throw switch (SPDT)
	Preset potentiometer		NPN transistor		Double-Pole-Double-Throw switch (DPDT)
	Thermistor		Amplifier		Push-To-Make switch (PTM)
	Light-dependent resistor		Fuse		Push-To-Break switch (PTB)
	Polarised capacitor		Resonator		Dry-reed switch
	Non polarised capacitor				Opto switch
	Power supply		Primary or secondary cell		Relay (with double-throw contacts - contact symbol varies with type used)
			Battery (of cells)		

**Fig: Electronic Circuit Symbols**

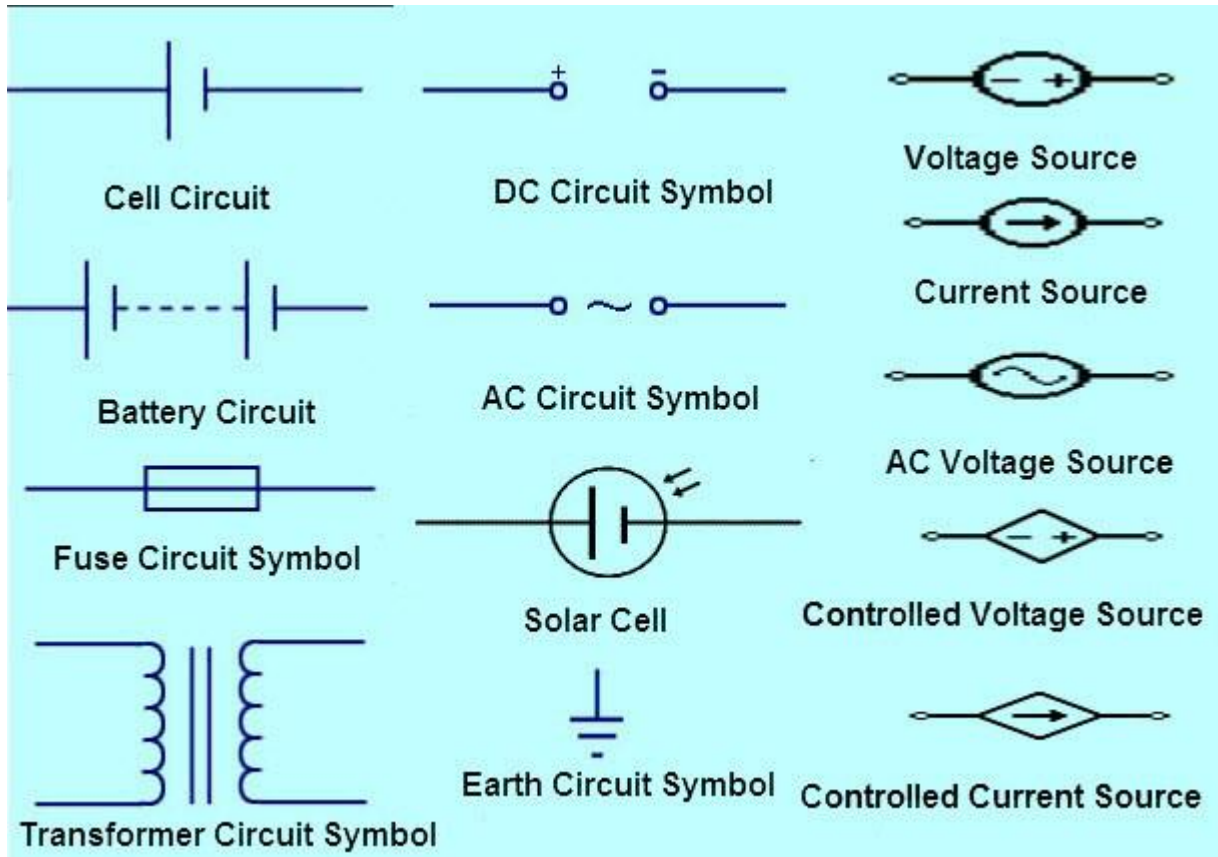


Fig: Symbols used for different Power Source

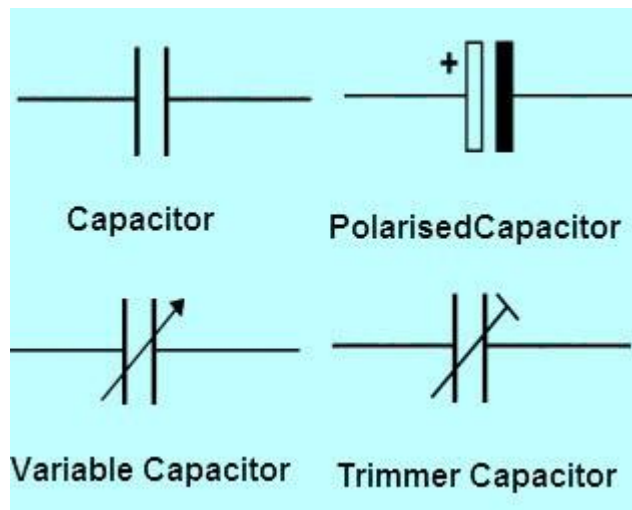


Fig: Symbol used for different types of capacitors



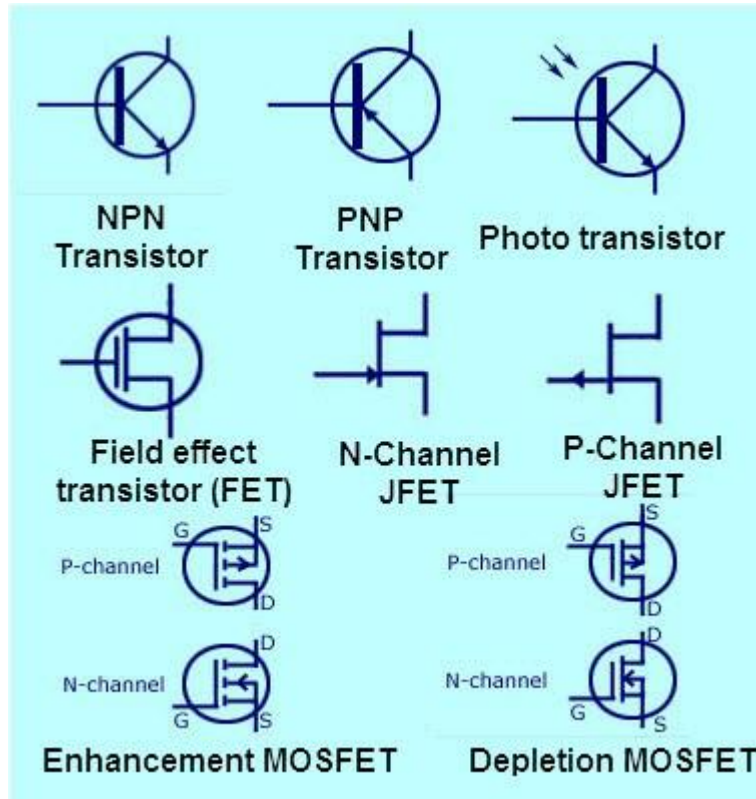


Fig: Symbol used for different types of Transistors

**NPN transistor:** A P-type doped semiconductor material is placed in between two N-type semiconductor materials. The terminals are the emitter, base, and collector.

**PNP transistor:** A N-type doped semiconductor material is placed in between two P-type semiconductor materials. The terminals are an emitter, base, and collector.

**Phototransistor:** It is similar to [bipolar transistors](#), but it converts light to current.

**Field Effect Transistor:** FET controls the conductivity with the help of an electric field.

**N-channel JFET:** The Junction Field Effect Transistors are simple of FET for switching.

**P-channel JFET:** P-type semiconductor is placed in between N-type junctions.

**Enhancement MOSFET:** Similar to DMOSFET but an absence of conducting channel.  
**Depletion MOSFET:** The current flows from source to drain terminal.



➤ Meters

A Meter is an instrument used for measuring voltage and current flow in electrical and electronic components. These are used to measure the resistance and capacitance of the electronic components.

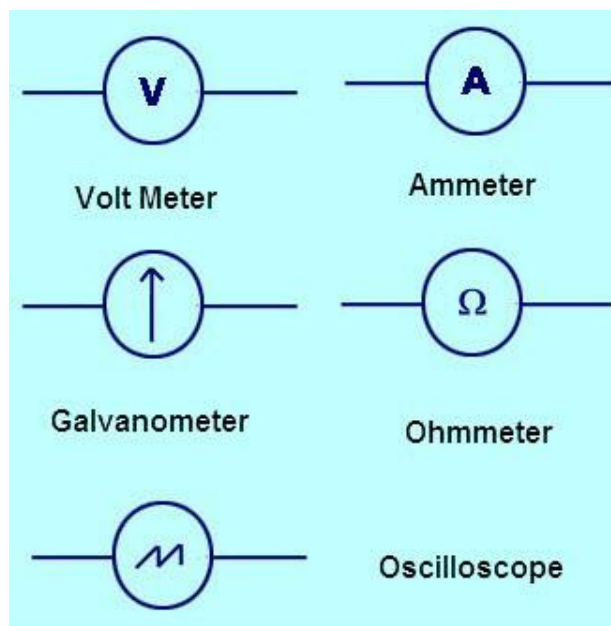


Fig: Symbols of Different types of Meters

**Voltmeter:** It is used to measure voltage.

**Ammeter:** It is used to measure current.

**Galvanometer:** It is used to measure small currents.

**Ohmmeter:** It is used to measure the electrical resistance of a particular resistor.

**Oscilloscope:** It is used to measure voltage with respect to time for signals.





➤ Switches

A Switch is an electrical/electronic component that will connect electrical circuits when the switch is closed, otherwise, it will break an electrical circuit when the switch is open.

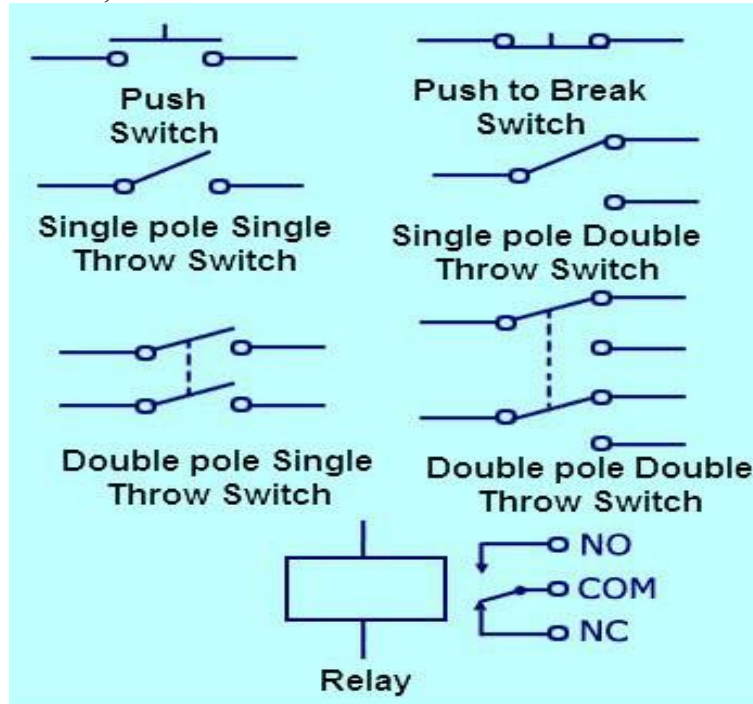


Fig: Symbols of Different types of Switches

**Push switch:** It will pass the current flow when the switch is pressed.

**Push to break switch:** It will block the current flow when the switch is pressed.

**Single pole single throw switch (SPST):** Simply, it is an ON/OFF switch allows flow only when the switch is in ON.

**Single pole double throw switch (SPDT):** In this type of switch current flows in two directions.

**Double pole single throw switch (DPST):** It is a dual SPST switch, mainly used for electrical lines.

**Double pole double throw switch (DPDT):** It is a dual SPDT switch.

**Relay:** A relay is a simple electromechanical switch made up of an electromagnet & a set of contacts. These are found hidden in all sorts of devices.

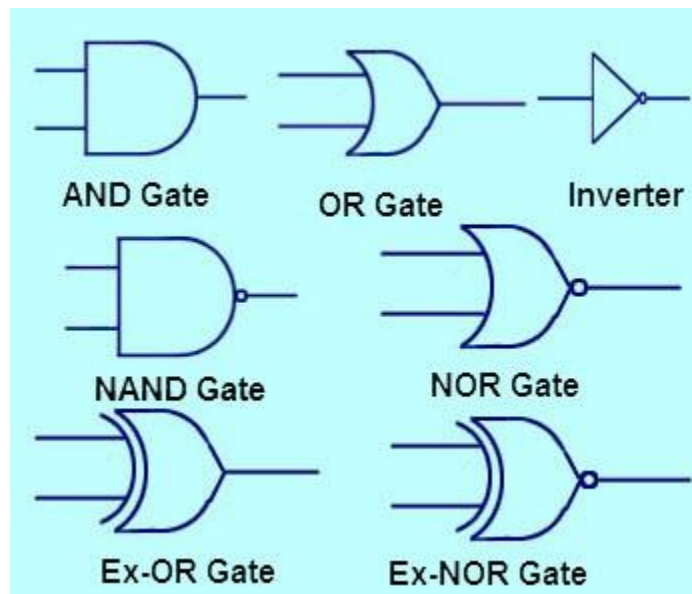


Fig: Symbols of Different types of Logic Gates

**AND Gate:** The output value is HIGH when two inputs are HIGH.

**OR Gate:** The output value is HIGH when one of the inputs is HIGH.

**NOT Gate:** The output is the complement of the input.

**NAND Gate:** The complement of the AND gate is a NAND gate.

**NOR Gate:** The complement of the OR gate is a NAND gate.

**X-OR Gate:** The output is HIGH when an odd number of HIGH occurs in its inputs.

**X-NOR Gate:** The output is HIGH when an even number of HIGH occurs in its inputs.