# Fundamentals of Electronics Devices

Unit-4 Lecture-1

#### Transistors

- Metal-semiconductor-field-effect-transistor (MESFET).
- Metal-insulator-semiconductor-field-effecttransistors (MISFET).
- Metal oxide semiconductor field effect transistor (MOSFET).
- Bipolar junction transistors (BJT).

#### Introduction

- The modern era of semiconductor electronics was ushered in by the invention of the bipolar transistor in 1948 by Bardeen, Brattain and Shockley at the Bell Telephone Laboratories.
- This device, along with its field-effect counterpart, has had an enormous impact on virtually every area of modern life.

## FET

- The field-effect transistor comes in several forms.
- In a junction FET (called a JFET) the control (gate) voltage varies the depletion width of a reverse-biased p-n junction.

# p-n junction

- In unit-4 we found that two dominant features of p-n junctions are the injection of minority carriers with forward bias and a variation of the depletion width W with reverse bias.
- The two p-n junction properties are used in two important types of transistors.

## History

- The history of BJTs and FETs is rather interesting. It was the FET that was proposed first in 1930 by Lilienfeld, but he never got it to work because he did not fully appreciate the role of surface defects or surface states.
- In the process of trying to demonstrate experimentally such a field effect transistor, Bardeen and Brattain somewhat serendipitously invented the first bipolar transistor, the Ge point contact transistor.