

Electronics and Devices, JML 201
Course Credits 1 (Electronics): 2 (Devices)
Instructor: K. S. Narayan

Electronics:

Active and Passive components

Current and Voltage Sources and Semiconductor

Physics Equivalent Circuits

Diodes, filters, functional circuits

Bipolar Junction Transistor (BJT), Transistor Biasing and Stabilization of Operating Point

Applications of BJTs , Field Effect Transistor (FET) , Transistor amplifiers , Electronics

Oscillators & and Boolean , Algebra Combinational Circuits , Sequential Circuits

Digital Logic , Families Principles of low signal measurements, examples in electrophysiology

Devices: p-n junctions and diodes: pn junction theory, energy band diagram, depletion layer models

and width, built in potential, IV and CV characteristics in forward and reverse bias, Avalanche breakdown, pn diode and applications in solid state devices.

- Bipolar Junction Transistors: IV characteristics, current gain and output conductance, transit time and charge storage etc.

Metal-Semiconductor Junctions: Schottky barriers for n-type and p-type semiconductors, depletion region, Fermi-level pinning, Defect induced trap states, thermionic emission

theory, Schottky diodes, tunneling and Ohmic contact etc.

Review of basic device physics, MOS capacitor and transistor theory, Moore's law on technology scaling

Additional Content Depending on the background of students

Electronics Instruments & Measurements

Basics & Applications of Communication System

Low level signal measurements, noise and error analysis, fundamental limits -bandwidth, speed, uncertainty

Book: Modular Series in Solid State

Devices Volume 1, II, III, IV; Art of

Electronics – Horowitz and Hill,

Reference Book:

Book: Physics of Information Tech., Neil Gershenfeld , Cambridge Pub