

ENG325 Semiconductor Devices

Level: 3

Credit Units: 5 Credit Units

Language: ENGLISH

Presentation Pattern: EVERY JAN

Synopsis:

This course covers the principles of operation of various semiconductor electronic and photonic devices, and their fabrication and applications. Topics include the fundamental physical principles of semiconductor/metal contacts/junctions, the use of mathematical models to describe the physical behaviour of BJTs, MOSFETs and junction FETs, and the operation and construction of optoelectronic devices (LEDs and solar cells).

Topics:

- P-N junction in equilibrium, P-N junction under forward bias
- P-N junction under reverse bias, Capacitance in P-N junctions
- Reverse breakdown in P-N junctions, Metal-semiconductor contacts
- Light emitting diodes & photovoltaic devices
- Bipolar junction devices
- Junction field effect transistors [JFET] & metal-oxide-semiconductor FET [MOSFET]

Textbooks:

Kasap, S.O: Principles of Electronic materials and Devices (eTextbook) 4th edition McGraw-Hill, 2006
ISBN-13: 9781259165900-AA

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Learning Outcome:

- Discuss the fundamentals of semiconductor devices such as pn junction, bipolar junction transistors, field effect transistors, light emitting diodes and photovoltaic devices.
- Illustrate the breakdown mechanism in pn junctions and the characteristics of the different metal semiconductor contacts.
- Apply suitable mathematical model to study the performance of semiconductor devices.
- Appraise the circuit parameters for the transistor's different operational modes.
- Assess the impact of change in bias voltage, temperature, size and other parameters on the functioning of semiconductor devices.
- Calculate bias voltage, mole fraction, size, current flow, voltage, resistance and other parameters associated with semiconductor devices.

Assessment Strategies:

Continuous Assessment Component	Weightage (%)
CLASS TEST	15
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Sub-Total	30

Examinable Component	Weightage (%)
Written Exam	70
Sub-Total	70

Weightage Total **100**