

Advanced Semiconductor Device Theory

Code EE-903	CreditHours 3-0
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CourseDescription

This course covers secondary effects and deviation from simple theory of devices such as pn-junction diodes, BJT and FETs, covers pn-junction admittance and switching response, device models such as Ebers Moll and Gummel-Poon, switching response of BJT, frequency limitations, high frequency transistors such as HBT, nonideal MOS, and modern FET structures

TextBook:

1. Physics of Semiconductor Devices, 3rd Ed, by S. M. Sze, Kwok K. Ng, 3rd Ed. Wiley

ReferenceBook:

1. Solid State Electronic Devices, 6th Ed. By Ben J. Streetman and Sanjay K. Banerjee Prentice Hall
2. Modular Series on solid State Devices, 2nd Ed. by Gerold W. Nuedeck. Robert F. Pierret, Addison Wesley.
3. Fundamentals of III-V Devices, By William Liu, John Wiley and Sons, Inc.

Prerequisites

Nil

ASSESSMENTSYSTEMFORTHEORY

Quizzes	15%
Assignments	10%
MidTerms	30%
ESE	45%

1. Topics covered in the Course and Level of Coverage	
1. Deviation from simple diode theory	3hrs
2. pn-junction admittance	3hrs
3. Switching response of diode	3hrs
4. Coupled diode model for BJT	3hrs
5. BJT switching response	6hrs
6. Drift in base region, base narrowing, base resistance, emitter crowding	3hrs
7. Gummel-Poon model	3hrs
8. Small signal modelling of BJT	3hrs
9. Switching response of BJT	3hrs
10. High frequency transistors,	3hrs
11. HBT	3hrs
12. Capacitance voltage characteristics of MOSFETs	3hrs
13. Nonideal MOS	3hrs
14. Modern FET structures	6hrs