

4.8.2020

MAY

22

2018

Week 21

142-223

ECE 462

# PRINCIPLES OF SEMICONDUCTOR DEVICES

Tuesday

9 TAUGHT BY

10 • prof. anshu sarje

11

## COURSE TOPICS

12

### 6 fundamentals of semiconductors

1

• band structure

2

• electron-hole statistics

3

• intrinsic and extrinsic semiconductors

4

• band diagrams

5

• carrier transport mechanisms

6

• generation-recombination

7

• optical absorption and emission

• basics of circuit models

• parameter extraction

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Wednesday

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## 2. PN junctions

- physics of P-N junction
- diode electrical characteristics
- charge storage & transient behaviour
- circuit model
- junction break down
- zener diode
- Schottky diodes
- photo diode
- solar cell
- tunnel diode
- LED
- laser diode

## 3. bipolar junction transistors

- transistor physics

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Thursday

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- circuit models for BJT

- frequency response and switching of BJTs

- non-ideal effects

- hetero-junction bipolar transistors

- power BJTs

4. metal oxide semiconductor capacitor

- MOS capacitor

- structure and regions of operation

- electrical characteristics

- interface states

- flat-band condition

- small-signal capacitances

5. metal oxide semiconductor field effect transistor

- regions of operation

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145-220

- body effect
- threshold voltage
- popular MOSFET SPICE models
- scaling laws
- short geometry effects
- integrated circuit technology.

## 6. Advanced integrated circuit technology

- principles and technology of advanced devices for future IC technology.

- devices like

- UTBSOI

- finFETs

- HEMTs

- tunnel FETs

} will be introduced.

## TEXT BOOKS

1. fundamentals of modern VLSI device; taur.

2. Semiconductor devices: physics & technology; see. (2012)

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\* \* 1 2 3 4 5S M T W T F S  
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Saturday

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146-219

3. solid state electronic devices ; streetman.

4. semiconductor device fundamentals ; pierret. (1996)

5. semiconductor devices, an introduction ; singh.

6. current literature from journal & conference proceedings.

Sunday 27

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