EE 101: Introduction to Electrical and Electronic Circuits

Autumn 2015

S. Lodha

EE 101: Introduction to Electrical and Electronic Circuits

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- In case of doubts, make use of:
  - Moodle (Peers, TAs, Instructor)
  - Tutorial Hour
  - Instructor (anytime during office hours)

Course Content

(https://www.ee.iitb.ac.in/web/academics/courses#EE101)

- Introduction, basic physical laws, circuit elements
- KVL, KCL, and circuit theorems, simple circuits
- Transients in RL, RC, RLC, Sinusoidal steady state, real/reactive power
- Three-phase circuits
- Working principles of transformers/AC/DC machines
- Functional characteristics of diode, BJT, MOSFET, Op-Amp
- Analog circuits using Op-Amp: Amps, oscillators, rectifiers
- Digital circuits using MOSFET: Inverter, AND/OR gates, Flip Flops, DAC/ADC etc.

Course Content [2014]

- Introduction, basic physical laws, circuit elements
- KVL, KCL, and circuit theorems, simple circuits
- Transients in RL, RC, RLC, Sinusoidal steady state, real/reactive power
- Three-phase circuits
- Working principles of transformers/AC/DC machines
- Introduction to semiconductors and basic devices [Added]
- Functional characteristics of diode, BJT, Op-Amp
- Digital circuits using diode and BJT [Added]
- Analog circuits using BJT [Added]
- Analog circuits using Op-Amp
- *Basics of MOSFET and combinational digital circuits using MOSFETs*
  - Less focus due to CS210 in 4th sem

Course Content [2015]

- Introduction, basic physical laws, circuit elements
- KVL, KCL, and circuit theorems, simple circuits
- Transients in RL, RC, RLC, Sinusoidal steady state, real/reactive power
- Three-phase circuits
- Working principles of transformers/AC/DC machines
- Introduction to semiconductors and basic devices [Added]
- Functional characteristics of diode, BJT, Op-Amp
- Digital circuits using diode and BJT [Added]
- Analog circuits using BJT [Added]
- Analog circuits using Op-Amp
- **Basic Digital circuits using MOSFET**
  - **Boolean logic, Minimization, Basic combinational and sequential circuits**
  - **More coverage due to MM batch**

Learning Objectives

- To learn about various circuit elements and laws/principles for analyzing electronic/electrical circuits
- To be able to analyze reasonably complicated electrical and electronic circuits in time and frequency domain
- To learn about basic building blocks of electronics: Semiconductor devices and the operational amplifier
- To be able recognize and analyze some simple analog and digital circuits
- Bonus- Synthesize/design a circuit for given specifications
- Bonus- Learn basic spice simulation for circuit analysis

Text Books

- Foundations of Analog and Digital Electronic Circuits 1st Edition: Anant Agarwal

- Fundamentals of Electrical Engineering 2nd Edition: Leonard S. Bobrow

Evaluation

Topic	Quantity	Preparation	Grading	Weightage
Homework Assignments	Approx. 5-7 (equal weightage)	TAs and Instructor	TAs	15%
Quizzes and Exams	Best 2/3 Quizzes -August -September -October Midsem -September Endsem -November	Instructor	TA and Instructor	15% 30% 40%

- Homework Submission: Labeled Box will be kept in Microelectronics Office, first floor of EE Annexe

Course Policies

- >80% attendance is mandatory
- Relative grading
- Copying in homeworks, quizzes and exams will be dealt with strictly

Tentative Travel Dates

- Sept 14 (Monday after midsem week)
- Sept 15 (Tuesday after midsem week)
- Oct 26 (Monday after Dussehra holidays)
- Options:
  - Guest lectures
  - Swap with tutorial
  - Quiz (Oct. 26)
  - Worst case: cancel the class and make up later