

EC1010: Electrical and Magnetic Circuits

Introduction

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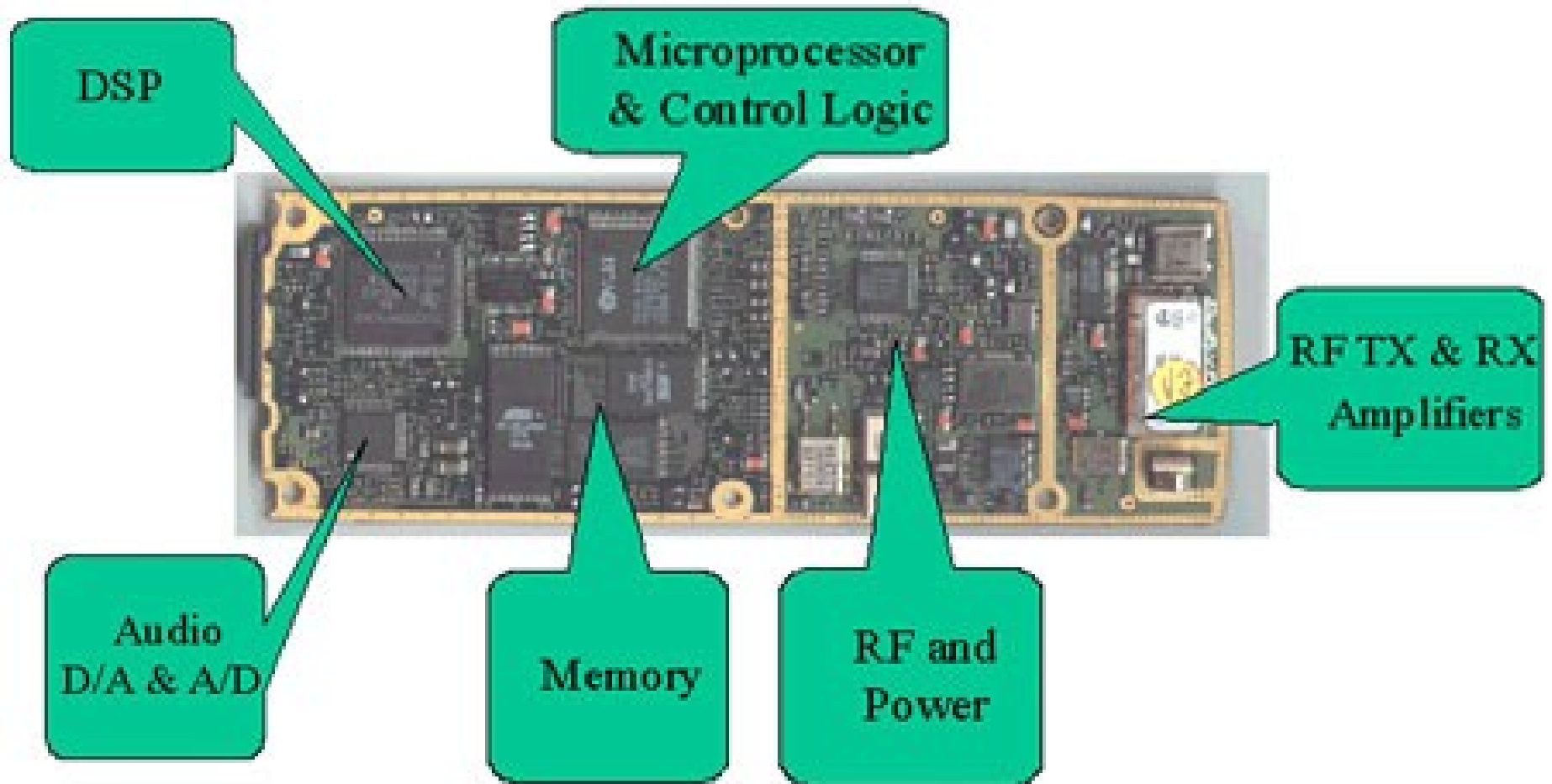
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Dept. of EE, IIT Madras

What are E & M Circuits?

- Electrical Circuits:
 - Interconnection of Electrical Components
 - All electronic and electrical gadgetry
- Magnetic Circuits:
 - Interconnection of Magnetic Components
 - Generators, Motors, Transformers
- Absolutely **everywhere** around us!

Mobiles, Laptops, Music players, ...



[<http://static.ddmcdn.com/gif/cell-phone-inside.jpg>]

Mobiles, Laptops, Music players, ...



[<http://smartech.blogetery.com/files/2008/04/asus-eee-pc-900-inside.jpg>]

Transformers, Generators, ...



[http://i01.i.aliimg.com/photo/v0/110482299/Power_Transformer.jpg]

[<http://media.digikey.com/Renders/Johanson%20Tech%20Renders/2.45GHz%20Balun6.jpg>]

What is EC1010 all about?

- Analysis techniques applicable to **all circuits**
- Not about any particular circuit
- One of the two most important EE courses (the other being Networks and Systems)
- Pre-requisite for:
 - Networks and Systems
 - Electrical Machines
 - Analog Circuits
 - Placements in core EE companies!

Course topics

- Electrical quantities and elements
- Electrical circuit analysis; Theorems
- One and two port networks; Transformations
- Negative feedback and ideal opamp
- RL, RC, RLC circuits
 - Solving differential equations
 - Forced and natural response
 - Sinusoidal steady state
- Polyphase circuits
- Magnetic circuits

Course goals

- Learn circuit analysis and learn it well!
 - Practice, practice, and practice problem solving
 - Understand every step of problem solving

Logistics

- Time table:
 - A slot((Mo 8am, Tu 1pm, Th 11am, Fr 10am)
 - Odd roll numbers: ESB127
 - Even roll numbers: ESB106
- Evaluation
 - 4 quizzes (total of 50-60%; dates TBA)
 - End sem (40%)
 - Problem sets (up to 10%)

Tutorials

- ~ One every week
- Tuesday 1pm class
- Problem sets will be posted in advance
- Must solve problems before the tutorial session
- Use tutorial sessions for clarifications, difficult concepts etc.

Classroom etiquette and expectations

- Mobile phones off
- 85% attendance
- Don't enter the class if more than 5 minutes late
- TAs take attendance in the first 5 minutes
- **Must solve problems** given in class
 - Bring your pen, notebook, calculator and **use them**
- **Participate** in classroom Q&A

Resources

- Class homepage
 - http://www.ee.iitm.ac.in/vlsi/courses/ec1010_2012/start
- Lectures recorded in the classroom:
 - <http://www.ee.iitm.ac.in/~nagendra/videolectures/>
- Textbook
 - Hayt, Kemmerly, and Durbin, *Engineering Circuit Analysis*, 7th Edition, McGraw Hill 2006.
- Extras: NPTEL(<http://nptel.iitm.ac.in>)
 - SC Dutta Roy, *Circuit Theory*,
<http://nptel.iitm.ac.in/video.php?subjectId=108102042>