

## EE1100 Basic Electrical Engineering – Teaching Plan @ IITP for Aug-Nov 2016

Topics	# hours
<b>Introduction + Topic 1</b> :- Basics and definitions: definition of charge, voltage, current, power, energy, resistor, Ohm's law, ideal sources, internal resistance of voltage and current sources	<b>2</b>
<b>Topic 2</b> :- Circuit laws and solving for unknowns: description & derivation of Kirchoff's laws, series and parallel connections, analysis of circuits using Nodal analysis technique usage of the principle of linearity and superposition to solve when multiple sources are present.	<b>2</b>
<b>Topic 3</b> :- Dynamic circuit components L & C: derivation of the relationship between current and voltage in capacitors(C) and inductors(L), power in L & C, combination of R & L , R & C, numerical & graphical analysis of transients with DC sources, combination of R, L & C in circuits.	<b>4</b>
<b>Topic 4</b> :- Single phase AC circuits : Introduction to AC signals and sources, description of AC signals using magnitude, frequency and phase, distinguishing between peak, average and RMS values, definition of power in AC circuits, derivation of properties of R, L and C with AC signals, introduction to Impedance(Z), Differentiate between DC and steady state, calculation of power in AC systems, differentiating between active, reactive and apparent power, introduction to power factor, usage of phasors to represent, manipulate and calculate circuit quantities like voltage, current, impedance, and power.	<b>5 to 6</b>
<b>Quiz I, Thursday, September 8</b>	
<b>Topic 5</b> :- How does the wireline telephone system work? Local loop, analog to digital conversion, sampling of speech, compression of speech, echo-control, blocking and non-blocking switches, application of Erlang-B formula to voice networks, and how to send data thro the (voice-based) telephone network	<b>6</b>
<b>Topic 6</b> :- Digital communications Analog communications vs Digital communication, examples from source compression, error-control coding, mapping bits to waveforms (transmit modulation), and recovering bits from noise corrupted waveforms (demodulation and detection at the receiver)	<b>5 to 6</b>
<b>Quiz II, Thursday, October 20</b>	
<b>Topic 7</b> :- Packet Switching – advantage over circuit switching, how coding and packet repetition can ensure “error-free” data transport over the internet	<b>3</b>
<b>Topic 8</b> :- Wireless transmission – transmit power, path loss, receiver sensitivity, and link budget, point-to-point wireless links, wireless broadcasting	<b>3 to 4</b>
<b>Topic 9 (if time permits)</b> :- Mobile Cellular networks – evolution from voice-only (2G) to mainly data applications (4G)	<b>2</b>
<b>Final, Thursday, November 17</b>	

**Contact:** K. Giridhar, Dept. of EE, IIT Madras; +91 44 2257 4420; [giri@ee.iitm.ac.in](mailto:giri@ee.iitm.ac.in)

### Breakup of Assessment:

3 mini-quizzes of 5 marks each; Quiz1 : 15 marks; Quiz2: 20 marks; Final: 50 marks

### Books:

- *Electrical Circuit Theory and Technology*, John Bird, Elsevier, 2011 [Text book for topics 1 to 4]
- *Essentials of Electrical and Computer Engineering*, Kerns & Irwin, Pearson, 2004
- *Notes on the remaining topics will be uploaded on Moodle*