

Electronics

In the sector of electronics core, there are two major profiles : Analog and Digital. The roles and responsibilities for these may be different, however there is not a stark contrast between the preparation process or the interview/selection process.

General Guidelines-

1. The suggested resources are based on information received from the students who have received internships/placement offers.
2. Technical Interviews in the core electronics sector regularly include problems to be solved during the interview. Hence, prepare yourself by solving different problems and interrupting yourself by asking questions while solving as interviewers will do that.
3. The basics of all 2nd/3rd year CDCs should be clear.

ANALOG

Focus Subjects :

1. Electrical Sciences
 2. Microelectronic Circuits
 3. Analog Electronics
 4. Topics from Control Systems and Signals and Systems
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1. Electrical Sciences
 - Thevenin 's Theorem, Norton's theorem, Superposition theorem
 - Two port network theory (knowing this is very handy while solving complex circuits)
 - Response to various inputs to circuits with combinations of R, L and C (very important). Inputs can be step or sinusoidal in nature (Current sources or Voltage sources)

- Second order RLC circuits and various types of responses (Overdamped, underdamped, critically damped, undamped)
- Should be able to intuitively explain a pole and a zero given a circuit and what are the major contributors for them
- Writing transfer functions of an RLC network and should be able to tell the “Q Factor”, poles, zeros
- Simulations on LTSPICE is also a good method to develop intuition

References:

- A. Network Analysis – Van Valkenburg
- B. Circuit theory – Hayt and Kemmerly
- C. Lectures of IIT Madras:
http://www.ee.iitm.ac.in/videolectures/doku.php?id=ec1010_2014nk:start
- D. YouTube videos by Prof Chembiyan T
- E. Fundamentals of Electrical Engineering by Leonard S. Bobrow (ES Textbook) /Fundamentals of Electrical Circuits by M. Sadiku

2. Microelectronic Circuits

- Basic Functioning of a MOSFET – regions of operation
- Single Stage Amplifiers – CS, CG, CD Amplifiers gain, input & output impedance, with various loads, etc.
- Differential Amplifier
- Basics of BJT
- Analysis using small signal circuit equivalent of all the basic amplifiers
- Miller’s Theorem
- Basic Inverter circuit analysis

References:

- A. Microelectronic Circuits – Sedra and Smith
- B. Fundamentals of Microelectronics – Behzad Razavi
- C. Design of Analog Integrated Circuits – Behzad Razavi

3. Analog Electronics

- Video Lectures by Behzad Razavi and videos by [All About Electronics](#)
- Class Notes
- OpAmps from Microelectronic Circuits by Sedra and Smith
- Analog Electronics by LK Maheshwari

4. Signals and Systems

- Basics of LTI systems
- Convolution theory
- Nyquist theorem
- Frequency Domain - CT, DT, DTFT, DFT

References:

- A. Signals & Systems - Oppenheim A V, Willsky A S, Nawab S H
- B. Lectures of IIT Bombay:
<https://www.edx.org/course/signals-systems-part-1-iitbombayx-e210-1x-2>
<https://www.edx.org/course/signals-systems-part-2-iitbombayx-e210-2x-2>

5. Control Systems

- Bode plots, Stability Criterion, etc.
- Lead – lag compensators
- Basic Feedback systems – What blocks are important in a Feedback System?

- Proper understanding of Second Order System Characteristics
- Laplace & inverse Laplace transforms and estimating frequency response of output for step/impulse input

Reference:

- A. Control Systems Engineering – I.J. Nagrath and Kothari
- B. Modern Control Theory – Kaushiko Ogata
- C. Automatic Control Systems - Kuo, B. C., Golnaraghi, F.

DIGITAL

1. Network Theory:

- RLC Circuits Steady State & Transients

Reference:

- A. Network Analysis – Van Valkenburg
- B. Circuit theory - Hayt and Kemmerly
- C. Lectures of MIT

<https://www.edx.org/course/circuits-electronics-1-basic-circuit-mit-x-6-002-1x-0>

<https://www.edx.org/course/circuits-electronics-2-amplification-mitx-6-002-2x-0>

<https://www.edx.org/course/circuits-electronics-3-applications-mitx-6-002-3x-0>

2. Digital Electronics:

- Combinational/Sequential Circuits
- FSM (Mealy-Moore)
- Flip-Flops
- Counters
- Pattern Detector Clock Divider
- Synchronizers

Reference:

- Digital Design by Morris Mano

3. Microprocessors:

- RISC/CISC
- Pipelining
- 8085 architecture

References:

- A. Intel X86 Microprocessors by Barry Brey

4. Verilog and Static Timing Analysis

- Verilog HDL by Samir Palnitkar
- Behavioral, Dataflow Important
- <http://www.vlsi-expert.com/2011/03/static-timing-analysis-sta-basi-c-timing.html>
- Lectures of IISc, Bangalore
<https://www.youtube.com/watch?v=EDbutwR35bg&list=PLbMVogVj5nJSY-1XxFHgwgtj2F7mB7NuV>
- <http://www.asic-world.com/verilog/>

5. Signals and Systems

- Basics of LTI systems
- Convolution theory
- Nyquist theorem
- Frequency Domain - CT, DT, DTFT, DFT

Reference:

- A. Signals & Systems - Oppenheim A V, Willsky A S, Nawab S H
- B. Lectures of IIT Bombay:

<https://www.edx.org/course/signals-systems-part-1-iitbombayx-e210-1x-2>

<https://www.edx.org/course/signals-systems-part-2-iitbombayx-e210-2x-2>