Prep for Texas Instruments

Who are we?

Texas Instruments Incorporated (TI) is a global semiconductor company that designs and manufactures semiconductors and various integrated circuits. TI is one of the top-10 semiconductor companies worldwide, based on sales volume and is focused on developing analog chips and embedded processors, which account for more than 80% of our revenue. TI has been a pioneer in many innovations in the semiconductor domain including the development of the first integrated circuit, the first patent on a single-chip microprocessor, the first single-chip linear predictive coding speech synthesizer, developing the prototype of the world's first transistor radio and the invention of the digital light processing device (also known as the DLP chip), which serves as the foundation for the award-winning DLP technology and DLP Cinema (used in IMAX theatres).

TI India was set up in 1985 and has R&D presence for all the major business units of TI including Analog (Data Converters, Amplifiers, Clocks & Synthesizers, Motor Drives, Power Management) and Embedded Processors (Connected Microcontrollers, Radar, ADAS - Advanced Driver Assistance, Infotainment Processors etc.) and caters to products for different market segments - Industrial, automotive, personal Electronics, Communication and Enterprise.

By employing the world's brightest minds, TI creates innovations that shape the future of technology. TI is helping about 100,000 customers transform the future, today. We're committed to building a better future – from the responsible manufacturing of our semiconductors, to caring for our employees, to giving back inside our communities and developing great minds. Put your talent to work with us – change the world, love your job!

To know more about TI, visit www.ti.com

Who are we looking for?

We are looking for individuals who are passionate about electronics, love to tackle challenging problems and build solutions that have an impact and can improve human lives though technology.

- **Basics, basics, basics!** Strong basics and fundamentals are what allow engineers to tackle new problems effectively
- **Perseverance** – people who quickly give up on a problem without trying or just saying "I don't know" without taking time to think, are pretty much immediately ruled out
- **Sharpness** – being able to identify patterns, and making logical leaps that can circumvent multiple steps
- **Thoroughness** – after making such a leap, being able to go back and justify the answer

How to prepare for the TI selection process?
Analog

1. Basic Electrical Sciences
    a. Thevenin's Theorem, Norton's theorem, Superposition theorem
    b. Two port network theory (knowing this is very handy while solving complex circuits)
    c. Response to various inputs to circuits with combinations of R, L and C (very important)
    d. Inputs can be step or sinusoidal in nature (Current sources or Voltage sources)
    e. Second order RLC circuits and various types of responses (Overdamped, underdamped, critically damped, undamped)
    f. Should be able to intuitively explain a pole and a zero given a circuit and what are the major contributors for them
    g. Writing transfer functions of a RLC network and should be able to tell the "Q Factor", poles, zeros

    Reference material:

    a. Network Analysis – Van Valkenburg
    b. Circuit Theory – Hayt and Kemmerly

    Some Lectures of IIT Madras:

    https://www.youtube.com/watch?v=RciUpMP9S7A&list=PLa4KQhDlGd7QCTX3gTz0LyoL93jVjtaMe&index=10

    Important lectures: 2 to 11,18, 37,38, 70-73, 98-105, 109, 110, 114-129

    Charge sharing and capacitor basics:

    https://www.youtube.com/watch?v=NHeGgCeYSRM

    Circuit Intuitions series:

    https://www.eecg.utoronto.ca/~ali/intuitions.html

2. Analog Electronics
    a. Positive feedback, Negative feedback, regulators, Oscillators, Barkhausen condition
    b. Everything from this course should be known from virtual ground concept till high pass – low pass filters
    c. Writing transfer function of op amp based configurations (which may include passive networks around the op amp)

    Reference material:

    a. Sergio Franco's Operational Amplifier book
    b. For quick revisions: http://www.electronics-tutorials.ws/

3. Signals & Systems
    a. Basics of LTI systems, Convolution theory, Nyquist theorem
    b. Frequency Domain – CT, DT, DTFT, DFT concepts should be clear and well understood

    Generic Reference: Alan. V. Oppenheim 's book on Signals and systems

4. Control Systems
    a. Bode plots, Stability criterion, etc
    b. Lead – lag compensators
    c. Basic Feedback systems – What blocks are important in a Feedback System?
    d. Proper understanding of Second Order System Characteristics
    e. Laplace & inverse Laplace transforms and estimating frequency response of output for step/impulse input

    Reference material:

    a. Modern Control Theory – Kaushiko Ogata
    b. Control Systems Engineering – I.J. Nagrath and Kothari

    (Reference given is quite heavy with a lot of theory, important to concentrate on basics (that should be enough))

5. Microelectronic Circuits
    a. Basic Functioning of a MOSFET – regions of operation
    b. Single Stage Amplifiers – CS, CG, CD Amplifiers gain, input & output impedance, with various loads, etc.
    c. Differential Amplifier
    d. Analysis using small signal circuit equivalent of all the basic amplifiers
    e. Miller's Theorem
    f. Basic Inverter circuit analysis

    Reference material:

    a. Microelectronics – Sedra and Smith
    b. Design of Analog CMOS Integrated Circuits – Behzad Razavi

6. Miscellaneous
    a. Power Electronics: Buck, boost circuits, basic inverter and rectifier configurations

Useful Lectures by Dr. KRK Rao: http://nptel.ac.in/courses/117108107/

General Interview Tips & Guidelines

CV:

1. Clearly mention key achievements, projects, papers / publications, interest areas and grades in relevant courses

Personal Interview:

2. Think out loud while solving any question. The Interviewer judges you on the approach and not the answer
3. Pay attention to the question and think before proceeding, it is okay to take few seconds before answering if you are not sure
4. If you don't know the answer or are not sure about the answer, then mention the same before answering
5. There might be questions on areas that you have not worked on. That does not mean you completely give up and not answer. Try answering the questions based on the hints provided by the interviewer. The interviewer is trying to see if you would be able to solve a question logically even though you do not have a background on the topic
6. Show curiosity and your drive to solve problems. Ask questions, seek help and think aloud
7. If you have hit a roadblock, don't be afraid to go back to square one and start afresh on a new path