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 your TI interview?
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. Current sources or Voltage sources
    f. Passive HPF, LPF, BPF, Notch Filters – time and frequency domain analysis
    g. Resonance circuits/Oscillators
    h. RC circuits - Very important, most of the questions were based on this
        i. Charging & Discharging
        ii. Time constant
        iii. Voltage division in series and parallel connection
    i.

    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

    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. Simple Diode and Wave Shaping Circuits(Clipping, Clamping and Rectifiers etc.)

    c. Zener Diode

    d. MOSFET

        i. Constructional features

        ii. Types with working

      iii.   Circuit design using nmos and pmos and cmos

  e. Amplifiers

      i.   Class A, Class B, Class AB Amplifiers etc.

  f. Opamps

      i.   Properties of Ideal op-Amp

      ii.   Unity Gain Amplifiers

      iii.   Virtual ground concept

      iv.   Feedback circuits

      v.   Applications (schmitt trigger, Comparator, V to I and I to V converters etc.)

  g. Active filters and Frequency domain analysis

Reference material:

For quick revisions: http://www.electronics-tutorials.ws/

MOSFET-https://nptel.ac.in/content/storage2/courses/108105066/PDF/L-6(DK)(PE)%20((EE)NPTEL).pdf

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

3. Signals & Systems
  a. System Analysis using Step and Impulse responses
  b. Understanding of different Transformations
      i. Fourier Transform
      ii. Laplace Transform
      iii. Z transform etc.
  c. Understanding Bode Plots
      i. Stability
      ii. Bandwidth, Gain Margin, Phase Margin etc.

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

Reference material:
  a. https://www.edx.org/course/signals-systems-part-1-iitbombayx-ee210-1x-2
  b. https://www.edx.org/course/signals-systems-part-2-iitbombayx-ee210-2x-2

4. Digital Electronics

       c.   Combinational/Sequential Circuits

       d.   Flip-Flops

       e.   Counters

       f.   Circuit design using gates given truth table

       Reference material: Digital Design by Morris Mano

5. CMOS Inverter Characteristics, Logic Gates

       a.   Comparison of BJT and MOSFET

       b.   MOSFET Structure and Working

       c.   Understanding of CMOS Fabrication steps

       d.   Construction of Resistor and Capacitors

       e.   CMOS Logic Circuits and their working

       Reference material:

       CMOS VLSI Design: A Circuits and Systems Perspective by David Harris and Neil Weste

       CMOS Digital Integrated Circuitsby Sung-Mo Kang and Yusuf Leblebici

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 tell them directly, if not sure mention that 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