

# Application and Admission Procedure- PhD (ECE)

## How to Apply

1. Fill up the online application form. ([Click here](#))  
Last date of application - **24<sup>th</sup> Nov, 2015**
2. The candidates will be screened based on the information provided in the online application form.

## Entrance Test

- The shortlisted candidates will have to appear in a written test and an interview (if shortlisted after the programming test) at IIT-Delhi on 8<sup>th</sup> Dec, 2015.
  - **Venue:** IIT-Delhi
    - Reporting date: 8<sup>th</sup> Dec, 2015 (Tuesday)
    - Registration time: 8:30 A.M.
    - Following is the tentative schedule for the rest of the day.
    - Written test starts: 10:00 A.M.
    - Lunch: 12:30 P.M. (only for candidates)
    - Interview (for selected candidates): 02:30 P.M.
- **Documents:** Shortlisted candidates MUST bring with them the following documents for the purpose of verification of facts furnished in the application form.
  1. One recent passport size photograph
  2. Original mark sheets, degree and certificates (including X, XII, undergraduate, etc.)
  3. Proof of date of birth and photo identification
  4. Copies of all publications (if any)
  5. GATE/GRE/TOEFL/other score card (if any)
  6. Original copies of awards
  7. Sponsoring Certificate (for sponsored candidates)
  8. Any other document (in original form) that you have mentioned in the application form

You must bring with you COPIES of the above documents without fail. In case your last semester exam is not yet over or the results have not yet been declared, you should bring mark sheets / grade cards of all the previous semesters whose results have been declared.

---

## Written Test (for ECE)

- **Written test:** The written test will have two sections (Part A and B) as described below. The questions will be on standard B.Tech. level concepts. Syllabus for the test is given below. The questions may be a mixture of multiple choice, fill in the blanks, one-two line answers, and similar

short answers. They will not require long descriptive answers. Use of calculators and similar computing devices will not be permitted.

- **Part-A** is compulsory. This section will have questions from **circuit theory, calculus and probability**.
  - Syllabus:  
Calculus: Mean value theorems, Theorems of integral calculus, Maxima and minima, First order differential equation (linear and nonlinear), Initial and boundary value problems  
Probability: Conditional probability, Random variables, Discrete and continuous distributions, Poisson, Normal and Binomial distribution, Circuits: Thevenin and Norton's maximum power transfer, Wye-Delta transformation. Time domain analysis of simple RLC circuits, Solution of network equations using Laplace transform: frequency domain analysis of RLC circuits.
- In **Part-B**, candidates need to choose ANY ONE from the following 4 subsections. The candidate will have to specify their choice during registration on the morning of the test.

### 1. **Digital Circuits.**

§ Syllabus:

Boolean algebra, minimization of Boolean functions; logic gates; digital IC families (DTL, TTL, ECL, MOS, CMOS). Combinatorial circuits: arithmetic circuits, multiplexers, decoders, PROMs and PLAs. Sequential circuits: latches and flip-flops, counters and shift-registers. Sample and hold circuits, ADCs, DACs. Semiconductor memories. Microprocessor: architecture, programming, memory and I/O interfacing.

### 2. **Signals and Systems.**

§ Syllabus:

Definitions and properties of Laplace transform, continuous-time and discrete-time Fourier series, continuous-time and discrete-time Fourier Transform, DFT and FFT, z-transform. Sampling theorem. Linear Time-Invariant (LTI) Systems: definitions and properties; causality, stability, impulse response, convolution, poles and zeros, parallel and cascade structure, frequency response, group delay, phase delay. Signal transmission through LTI systems.

### 3. **Analog Circuits**

§ Syllabus:

Analog Circuits: Small Signal Equivalent circuits of diodes, BJTs, MOSFETs and analog CMOS. Simple diode circuits, clipping, clamping, rectifier. Biasing and bias stability of transistor and FET amplifiers. Amplifiers: single-and multi-stage, differential and operational, feedback,

and power. Frequency response of amplifiers. Simple op-amp circuits. Filters. Sinusoidal oscillators; criterion for oscillation; single-transistor and op-amp configurations. Function generators and wave-shaping circuits, 555 Timers. Power supplies.

#### 4. Communication Systems

§ Syllabus:

Random signals and noise: probability, random variables, probability density function, autocorrelation, power spectral density. Analog communication systems: amplitude and angle modulation and demodulation systems, spectral analysis of these operations, signal-to-noise ratio (SNR) calculations for amplitude modulation (AM) and frequency modulation (FM) for low noise conditions. Digital communication systems: pulse code modulation (PCM), differential pulse code modulation (DPCM), digital modulation schemes: amplitude, phase and frequency shift keying schemes (ASK, PSK, FSK), matched filter receivers, bandwidth consideration and probability of error calculations for these schemes. Basics of TDMA, FDMA and CDMA and GSM.

## Interview

- Shortlisted candidates (after the written test) will be interviewed on the same day.
- Apart from general problem solving questions, interview MAY also involve writing small code in C, Verilog/VHDL or microcontroller programming.
- A final shortlist, based on the performance in the tests and the interview, will be the final list of admitted candidates.
- All admission decisions (i.e. screening, shortlisting, and selection) made by the IIIT-D PhD Admission Committee will be final.

## Additional requirements for candidates apply in ECE:

- MTech candidates applying in ECE must mention 3 courses in the application out of the courses listed below. Candidate shall be interviewed in the courses mentioned in application.
- BTech candidates applying in ECE must mention 4 courses in the application out of the courses listed below. Candidate shall be interviewed in the courses mentioned in application.

Advanced Signal Processing	Statistical Signal Processing	Digital VLSI Design	Analog CMOS design
Digital Communications	Communication Networks	Linear systems	Introduction to Robotics
RF Circuit design	Antennas and Propagation	Embedded systems	

- \*For syllabus, click [here](#)