JULY 2025

PhD Admissions

DEPARTMENT OF ELECTRICAL ENGINEERING

Indian Institute of Technology Hyderabad

భారతీయ సాంకేతిక విజ్ఞాన సంస్థ హైదరాబాద్
भारतीय प्रौद्योगिकी संस्थान हैदराबाद
Indian Institute of Technology Hyderabad

Department of Electrical Engineering

INDIAN INSTITUTE OF TECHNOLOGY HYDERABAD

The Department of Electrical Engineering (EE) is one of the largest departments at IIT Hyderabad, consisting of 38 faculty members, one emeritus faculty member, two distinguished and two adjunct faculty members.

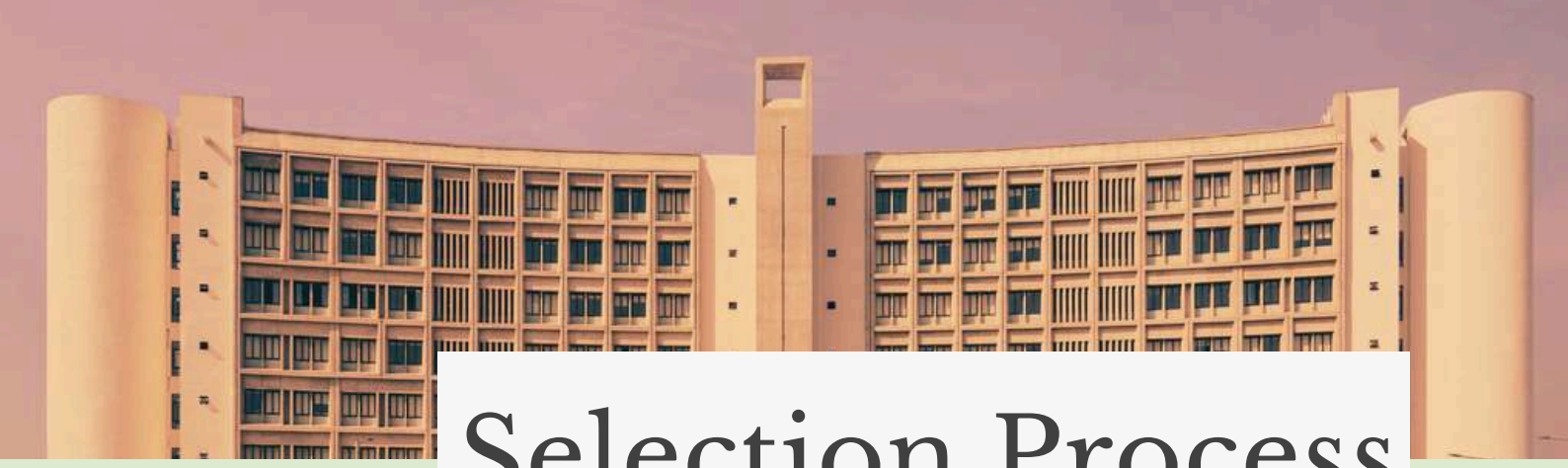
The department consists of more than 600 students, about half of whom are pursuing Masters and PhD programs.

With 14 research labs, 15 teaching labs and a research funding in excess of Rs 200 crores since its inception, the department is well resourced and is one of the best destinations to pursue high quality academic research in India.

The department also boasts of more than 1000 journal and conference publications and more than 50 technological products, patents and prototypes.

The research activities in the department fall into the following 5 specializations:

- Communications, Signal Processing & Learning
- Microelectronics and VLSI:
  Nanodevices and Technology
- Microelectronics and VLSI:
  Integrated Circuits and Systems
- Power Electronics & Power Systems
- Systems & Control



Selection Process

Candidates must apply online via **https://iith.ac.in/phdadmissions**

Each candidate **must choose from the five specialization streams while specifying their 'Areas of Interest' during online application**. This is important for the application to be considered for further processing

Selection will be based on either a single- or a two-stage screening process, which might consist of a written/online test followed by an interview of the candidates selected from the first stage (please see further below for the syllabus for the written/online test; the interview has a broader scope).

The written test and interview are typically (but not always) conducted on the same day in offline mode in IIT Hyderabad campus—the test in the morning session and the interview of the shortlisted candidates in the afternoon session. However, depending on logistical constraints, the interviews may extend to the next day. Final selection will be based on the performance in the interview.

It is advisable that shortlisted candidates bring the call-letter, a valid photo identification, original educational degree certificates, GATE score cards (if applicable) and any other certificates relevant for the selection process.

The decision of the selection committee will be final.

Note: The department reserves the right to set any cut off criteria for shortlisting the candidates. The shortlisted candidates will be called to participate in the next stages of the selection process. The department has the right to not select any candidates if appropriate candidates are not found.

Syllabus

The syllabus for the written test and interview vary across research specializations

COMMUNICATIONS, SIGNAL PROCESSING & LEARNING

The written test and interviews will test the understanding of fundamental concepts and how they can be applied to engineering problems. The focus of the written test will be on:

- **linear algebra,**
- **probability theory and random variables**, and
- **mathematical aptitude**.

The interview has a broader scope; in addition to the above topics the interview questions may involve

- **programming aptitude**,
- fundamentals of **communications**, or **signal processing** or **machine learning**, and
- any other relevant areas.

For more information (including reference books), please visit https://ee.iith.ac.in/csplphd.html

MICROELECTRONICS & VLSI: NANODEVICES AND TECHNOLOGY

- **Fundamentals of semiconductor devices**: Band-diagrams, Carrier transport, Diode operation, MOSCAP CV, MOSFET operating regimes
- **Basic Quantum Mechanics:** Wave-particle duality, uncertainty, Wave-functions, Schrodinger equation and particle in a box problem.
- **VLSI Technology:** Photolithography, Deposition (Physical and chemical), Wet and dry etching.
- **Basic Electromagnetics**: Coulomb's law, Laplace and Poisson's equations, Maxwell's equations in differential and integral form.
- **Computational skills:** familiarity with a programming environment (C/Matlab/python), writing pseudocode.
- **Miscellaneous topics:** Basic operating principles of electronic and electrical devices in everyday life, basics of signal processing (Fourier transform, windowing, low and high pass filtering).

Syllabus (Continued)

MICROELECTRONICS & VLSI: INTEGRATED CIRCUITS AND SYSTEMS

- **Electrical networks:** Network theorems, Steady state sinusoidal analysis, Time domain analysis of simple linear circuits, 2-port networks.
- **Analog electronics:** Diodes, BJTs and MOSFETs, BJT and MOSFET amplifiers: biasing, small signal analysis and frequency response, feedback, op-amp circuits, Active filters, Sinusoidal oscillators.
- **Digital electronics:** Number systems, Combinational circuits: Boolean algebra, Karnaugh map, logic gates and their static CMOS implementations, arithmetic circuits, code converters, multiplexers, decoders, Sequential circuits: latches and flip-flops, counters, shift-registers and finite state machines.
- **Signals and systems**: Fourier series and Fourier transform, LTI systems: causality, stability, impulse response, convolution, poles and zeroes, frequency response.

POWER ELECTRONICS & POWER SYSTEMS

In addition to **GATE EE syllabus**, emphasis will be on

- Electrical networks
- Electrical machines
- Power systems
- Power electronics
- Control systems
- Linear algebra
- Signals and systems

SYSTEMS & CONTROL

In addition to **GATE IN syllabus**, emphasis will be on

- Electrical Networks
- Linear Algebra
- Control systems
- System design
- Advanced Control
- State Space Techniques
- Optimization

Eligibility Criteria

Considering the breadth of research activities conducted in the EE department, the eligibility criteria for PhD admissions are different across the five research specializations.

COMMUNICATIONS, SIGNAL PROCESSING & LEARNING

Candidates must satisfy at least one of the following criteria

- **BE/BTech** in EE, EC, AI, MC, CS, ES, EP or equivalent
- **ME/MTech** in EE, EC, AI, MC, CS, ES, EP or equivalent
- **MSc** in Mathematics/Statistics or equivalent

Candidates who do not hold an ME/MTech degree must additionally hold a **valid GATE score** in EC, CS, DA, MA or ST.

MICROELECTRONICS & VLSI: NANODEVICES AND TECHNOLOGY

Candidates must satisfy at least one of the below criteria

- **B.E./B.Tech.** in Telecommunication Engineering (EC) / Electrical Engineering (EE) / Engineering Physics (EP) / Instrumentation Engineering (IN) / Engineering Sciences (ES) / Nanotechnology / Nanobiotechnology / Material Science and Engineering
- **M.Sc. or equivalent** in Electronics / Electronic Sciences (EL) / Physics (PH) / Nanotechnology / Material Science
- **M.E./M.Tech.** in Microelectronics / VLSI Design / Nanoelectronics / Nanotechnology / Nanobiotechnology / Material Science and engineering

Candidates without M.E./M.Tech. must also fulfill at least one of the following additional requirements

- **Valid GATE score** in EC, EE, IN, PH, MT or XE
- **Valid JEST** score in Physics
- **Junior research fellowship** (JRF) of **CSIR/UGC** or **DST INSPIRE** fellowship.

Eligibility Criteria

(Continued)

MICROELECTRONICS & VLSI: INTEGRATED CIRCUITS AND SYSTEMS

Candidates must satisfy at least one of the below criteria

- **B.E./B.Tech.** in Telecommunication Engineering (EC) / Electrical Engineering (EE) / Engineering Physics (EP) / Instrumentation Engineering (IN) / Engineering Sciences (ES) / Nanotechnology
- **M.Sc. or equivalent** in Electronics / Electronic Sciences (EL) / Physics (PH)
- **M.E./M.Tech.** in Microelectronics / VLSI Design / Nanoelectronics / Nanotechnology

Candidates without M.E./M.Tech. must also fulfill at least one of the following additional requirements

- **Valid GATE score** in EC, EE, IN, PH
- **Junior research fellowship** (JRF) of **CSIR/UGC** or **DST INSPIRE** fellowship

POWER ELECTRONICS & POWER SYSTEMS

Candidates must satisfy at least one of the below criteria

- **B.E./B.Tech.** with the following specialization
  - Electrical/Electrical and Electronics/Power engineering or equivalent, or
  - Any other related branch of Electrical Engineering / Technology
- **M.E./M.Tech.** with following specialization
  - Power Electronics/Power Systems/Electrical Engineering, or
  - Any other related branch of Electrical Engineering /Technology

Further, candidates who do not hold an M.E./M.Tech. degree must additionally hold a **valid GATE score** in EE.

Eligibility Criteria

(Continued)

SYSTEMS & CONTROL

Candidates must satisfy at least one of the below criteria

- **B.E./B.Tech.** with following specialization
    - Instrumentation and Control/Control Engineering, or
    - Any other related branch of Engineering/Technology
- **M.E./M.Tech.** with following specialization
    - Systems/ Control & Computing/ Automation Engineering, or
    - Any other related branch of Engineering/Technology

Further, candidates who do not hold an M.E./M.Tech. degree must additionally hold a **valid GATE score** in IN, EE or EC.

Admission to Direct PhD

Candidates with B.E./B.Tech./B.S./M.Sc. degrees from Centrally Funded Technical Institutes (CFTIs) are eligible to apply for the direct PhD program under the following two categories

- After **B.E./B.Tech./B.S./MSc from IITs/IISERs/NITs/IISc & CFTIs** with **CGPA 9.0 or more** (higher stipend than Ministry of Education funding)

- Students graduated (**B.E./B.Tech./B.S./MSc**) **from CFTIs** with **CGPA 8.0 or more**, are eligible for applying (with regular Ministry of Education fellowship). Students with CGPA lower than 8.0 need GATE qualification for applying to the PhD program.

Admission under External Category

Candidates **employed in well-resourced scientific institutions, R&D establishments, and industry laboratories, engaged in research based activities** can opt for applying in the External (or Sponsored) category. The candidate should be **working in an organization closely related to the proposed Ph.D. research topic**.

The minimum educational qualification is the same as mentioned in the previous **specialization-specific eligibility** in this brochure.

In case the candidate is shortlisted for further selection process, the candidate should furnish a **No Objection Certificate** (NOC) issued by his/her organization for verification.

The candidates given admission under this program are **not eligible for any financial assistantship** from the institute.

Further Information

IIT HYDERABAD'S PHD ADMISSIONS PORTAL

https://www.iith.ac.in/phdadmissions/

FACULTY MEMBERS & RESEARCH AREAS, EE@IITH

https://ee.iith.ac.in/faculty.html

DEPARTMENT OF EE@IITH

https://ee.iith.ac.in/

HOW TO REACH IIT HYDERABAD

https://www.iith.ac.in/about/aboutiith/#reach