Department Handbook 2020-21

Electrical Engineering

IIT BOMBAY

Disclaimer

The Institute Student Companion Program (ISCP) has acquired and presented the data in this handbook on the feedback compiled from the respective specialization seniors. Best efforts have been put to cater to relevant and useful information to you. We request you to exercise caution and wisdom while relying on this information. ISCP will not be held responsible for any inaccuracies in the document.

CONTENTS

1. About the Department

The Department of Electrical Engineering (EE) is one of the largest departments of IIT Bombay since its inception in 1958. The department has different academic programs with about 570 undergraduate and 730 postgraduate students. The department is equipped with the state of the art experimental and computational facilities for undertaking R & D and consultancy activities in various fields.

The EE department has a vibrant postgraduate program with a strong focus on research and development. The number of postgraduate students in EE is more than that of the undergraduate students and the department attaches a lot of importance to its Masters's students as they constitute the backbone of research and development.

The department offers MTech in six research areas/specializations:

- Communications Engineering (EE1)
- Control and Computing (EE2)
- Power Electronics and Power Systems (EE3)
- Electronic Systems (EE5)
- Integrated Circuit and Systems (EE6)
- Solid State Devices (EE7)

Faculty members of the department are recipients of many distinguished awards like the Shanti Swarup Bhatnagar Prize, Prof. K. Sreenivasan Memorial Award, Prof. SVC Aiya Memorial Award, Dr. Vikram Sarabhai Research Award, Ram Lal Wadhwa Award, INAE Young Engineer Award, Alexander von Humboldt Fellowship, and many others.

Many faculty members are Editors of IEEE and other national and international journals. They are also Fellows of organizations like IEEE, IETE, INAE, IASc, NASI, and INSA.

2. Message from HoD

Congratulations on your selection for the MTech program in EE at IIT Bombay. As you are aware, the competition was very stiff and you are among the very few students who made it. We, the faculty members, staff, and students, extend a warm welcome to you. As you are aware, ours is among the largest Electrical Engineering departments in the country, with 67 faculty members and more than 1340 students, of which more than 55% are postgraduate students. We have a strong academic and research culture. We have state-of-the-art research laboratories in almost all areas of electrical engineering and few centers of excellence. Most of the facilities are being managed by senior scholars of the department. Our world ranking has been steadily improving, primarily because of the quality of research being carried out by my colleagues and graduate students and for the excellent classroom teaching. I invite you to be a part of the journey in putting IIT Bombay in the one of most sought places in the world for research.

This year, I will not be able to personally welcome you to the department. Due to Covid-19, our lives have taken a steep turn. Hope and pray the situation will get back to normal, soon and you will come and stay inside the campus. The campus has a lot to offer you. I am sure that you will find this place academically rewarding. This department has a lot to give; just how much you take depends on one person, that is you. You will face diverse temptations, but you need to stay focused to achieve your goals. Do good work, and you grow, and the department does too. It is a win-win situation. All in all, I assure you the time spent here will be the best years of your life! Feel free to contact me if you need any help! I hope to see you soon at the IIT Bombay Campus.

All the Best to you all!

Baylon G Fernandes

Head of Department
head@ee.iitb.ac.in

3. Message from ISCP

Dear New Entrants,

These are tough times, but you are not alone.

We welcome you to one of the most prestigious institutes in the nation. Congratulations on having achieved this incredible feat. You are about to become part of a culture that will leave its traces within you for a long, long time, even if it begins 'untraditionally.' You will be the ones witnessing the first term to happen entirely online in the history of IIT-Bombay. It might feel overwhelming, and for all the right reasons, we must say. There will be several things you might be worried about, from coping up with the academics in online mode to missing out on things; however, as we said, "You are not alone."

Institute Student Companion Programme (ISCP) is a student body with the primary objective of building a relationship of trust and comfort between the final year students and the incoming students of the PG Programmes. We are here to help you in getting familiar with the ways of IIT-B, which is even more critical in these times. You will become a part of a culture where people want to perfect their craft and thus work day in and day out at it. The scope of these is not limited just to academics. Various online events are and will be organized by the cultural, technical, and sports clubs in IITB, like Code in Quarantine, Fitness challenges, Dance Challenges, etc. Managing these along with online lectures might seem daunting at first, and hence, to help you with a world of problems including these, we assign you a Student Companion.

The Student Companions are self-motivated volunteers who will genuinely help you in low and high tides as an act of giving back what they received from the program. You can look up to the

team for any form of support, any information before venturing out into an unknown domain, be it academics or extracurricular activities. You can reach out to us for any issue regarding the curriculum, facilities provided, your physical, social or mental health, and last but certainly not the least, reach out to have a chat with us because that is what we are for, for you.

The COVID -19 pandemic has affected all of us. For now, Health concerns prevent your arrival in our beautiful lush-green IIT-B campus, it also prevents your participation in hostel activities, sports, cultural activities. There are many things here at IIT-B waiting for you, but the most important thing is the campus, and the buildings do not define IIT-B. It's you. You set the culture, the activities, you represent IIT-B to the world, and you make IIT-B what IIT-B is. So, knowing that time flies at IITB, we strongly suggest participating in things that happen online other than attending lectures, make memories, reach out to us for any queries, and relax with the comfort of your home. At least till we get an opportunity to welcome you into the campus, let's be safe, let's be optimistic and let's keep our learning spirits high.

Looking forward to getting to know you. Giving out some motivation for these difficult times, we end with a quote by Albus Dumbledore: "Happiness can be found, even in the darkest of times, if one only remembers to turn on the light."

Stay Safe!

Overall Coordinators
Institute Student Companion Programme (2020-21)
IIT Bombay
Email:iscp@iitb.ac.in

Satyam Rathore
er.satyamrathore@gmail.com
+91 7389102399

Aakrit Anshuman
aakritanshuman1@gmail.com
+91 8904059856

4. Message from Academic Council

Dear Freshmen,

Congratulations to all for making it to one of the premier institutes of the country. Despite the stiff competition, you all managed to come out with flying colors. So, on behalf of the PG students of IIT Bombay, it is my honor to welcome you all here.

So now all of you are a part of the IIT Bombay PG community or “PG JUNTA” as we call them. The institute has a wide range of facilities and services to offer to all its students. This will not only ensure a fruitful educational experience but also promote overall skill development. In the institute, there are several student-run bodies, that focus on the development of skills, sports, and extracurricular activities such as music, dance, drama, etc. Along with academics, we urge you all to explore and make the most of the excellent facilities that the institute has to offer.

As the Institute Master’s Representative, my entire team and I aim to address your grievances and help you to the best of our abilities. This time since the first semester for you all is going to be online, you might have a lot of queries in your mind. Please feel free to contact us at any time. Our council PGAC is one that is for the PG students, of the PG students and most importantly by the PG students. So, whenever you face a problem, we are always there to help you out. Supporting the students in their academic endeavors is also our foremost priority and we will try to improve the IITB experience in all the ways we can. On this note, I once again welcome you all

to IIT Bombay, hoping to welcome you all back on the campus as soon as the situation gets better, and wishing you every success in your future endeavors.

Sohini Dasgupta
Institute Masters Representative (2020-2021)
Post Graduate Academic Council (PGAC)
imr@iitb.ac.in

5. Lab Facilities

1. **Wadhwani Electronics Laboratory (WEL)** (*3rd Floor, EE Building*)
   Professor In-charge - Prof Siddharth Tallur
   Relevant Specializations - for all specializations in EE

   The WEL houses all the major electronics hardware activities of the Electrical Department at IIT Bombay

2. **Signal Processing and Instrumentation Lab**
   (*1st Floor, EE Building*)
   Professor In-charge - Prof. P C Pandey
   Relevant Specializations - EE1, EE5

   This lab focuses on research in the areas of speech signal processing, bio-medical signal processing & instrumentation, electronic instrumentation, and embedded system design

3. **Integrated Systems Laboratory**
   (*1st Floor, Electrical Annex Building, Opposite to EE main building*)
   Professor In-charge - Prof. Jayanta Mukherjee, Prof. Maryam Shojaei Baghini
   Relevant Specializations - EE1, EE5, EE6, EE7

   Embedded system solutions are developed here. Primarily design and test of passive and active RF and circuits are done

4. **Embedded System lab**
   (*5th floor, Girish Gaitonde (GG) building*)
   Relevant Specializations - EE5, EE6, EE7

   The prime focus areas of the lab are system design, prototyping and evaluation starting from sensor/transducer interfacing to full system development and network of sensor nodes.

5. **Applied Integrated Micro Systems (AIMS) Laboratory**
(*1st Floor, Electrical Annex Building, Opposite to EE main building*)
Professor In-charge - Prof. Siddharth Tallur
Relevant Specializations - EE5, EE6, EE7

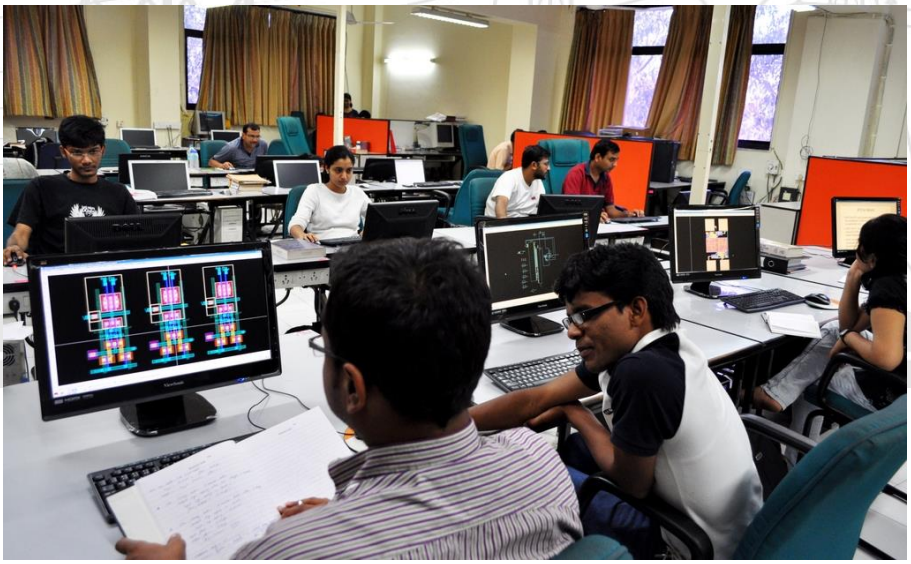
AIMS lab works on innovative instrumentation for impactful measurements. The research areas include sensor systems, hybrid integrated microsystems, studying their underlying physics to leverage such platforms for high-resolution sensing applications.

6. **Photonics and Quantum Enabled Sensing Technology (P-Quest) Laboratory**
(*2nd Floor, EE Building*)
Professor In-charge - Prof. Kasturi Saha
Relevant Specializations - EE1, EE7

P-Quest lab works on exploring precision metrology and sensing using novel interdisciplinary research in fields like nano-photonics, classical and quantum information processing and life sciences, to develop practical quantum devices via design and experimentation, thus connecting quantum theory to engineering applications.

7. **VLSI Design Lab**
(*5th Floor, Girish Gaitonde (GG) Building*)
Relevant Specializations - EE5, EE6

The VLSI Design Lab hosts all major VLSI CAD Vendor tools and their licenses. Few major tools in frequent use are Synopsys, Cadence, Mentor, Agilent, Magma, Xilinx, etc. The main research focus is in the area of analog and digital design. In addition to courses, this lab also hosts accounts for different courses that require the hands-on experience of tools. For different projects and their tape-out, there is the availability of a high-performance computational server to speed up the simulations.



8. **Signal Processing and Artificial Neural Networks (SPANN)**
(*3rd Floor, EE Building*)
Professor In-charge - Prof. S.N. Merchant
Relevant Specializations - EE1

The major areas of research that are pursued in SPANN Lab include Wireless Communications, Sensor Networks, Image Processing, and Signal Processing.

9. **Information Networks Laboratory**

(*2nd Floor, EE Building*)
Professor In-charge - Prof. Prasanna Chaporkar, Prof. Abhay Karandikar
Relevant Specializations - EE1

Group members of the lab are pursuing research in the field of 4G and 5G cellular technologies, with an emphasis on inter-working with non-3GPP Wireless Local Area Networks (WLANs).

10. **Texas Instruments Digital Signal Processing Lab (TIDSP)**

(*3rd Floor, EE Building*)
Professor In-charge - Prof. V.M. Gadre
Relevant Specializations - EE1, EE5

TIDSP laboratory was set up in the EE Department to support DSP hands-on projects at the undergraduate and the postgraduate levels. DSP specific hardware and software support is provided by Texas Instruments (TI) itself.

11. **Fiber-Optics Communication Lab**

(*2nd Floor, EE Building*)
Professor In-charge - Prof. Kumar Appaiah, Prof. Joseph John
Relevant Specializations - EE1, EE5

This lab is dedicated to pursuing research mainly in the area of optical fiber communication (SM, MM, FM), plastic optical fiber, and fiber sensing.

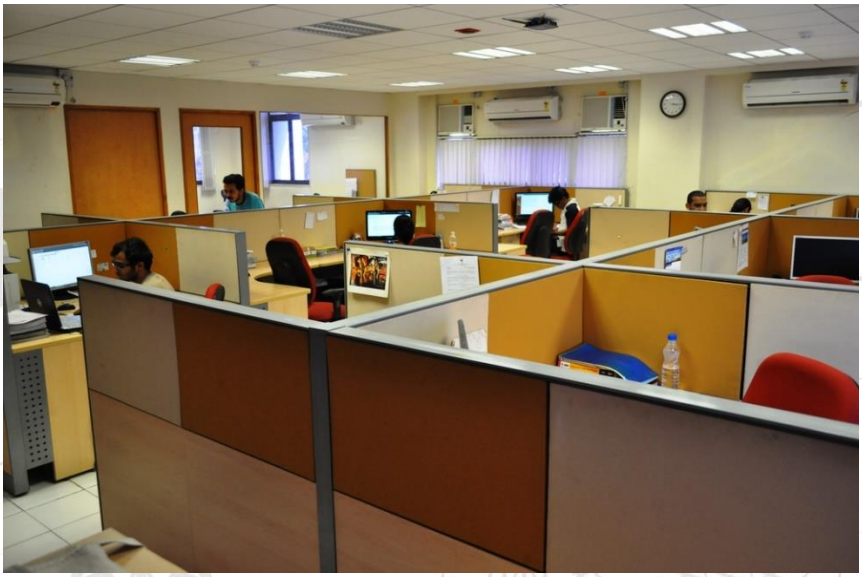
12. **Bharti Centre for Communication**

(*2nd Floor, EE Building*)

Professor In-charge - Prof. D. Manjunath, Prof. Bikash Kumar Dey

Relevant Specializations - EE1

The Bharati Centre for Communication is a center to generate fundamental knowledge in telecommunication and allied systems. The Vision of the center is to be an internationally recognized contributor in moving the frontiers of knowledge through research and education, to keep technology practice in focus and to educate for innovation and leadership.



13. **Vision and Image Processing**

(*1st Floor, EE Building*)

Professor In-charge - Prof. Rajbabu Velmurugan

Relevant Specializations - EE1, EE2, EE5

This lab is dedicated to Deep Learning, Computer vision techniques. The major projects currently undertaken are related to Haptics, Biometrics, Image segmentation, super-resolution, Anomaly detection, and surveilling related problems. This lab consists of more than 23 GPU, and a high-performance computer to work on the mentioned techniques

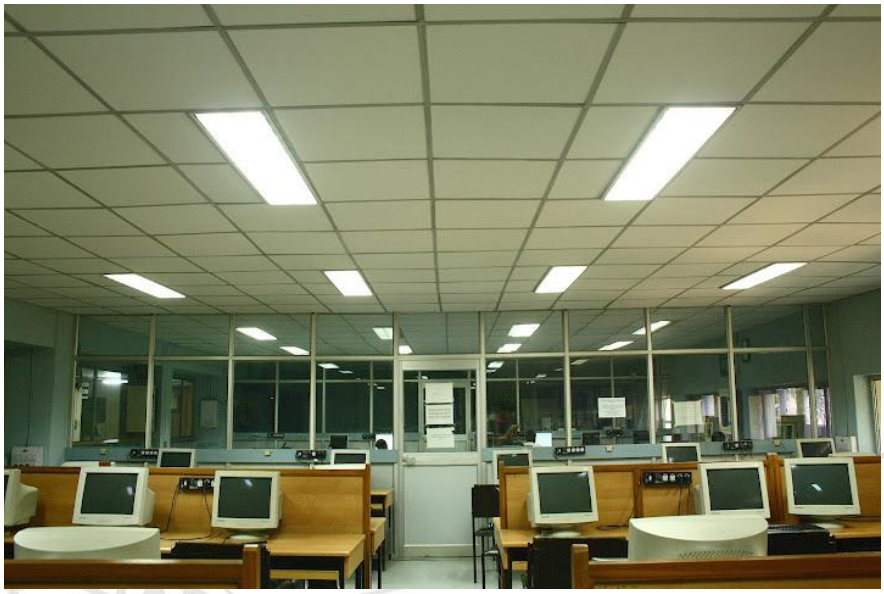
14. **PC Lab**

(*1st Floor, EE Building*)

Professor In-charge - Prof. Prasanna Chaporkar

Relevant Specializations - For all specializations in EE

PC Lab provides general computing facilities to students of Electrical Engineering and Reliability Engineering. Both Windows and Linux machines are present in the lab. Also, a load-balanced server (Sharada) is available for heavier computational use. Software packages like MATLAB, Lyx, Scilab, Spice, Ansys, Sequel, Grace, etc. are installed on Sharada. You can use them for your (academic) work. Standard Linux/Unix packages, such as LaTeX, MySQL, etc are also available.



15. **Digital Audio Processing Lab**
(*1st Floor, EE Building*)
Professor In-charge - Prof. Preeti Rao
Relevant Specializations - EE1, EE5

This lab is based on the application of signal processing in the analysis of speech and audio. Research activities are related to spoken language assessment, music content analysis, measuring the goodness of instruments like Tabla, segmentation of instruments in the music concert, and other application of speech and audio processing.

16. **Communication Lab**
(*1st Floor, EE Building*)
Professor In-charge - Prof. Shalabh Gupta
Relevant Specializations - EE1, EE5, EE6

Communication Lab primarily focuses on cutting edge research in the area of High-speed Communication Links. It can further be divided into different domains like High-speed Links using Optical Communication, Silicon Photonics, SerDes (Serialiser and Deserialiser) Links, RF Circuits, and Millimetre-wave circuits and Systems.

17. **Networking Lab**
(*2nd Floor, EE Building*)
Professor In-charge - Prof. D. Manjunath
Relevant Specializations - EE1

The work in the Networking lab deals with the theoretical aspects of queuing theory, sensor networks, applications of stochastic approximation, software routing, etc.

18. **Microwave and Antenna Lab**
(*3rd Floor, EE Building*)
Professor In-charge - Prof. Girish Kumar
Relevant Specializations - EE1

Microwave Lab is involved in research work in the area of RF Systems, Electromagnetic Waves, and Antenna Design. Primary research work is being done in different fields like Microstrip Antenna, Microwave Integrated Circuits, and Broadband Antennas.

19. **TTSL-IITB Centre of Excellence in Telecommunications (TICET)**
(*2nd Floor, EE Building*)
Professor In-charge - Prof. Abhay Karandikar
Relevant Specializations - EE1

TICET focuses on state-of-the-art research in telecom relevant to Indian Service Providers in general and Tata Teleservices Limited (TTSL) in particular with special emphasis on rural wireless applications and connectivity. The research activities in this lab are related to Quality of Service and resource allocation in wired/wireless networks, TV White Space, and its potential for affordable broadband access in India, Frugal 5G, and rural broadband research and standardization.

20. **Medical Deep learning and AI Lab (MeDAL)**
(*1st Floor, EE Building*)
Professor In-charge - Prof. Amit Sethi, Prof. Manoj Gopalkrishnan
Relevant Specializations - EE1

This lab is dedicated to solving real-world problems in the areas of medical imaging, radiology, and pathology using deep learning architectures. This lab houses high-end computing facilities to work with large scale data (Gigapixel images) to solve various computer vision problems. The research group has collaborated with various hospitals and universities.

21. **Information Systems and Radios (ISR) Lab**
(*2nd Floor, EE Building*)
Professor In-charge - Sibi Raj Pillai
Relevant Specializations - EE1

Information Systems and Radios (ISR Lab) facilitates research broadly in information theory and Radar Technology. Current research undertaken is wind-profiling algorithm for MST radars, GNSS Receiver Development, Information theoretical limit for Digital and Analog Hybrid communication, and Minimum energy transmission scheme for packetized transmission.

22. **Computer Architecture and Dependable Systems Lab (CADSL)**
(*2nd Floor, Electrical Engineering Annex*)
Professor In-charge - Virendra Singh
Relevant Specializations - EE5, EE6

Areas of research are - Advance and futuristic architecture and system including compiler and operating system support for architecture, An advanced dependable system including formal verification and VLSI testing and Computer-Aided Design of VLSI and hardware accelerator.

23. **High Performance Computing Lab (HPC)**
(*4th Floor, Girish Gaitonde Building*)
Professor In-charge - Prof. Sachin B Patkar
Relevant Specializations - EE1, EE2, EE5, EE6

Areas of research Our research is aimed at addressing future applications and implementations of high-end parallel and reconfigurable computing especially to Electrical Engineering related problems. Projects range from accelerating circuit simulation for digital, RF and power electronics, stereo imaging and Machine Learning on reconfigurable hardware, Network-on-Chip for Distributed Computing, and Crypt-analysis.

24. **Control and Computing Laboratory**
(*2nd Floor, EE Building*)
Relevant Specializations - EE2

Some of the research interests are Differential games, Formation control and consensus in Quad-rotors, Pursuit-Evasion games, Multi-agent systems and Co-operation control, Hamiltonian systems, Stability of switched systems, Differential algebraic equation and singular LQR problem, Passivity and KYP lemma, Automatic control theory, Data estimation and filtering, nD-Systems, Graph, and Metroid decompositions, etc.

25. **Applied Power Electronics Laboratory**
(*Ground Floor, EE Building*)
Professor In-charge - Prof. Vivek Agarwal
Relevant Specializations - EE3

Non-Conventional Energy-Modelling the steady-state and dynamic characteristics of the PV, Fuel cell and wind energy sources, Power converter topologies for standalone and grid-connected PV, FC and wind systems, Maximum Power Point Tracking Schemes, Microgrid Power Quality

26. **Power Anser Lab**
(*2nd Floor, EE Building*)
Professor In-charge - Prof. Shreevardhan A. Soman
Relevant Specializations - EE3

Power Anser Labs was set up in April 2007 in collaboration with TCS. The association aims at leveraging research outputs to full-fledged software products, primarily in the form of web services, which can be used by power utilities.

27. **Power Systems Laboratory**
(*Ground Floor, EE Building*)
Professor In-charge - Prof. Anil Kulkarni
Relevant Specializations - EE3

Fully Functional scaled-down model of 2 Area 4 machine system used for demonstration of power system dynamic phenomena i.e. frequency, voltage dynamics, the effect of controllers like AVR, FACTS, and HVDC converters (variable impedance, voltage source, and line-commutated converters) with digital control.

28. **Simulation Centre for Power Electronics and Power Systems**
(*Ground Floor, EE Building*)
Professor In-charge - Prof. Himanshu Bahirat
Relevant Specializations - EE3

The simulation center for PEPS conducts workshops for people from different colleges and industries to train them on software that is crucial for power electronics and power system applications. This lab has different software like Matlab, PSCAD, PSIM, DigSilent, and SaberRD. This lab accommodates its software server. The models of power electronics and power system components are implemented on this software that is available on the web site of the simulation center.

29. **National Centre for Photovoltaic Research and Education**
(*3rd Floor, Annex Building*)
Professor In-charge - Prof. B. G.Fernandes
Relevant Specializations - EE3

The broad objectives of NCPRE are to provide R&D and education support for India's ambitious 100 GW solar mission. The Centre is involved in both basic and applied research activities. These research activities include silicon solar cell fabrication and characterization, new materials for PV devices, energy storage and batteries for PV, development of power electronic interfaces for solar PV systems, and module characterization and reliability.

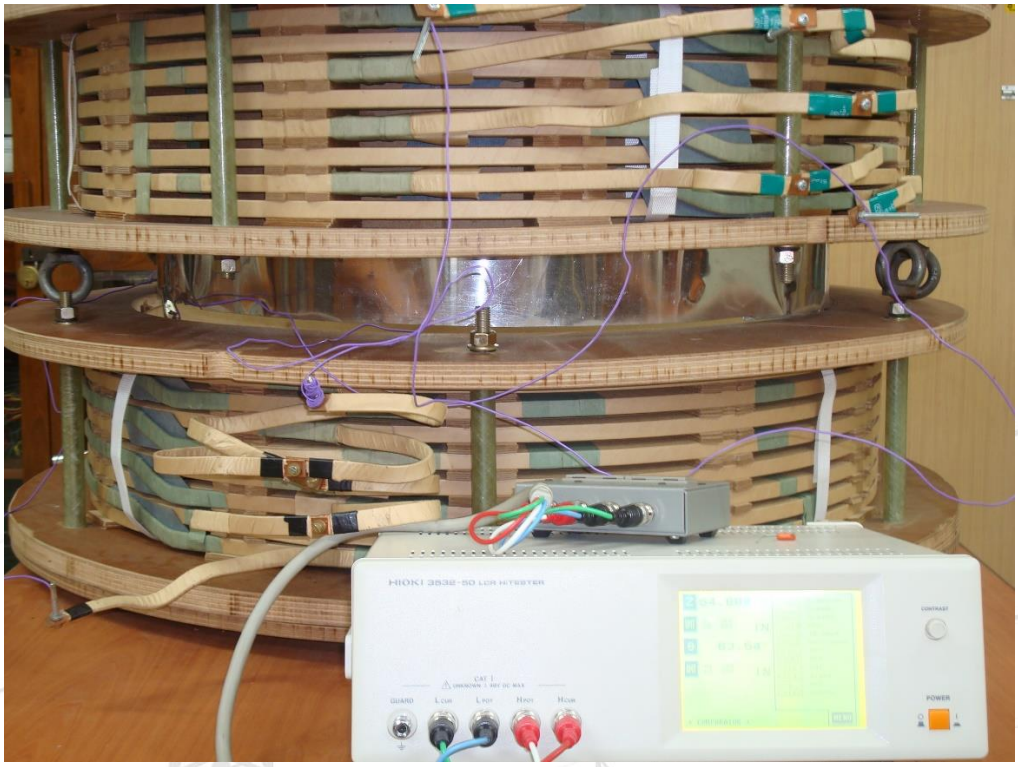
Si solar cell team displaying solar cells fabricated at NCPRE fabrication lab

30. **Field Computation Laboratory**
(*Ground Floor, EE Building*)
Professor In-charge - Prof. B. G. Fernandes
Relevant Specializations - EE3

Concurrent and visionary works related to generation, transmission, and distribution of electrical energy are being carried out. Distributed generation, microgrids, and renewable energy are the focus of research in the field of generation. Transmission expansion planning, ancillary service management, and power system stability are some of the studies undertaken by researchers in the lab.

31. **Insulation Diagnostics Lab**
(*2nd Floor, EE Building*)
Professor In-charge - Prof. S. V. Kulkarni
Relevant Specializations - EE3

This laboratory has a 100 kV ac / 140 kV dc set up along with a partial discharge measurement setup. The academic activities include giving exposure to undergraduate and postgraduate students about various high voltage engineering aspects. Study of corona inception voltage for various electrode arrangements, demonstration of frequencies radiated by corona is some of the experiments conducted as part of academic activities.



32. **Power Electronics Design Centre (PEDC)**
(*Ground Floor, EE Building*)
Professor In-charge - Prof. B. G. Fernandes
Relevant Specializations - EE3

The Power Electronics Research Lab has the equipment, instruments and computational facilities for research in power electronics, machines and drives, renewable energy field (photo-voltaic and wind) and their power conditioning and interconnection with the grid, power Converter topologies for grid-connected and standalone PV and wind system, MPPT Schemes, Machine design, BLDC motor, MultiLevel Inverter, DC Microgrid.

33. **Electrical Machines Lab**
(*Ground Floor, EE Building*)
Professor In-charge - Prof. B. G. Fernandes
Relevant Specializations - EE3

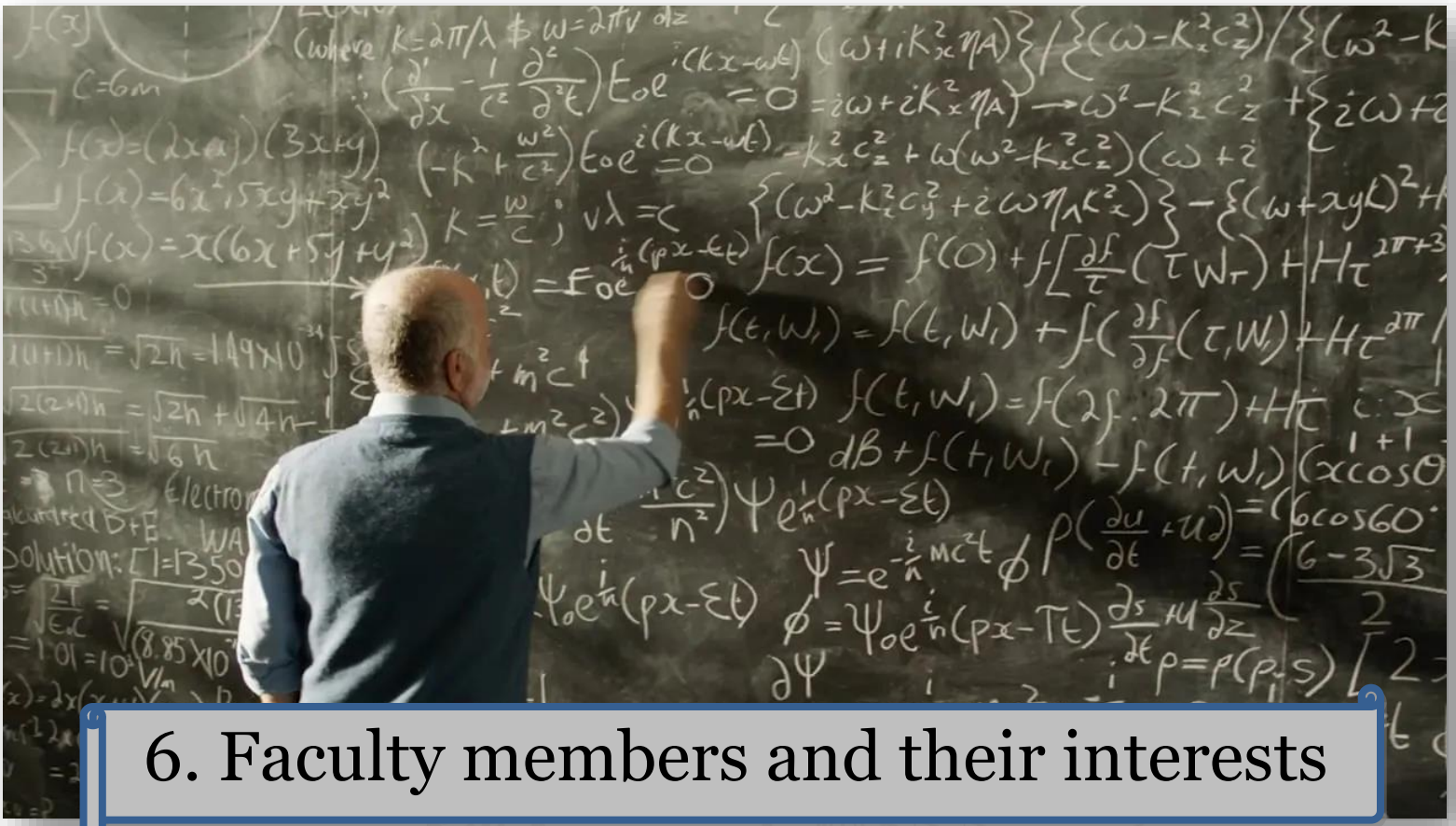
This undergraduate teaching laboratory has electric motor-generator sets, measuring instrumentation, and power electronic drives. Students are exposed to concepts of machine characteristics and control through lab experiments.

34. **Stochastic Systems Lab**
(*4th Floor, GG Building*)
Professor In-charge - Prof. Nikhil Karamchandani, Prof. Sharayu Moharir, Prof. J K Nair
Relevant Specializations - EE1, EE5

Description: In our lab, we focus on resource allocation for modern communication systems. Few are caching in distributed networks, Age of Information aware scheduling for IoT devices, coded caching.

35. **Advanced Integrated Circuits and Systems Lab (aiCAS Lab)**
(*1st Floor, EE Building*)
Professor In-charge - Prof. Rajesh Zele
Relevant Specializations – EE1, EE5, EE6 (IC design, embedded system design, and MEMs based sensors/circuit development)

Research at aiCAS lab focuses on the areas of high-performance Analog, RF, Mixed-signal IC design, and Embedded Systems design. State of the art hardware and software tools are used for developing integrated circuits using both RF-Analog and Digital design flow. The lab is being equipped with measurement instruments required for the post-silicon validation of ICs. Integration of electronic components on PCB for verification and product (hardware-software) co-development is enabled with the help of dedicated staff.



6. Faculty members and their interests

EE1: Communication Engineering

Prof Abhay Karandikar	Control and Performance Modelling of Wireless Networks, Quality of Service and Resource Allocation in Wired/Wireless Networks, Next Generation Wireless Network Protocols (related to 802.16m, LTE-Advanced, and 4G Standards), Co-operative Relay and Self Organizing Network, Carrier Ethernet and Mobile Backhaul, Rural Wireless Network.
Prof Amit Sethi	Computational pathology, Medical image analysis, Deep Learning, Machine learning, Computer vision, Image processing, Signal processing.
Prof Animesh Kumar	Signal processing, Applied statistics
Prof Bikash Kumar Dey	Information Theory, Coding Theory, Wireless communication
Prof D. Manjunath	Distributed computation in sensor networks and distributed optimization for network resource provisioning.

	Random geometric graph models for wireless networks and stochastic coverage processes. Queueing system models for wireless networks. Self-tuning mechanisms for optimal resource allocation in computer systems. Internet: Pricing, Quality of Service, Traffic Engineering. Traffic Measurement and Performance Monitoring. Performance Modeling, Stochastic Processes, and Queueing Theory. Optical Networks: Design and Algorithms for Traffic Engineering. Packet Switches: QoS provisioning Architectures and Analysis.
Prof Girish Kumar	Microstrip Antennas and Arrays, Broadband Antennas, Microwave Passive, and Active Circuits
Prof Gaurav S Kasbekar	Modeling, design and analysis of wireless networks, Network Security, Game-theoretic and economic aspects of spectrum allocation and Device-to-Device networks, Networking of Internet of Things (IoT) nodes, Design and implementation of wireless sensor networks, Interference management and resource allocation in cellular networks
Prof Jaykrishnan U Nair	Online learning, Uncertainty management in smart power grids, Communication networks, Network economics
Prof Kumar Appaiah	Signal processing for communication; Fiber Optics; Wireless Communication.
Prof Manoj Gopalkrishnan	Algorithms in nature; Information processing in networks; Reaction networks; Neural networks; Evolution; Game theory; Deep learning; Information geometry; Thermodynamics of information; Quantum Information.
Prof Nikhil Karamchandani	Networks, Communications, and Information Theory; Online/active learning including multi-armed bandits, sequential testing, etc.; Algorithms for edge computing / caching systems; Coding for communication/computation; Graphs - theory and algorithms
Prof Prasanna Chaporkar	Resource Allocation and scheduling in wired/wireless networks, Optimization and control of stochastic systems, Distributed systems and algorithms.
Prof Saravanan Vijayakumaran	Cryptocurrency and Blockchain Technologies, Cryptography
Prof Sibi Raj B Pillai	Information Theory of Networks, Stochastic Modeling, and Resource

	Allocation, Wireless Communication, Signal Processing for Radar, Information Inheritance in Biological Systems, Error Correction Codes
Prof Sharayu Moharir	Modeling and the design of scalable resource allocation algorithms for large networks, including content delivery networks, communication networks, and social networks. Machine learning, specifically multi-arm bandit problems motivated by resource allocation problems.
Prof Shabbir Merchant	Signal Processing, Image Processing, Wireless Communication, IoT, Machine Learning
Prof Subhasis Chaudhuri	Image Processing, Machine Learning, Pattern Recognition, Haptics
Prof Vikram M. Gadre	Communication and signal processing, with emphasis on multi-resolution and multi-rate signal processing, especially wavelets and filter banks: theory and applications.

EE2: Control and Computing

Prof Debraj Chakraborty	Optimal Control, Linear Systems, Optimization, Differential Games, Game Theory
Prof Dwaipayan Mukherjee	Multi-agent Systems, Consensus, Formation Control, Control Theory, and Robust Control
Prof Debasattam Pal	Distributed parameter systems, algebraic analysis, optimal control.
Prof Harish K. Pillai	Control theory, Systems theory, Multidimensional systems, Numerical and computational methods, Coding theory, Optimization techniques, Electromagnetics
Prof Madhu N. Belur	Control theory, dissipative systems, graph theoretic methods, decentralized control, behavioral theory control, Fault diagnosis
Prof Vivek Shripad Borkar	Emeritus
Prof Virendra R. Sule	Cryptology: Block and Stream Ciphers, Public Key Algorithms, Boolean Cryptanalysis, Nonlinear Finite State Systems, Feedback Control.

EE3: Power Electronics and Power Systems

Prof Anil Kulkarni	Power System Dynamics and Control, Application of Power Electronics to Power Systems, Renewable Energy Systems, Wide Area Measurement Systems
Prof Anshuman Shukla	Multilevel converters and Modulation and control of power electronic converters, Power electronics applications in power systems (FACTS, HVDC, custom power devices, etc.), Renewable energies and Energy storage, Control of electric drives, Hybrid and solid-state circuit breakers and current limiters
Prof Anupama Kowli	Power System Planning, Operations and Control, Electricity Markets and Economics of Electric Power Grids, Demand-side Management, Demand Response and Flexible Loads, Smart Grids, and its Enabling Technologies and Mechanisms, Policy and Regulation for Electric Power Grids.
Prof Baylon G. Fernandes	Inverter topologies for VAR compensation, Power electronic interface for non-conventional energy sources, Permanent magnet machines for wind power generation, Switched reluctance machines for electric vehicle application.
Prof Himanshu J. Bahirat	Renewable Energy Sources, Grid Integration of Renewable Energy, Offshore Wind Energy, Transients in Power Systems, DC Power Systems, DC Wind Farms, Multi-terminal DC Networks, Circuit Breakers, Power Electronics
Prof Kishore Chatterjee	Utility friendly converter topologies, Power factor correction techniques, STATCOM, Switched-mode rectifiers, Electronic ballast Power evacuation from solar photovoltaic systems, BLDC motors, Microgrids, Chargers for Electric Vehicles
Prof Mukul C. Chandorkar	Power Electronics, System Emulation, Static Compensation, Motor Drives
Prof Sandeep Anand	DC-DC and DC-AC Conversion, Changes for EVs, Reliability of Power Electronic Circuits, GaN & SiC based Power Electronic Converters and Circuits for interfacing Solar PV
Prof Shreevardhan A. Soman	Power system analysis, computation, and economics, Power system Protection

Prof Shrikrishna V. Kulkarni	Transformers: Design, Analysis and Diagnostics, Electromagnetic and Coupled Field Computations, Power Engineering: Distributed Generation, High Voltage Engineering: Insulation Design/Diagnostics
Prof Vivek Agrawal	Power conversion: New converter topologies, High-frequency link power conversion, ZCS-ZVS configurations, Switched Capacitor DCDC converters, Power quality issues: Power factor correction techniques, Static VAR compensation, Active filters

EE5: Electronic Systems

Prof Joseph John	Analog and Digital Circuits, Optical Fiber Communications, Indoor Optical Wireless Systems, Modern Electronic Systems and Instrumentation.
Prof Prem C Pandey	Speech and Signal Processing, Biomedical Signal Processing and Instrumentation, Electronic Instrumentation, Embedded Electronic System Design
Prof Preeti Rao	Speech and Audio Signal Processing, Music Information Retrieval
Prof Rajbabu Velmurugan	Signal processing: Statistical estimation, target tracking; Speech and audio processing: Speech enhancement, source separation; Image processing, video analysis, and computer vision applications; Joint audio-visual signal processing; Efficient hardware for signal processing: edge-computing
Prof Siddhartha P. Duttagupta	Microelectronics, Micro/Nano Sensor Technology Optimization and Application, Sensor Integrated Electronic Circuits and Systems Design
Prof Siddharth Tallur	Embedded Systems and Sensors, Digital Systems and Signal Processing, Photonics and Frequency Control, Microsystems and MEMS, Ongoing projects: GaN HEMT based biosensors, electrochemical sensors for water quality monitoring, acoustic and electromagnetic techniques for corrosion monitoring, elastomer vibration sensor systems for machine health monitoring
Prof Sachin Patkar	Combinatorial optimization: Matroid Theory, Submodular Functions, Linear/Integer programming, Network Flows. High Performance Computing: FPGA-based accelerated computing, GPU based

	acceleration, High Performance Circuit Simulation, Algorithms Design and Analysis, Graph Theory, Geometric Design and Graphics, Software/Hardware Development Projects

EE6: Integrated Circuit and Systems

Prof Madhav P. Desai	VLSI Circuits and Systems, VLSI design and design automation, Graph theory and combinatorics
Prof Maryam Shojaei Baghini	Circuit & system design and integration for intelligent sensing, processing, and problem-solving, Analog/Mixed-signal VLSI design (AI/ML domain circuits and systems, LV, LP and LE for healthcare, bio-inspired circuits and systems, I/O, highly-precise circuits & systems, instrumentation, energy harvesting, and more applications) 3. MEMS/NEMS and Technologies for Sensing, Integrated circuits and system design with emerging devices, Energy harvesting, and power management circuits & systems, RF integrated circuit design for various applications, High-speed data transmission and interconnects, Analog aspects of digital circuits, VLSI design, and embedded system
Prof Jayanta Mukherjee	RF VLSI Design, Antenna Design, Biomedical IC Design, Testing and Characterization, Analog VLSI, Digital VLSI, Noise Modeling
Prof Pramod Murali	Sensor Interface Circuits, Miniature LiDARs, EdgeAI
Prof Rajesh H. Zele	RF, Analog, Mixed-Signal Integrated Circuits/System-on-Chip (SOC) design, Wireless Sensor Networks for IoT applications, High-performance ADC and DAC design, Circuits and Systems for Machine Learning.
Prof Shalabh Gupta	High-speed CMOS analog/RF/mm-wave integrated circuits and systems, Optical fiber communication systems, Microwave photonics / ultrafast data conversion using photonics, Beamforming antenna systems, Signal processing for these systems
Prof Virendra Singh	Computer Architecture Processor architecture and microarchitecture, VLSI Testing, Fault-tolerant computing, Robust design and architectures, Self-healing system design, SoC/ NoC

	design and test, Post Silicon Debug, High-level synthesis, Formal verification

EE7: Solid State Devices

Prof Anil Kottantharayil	CMOS device physics, design, and modeling, Materials for advanced CMOS devices, CMOS device physics, design and modeling, Materials for advanced CMOS devices, Electrical characterization.
Prof Apurba Laha	III-Nitride semiconductors and heterostructures: Growth using Molecular Beam Epitaxy, III-Nitride Nanowires: Growth and Devices, Optoelectronics devices such as Green Laser Diode, UV LED for water purification, and medical application, Oxide-based electronics: Epitaxial rare earth oxides (high-K dielectrics) on III-Nitride substrates for MOSHEMT application, Physics of nanostructure growth, Solid-phase epitaxy of semiconductor and oxide materials, Encapsulated solid phase epitaxy, Molecular Beam epitaxy, Mismatch epitaxy.
Prof Bhaskaran Muralidharan	Computational nanoelectronics, spintronics, nanoscale energy conversion. http://www.ee.iitb.ac.in/bmwebpage
Prof Kasturi Saha	Nanophotonics, Quantum optics, Magnetometry, Colour centers in diamond
Prof Mahesh B. Patil	Circuit simulation, particle swarm optimization, and applications, real-time simulation, use of circuit simulation in pedagogy
Prof Valipe Ramgopal Rao	Nanoelectronics, Technology Aware Design Challenges with Emerging Technologies (Process-Device-Circuit Interactions with Multigate MOSFETs, Polymer Transistors, Molecular Electronics, etc.), CMOS Reliability, Bio-MEMS.
Prof Narendra S Shiradkar	Reliability of solar cells, modules and systems, PV Performance Monitoring, Design for reliability, Techniques for PV Power Plant Inspection and Monitoring, Power Electronic Device reliability.
Prof Pradeep R. Nair	Nanoscale devices for energy and healthcare applications., Semiconductor device physics and reliability., Micro-Electro-Mechanical Systems (MEMS).

Prof Saurabh Lodha	CMOS process integration and device physics, Materials and processes for advanced CMOS devices, Metal-semiconductor interfaces.
Prof Souvik Mahapatra	Electrical characterization, modeling and simulation of micro/nanoelectronic devices, NBTI/PBTI and Hot carrier degradation in MOSFETs, High-k gate dielectrics, Advanced CMOS device reliability, Flash EEPROMs - Floating gate, SONOS/SANOS & Metal Nanoparticles, Reliability of CMOS Logic and NAND Flash Memory Devices, Device to Circuit framework for reliability
Prof Dipankar Saha	Microelectronics New Device Physics Semiconductor Spintronics Spin injection, transport, and detection in III-V systems Device Reliability, Device Physics, Semiconductor Heterostructures, LED and lasers, RF transistors, Transport in reduced dimension system, Femtosecond spectroscopy
Prof Swaroop Ganguly	Physics and technology of nanoscale devices, Spin-based devices and circuits, Energy-conversion devices
Prof Subhananda Chakrabarti	III-V Compound semiconductor materials growth and characterization, Optoelectronic Devices of interest include quantum dot photodetectors and Solar cells, III-V device integration on germanium, II-VI (ZnO and ZnMgO) materials and devices
Prof Udayan Ganguly	Memory materials, technology and device (e.g. Flash, Resistance RAM, Ferroelectric RAM, etc.) for standard memory and neuromorphic/AI applications, Silicon-based advanced computing devices technology, physics and modeling (e.g. FinFET, SOI FET, etc.) for standard logic and neuromorphic/AI applications, Neuromorphic / AI computing - algorithms, circuits based on novel devices for neurons and synapses.
Prof Ashwin A. Tulapurkar	Spintronics, Physics of nano-devices, Spin-current induced magnetization switching, RF properties of spintronic devices, Noise, Thermoelectric effects

7. SWC and Gender Cell

Student Wellness Centre (SWC) is an integral part of the IITB campus. After securing admission at the Institute and starting your stay here, you may feel that a lot of parameters around you are different. You would have more responsibilities to handle at the hostel and the academic level. Take heart, you will not be the only one. There are a few issues that almost everyone in the Institute faces initially like academic concerns, social (family and peer) pressure, etc., leading to feelings of loneliness, low confidence, anxiety, stress, anger, and sadness, to name a few.
So, if you ever feel the need we are always here for you.
You can find all the contact information on **SWC** here.

IITB Gender Cell (GC), previously known as women's cell, has been in existence since 2002. In recognition of the Institute's belief that its employees and students have a right to be treated with dignity and respect, the Cell works proactively towards developing a safe and secure environment for employees, and to ensure that all students may gain their education without fear of prejudice, gender bias, hostility or sexual harassment. The IITB GC inquires into complaints of sexual harassment through its Internal Complaints Committee (GC-ICC). The GC and GC-ICC strive to work towards an egalitarian environment where men and women are afforded equitable treatment and equality of opportunity conducive to their professional growth. You can find all the contact information on **GC** here.

8. EE PLACEMENTS

Some of our recruiters:

Qualcomm

Texas Instruments

Micron

MediaTek

intel

NVIDIA

SAMSUNG

tsmc

MathWorks

9. Department Representatives

EE Student Association:
Posts relevant to a fresher Mtech student are mentioned here. For more information about EESA visit EESA website

Department placement coordinators

a) **Nijil George**: nijilgeorgek@gmail.com (+91 9496606266)
b) **Sunny Mehta**: sunnymehta@iitb.ac.in (+91 9571648532)
c) **Krishna Khairnar**: krishna.khairnar349@gmail.com (+91 8155955656)
d) **Gaurav Kamila**: gauravkamila@gmail.com (+91 9779995573)
e) **Kevin Arvadia**: kevinarvadia@gmail.com (+91 9925621436)
f) **Navoj R**: navoj98@gmail.com (+91 9987091957)

EE ISCP team

Department Coordinators

Akshay Raj
akshay123147@gmail.com
+918439677936

Debtanu Mukherjee
debtanu09@gmail.com
+918889040730

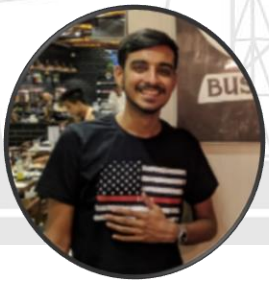
Student Companions

Samarth Nigam
samarthniitb@gmail.com
+91 7000507928

Goutham A P
apgoutham3@gmail.com
+91 7676862626

Akansha Shrestha
akaka.shrestha@gmail.com
+977 9849301967

Rucha Joshi
ruchajoshi2010@gmail.com
+91 8390098690



Aashish Tamrakar
28aashish@gmail.com
+91 9098203168

Robin James Payyappillil
robinpayyappilliljob2019@gmail.com
+91 9746171018

G V N Dinesh Kumar
dinesh9873780@gmail.com
+91 9087398493

Shivali Bhatnagar
shivalibhtnagar001@gmail.com
+91 8437628727

Akshay Subhash Dhok
akshaydhok10@gmail.com
+91 9773880986

Varsha S
varshasatish14@gmail.com
+91 7795001510

Abbas Barwaniwala
abbasbarwani52@gmail.com
+91 9561457751

Anwesh Mangal
anweshmangal@gmail.com
+91 8478044262

Vikash Kumar
vikashnitp96@gmail.com
+91 9334251127

Mitul Tyagi
mitultyagi45@gmail.com
+91 9897760557

Saurabh Sharma
saurabh8r@gmail.com
+91 7415298627

Varshit
varshitareti@gmail.com
+91 9765653310

Sethu Nandan O G
sethu81780@gmail.com
+91 9976190317

Arjun Raj
rjmeansarjun@gmail.com
+91 7415298627

Ippili Sidhartha Kumar
iskumar789@gmail.com
+91 9853554890

AURAA

Utkarsh Upadhyaya
AURAA (Academic Unit Representative of Academic Affairs), PGAC
Department of Electrical Engineering
183079019@iitb.ac.in
+91 8826839316

10. Important Links and Downloads

Following are the links you should check out:

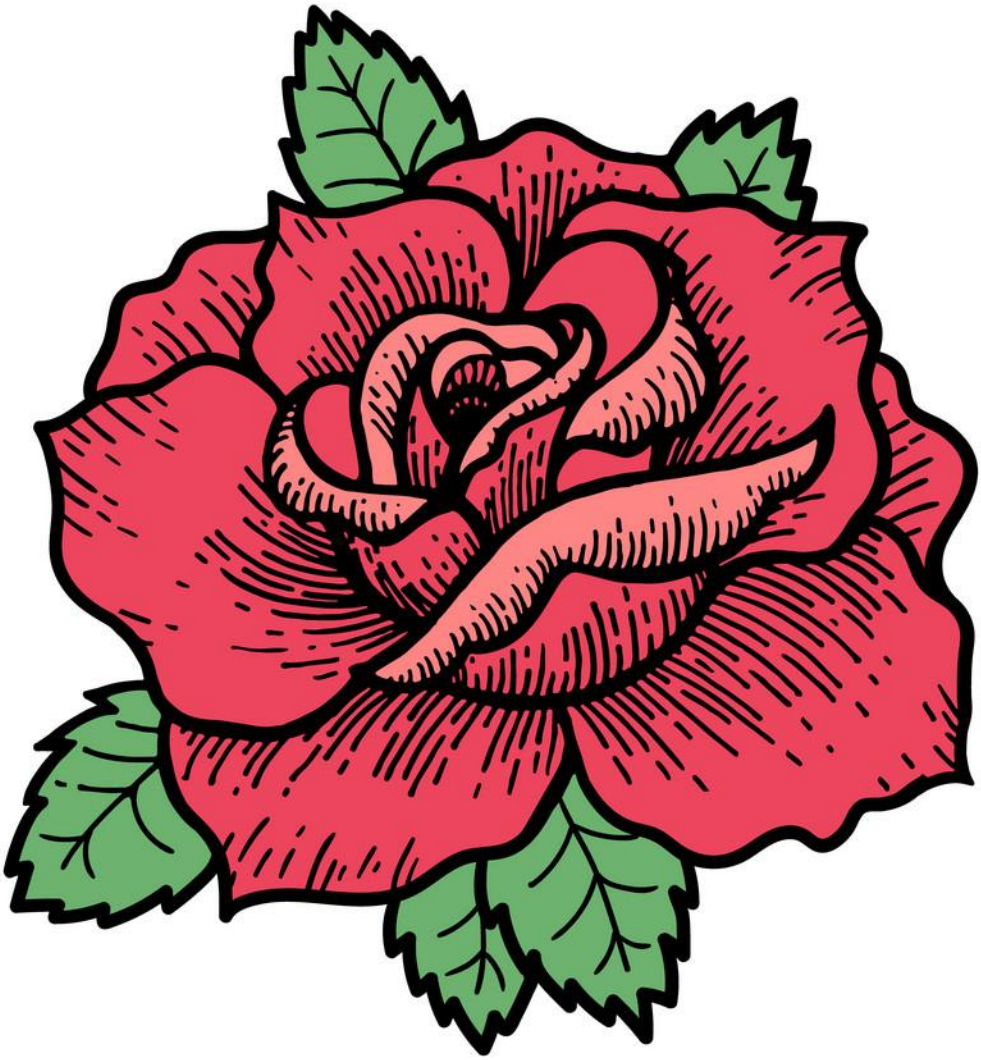
1. Dept. website: https://www.ee.iitb.ac.in/web
2. ISCP website: https://gymkhana.iitb.ac.in/~scp/scp/index.html
3. Computer Center: https://www.cc.iitb.ac.in/
4. Clubs at IITB: http://www.iitb.ac.in/en/activities/student-clubs
5. Cultural IITB: https://gymkhana.iitb.ac.in/~cultural/web/login_form.php
6. Sports IITB: https://gymkhana.iitb.ac.in/~sports/
7. SWC IITB: http://www.iitb.ac.in/swc/en/contact-lockdown
8. Gender Cell: http://www.gendercell.iitb.ac.in/en/home/contacts

Downloads from play store:

1. Insti app
2. Safe App
3. MYBYK or Yulu
4. Open VPN
5. SHIRU Café

11. Insti Map


SAMEER 70
Ananta 2
0.6 km
0.7 km
Pipe Line
H15
H16
DRDO
H3 H2 H1
H12
H13
H14
H6
H7
H9
H4
H5
ATM
Tansa House 84
1.8 km
Sports Ground
83
82
69
0.3 km
Vihar House 90
1.0 km
Power House 67
63
57
14 80
58
7 37 41 74 38 30 87
42 43 75 23
53 19 36 4
Central Library 12
12 min
3
NCC 60
H8 9
Girls' Hostel H11
steps 77
MAIN BUILDING
Steps towards arch
54 44 49 73 88
IDC
VMCC
VICTOR MENEZES CC
89
86
Tennis Court
Convocation Hall
50
LT Lawn
64
61
17
6 59 68 29
22
15 20
IRCC
45 SOM
27
28
32 72 26 5
Infinite Corridor
Hospital 39
Plant Nursery
56 40
47 48
65 16
1 62
Staff Club 78
18 KReSIT Building
Gulmohar
35
10
ATM
8
Boat House
Vanvihar 34
1 km
3
KV Ground
0.3 km
Powai Lake
33 Jalvihar
H10 Girls' Hostel
Girls' Hostel Annex
Kendriya Vidyalaya 13
Medical 55
11
Campus School
Post Office 66
24
Director's Bungalow
52 Market Gate (Y-Point Gate)
Temple 85 (Padmavati Devi)
White House 91
71
Kanjurmarg
State Bank 79
0.3 km
51 Main Gate
N
Map is not to scale
Map does not cover all the residential areas.
Bus Stop
46 Lake Side Gate
Andheri (towards airport)



Welcome to IIT Bombay!