



M.TECH IN VLSI DESIGN

Discover the two-year M.Tech program in VLSI Design from the Department of Electronics and Telecommunication. Our curriculum focuses on key research areas, preparing you for excellence in integrated circuit design and semiconductor engineering.

WE INVITE APPLICATIONS FROM GATE-QUALIFIED CANDIDATES OR BRIGHT AND MERITORIOUS STUDENTS WITH GOOD ACADEMIC RECORDS

CURRENT RESEARCH AREAS

- ASIC and FPGA based System Design
- Novel Architectures for VLSI Data Converters
- Reconfigurable Architectures
- Hardware Accelerators
- Continuous-Time and Switched Capacitor Filters
- Nano-Scale Devices
- RF Circuit Modelling & Optimization
- mm Wave Integrated Circuits
- Smart Antennas
- Detection And Prevention of Hardware Trojans in Processors/IPs
- Hardware Solutions for Image and Video Coding and Embedded Systems

CONTACT US

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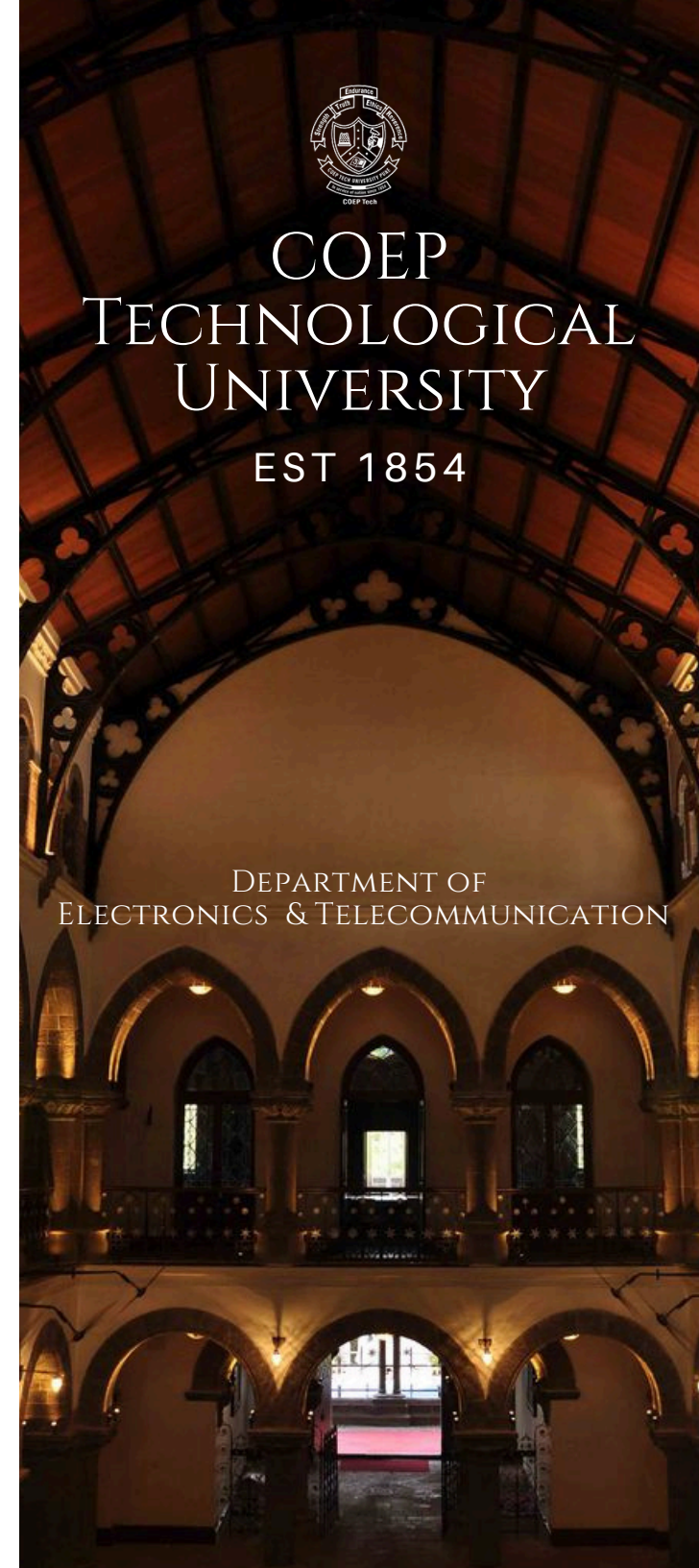
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COEP
TECHNOLOGICAL
UNIVERSITY

EST 1854

DEPARTMENT OF
ELECTRONICS & TELECOMMUNICATION



ABOUT THE INSTITUTE

- Chartered in 1854, Third Oldest College in Asia.
- Notable alumni include pioneers like Bharat Ratna Sir M. Visvesvaraya, Vijay Kelkar, Lila Poonawala, Laxman Narasimhan
- Ranked 73rd amongst 100 top Engineering Institutes as per NIRF 2023.
- Lead Center under the Technical Education Quality Improvement Program (TEQIP) assisted by MHRD-GoI and World Bank



ABOUT THE DEPARTMENT

- Founded 1948, Celebrating its 75th Year of existence.
- Offers Undergraduate Programme, B.Tech in Electronics and Telecommunication Engineering, 4 Postgraduate Programmes and Ph.D Programmes.
- Grants Courses encompass a multitude of disciplines across diverse verticals from VLSI Design, Embedded System and Computing, Wired and Wireless Communication, Signal Processing, Artificial Intelligence and Machine Learning, Internet of Things.

M.TECH IN VLSI DESIGN

PROGRAM OUTCOMES

The Department adopted the Programme Outcomes recommended by the NBA and specified two Programme Specific Outcomes.

Program Outcomes

PO1 : Demonstrate higher level of professional skills to tackle multidisciplinary and complex problems related to VLSI System Design.

PO2 : Comprehend the state of the art VLSI technologies

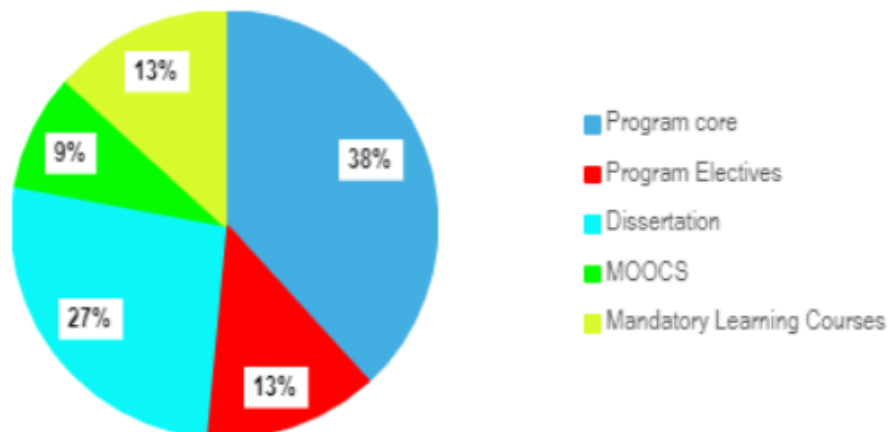
PO3 : Characterise and design Analog, Digital, RF and Mixed signal subsystems meeting given constraints under deep sub micron environment

The mandatory learning courses include seminar, mini project, interdisciplinary open elective and liberal learning course. The curriculum allows students to register for a maximum of 3 credits from certified MOOC courses (NPTEL/SWAYAM etc.) for their elective credit requirement in each semester of second year. Following is a list of courses offered for the M.Tech. VLSI Design Program.

Course Category	Credits
Program core	26
Program Electives	9
Dissertation	18
MOOCS	6
Mandatory Learning Courses	9

PROGRAM CURRICULUM

The curriculum has been designed in line with the requirements of the stated POs. Further, the curriculum has various well-balanced course components under programme core, programme electives, project, and mandatory learning courses.



Curriculum Structure

Core Subjects

Graph , Field and Ring Theory for Security and Physical design

RTL Simulation and Synthesis
Digital IC Design

IC Fabrication Techniques

Analog IC Design

Verification using SV and UVM

VLSI Physical Design

Department Electives

Next generation computer Architectures

Machine Learning

SoC Architecture

Memory Technologies

VLSI Testing

VLSI architectures for Signal Processing

Hardware / Software Co-design

Mixed Signal Circuit Design

Device Modeling

Advanced VLSI Design

Nano-electronic material and devices

Hardware Security

RF Circuit Design

CENTER OF EXCELLENCE

The Department has received three Centres of Excellence namely

- Signal and Image Processing
- Advanced Electronic Manufacturing
- 5G Testbed Network

LABORATORY RESOURCES FOR VLSI AND ALLIED AREAS

- VLSI Design Lab
- Electronics Laboratory
- Power Electronics Lab
- Digital Signal Processing Lab
- Digital Design Lab
- ICA Lab
- Communication Lab
- Test & Measurement Lab
- Microwave Laboratory
- Fibre Optics Lab
- Image Analysis Centre
- Centre for Advanced Embedded Computing
- Embedded Systems Laboratory
- Texas Instruments Centre of Excellence (Extension to an Embedded Systems Laboratory)
- Research Lab
- PCB Lab
- Audio-Video Lab

MAJOR EQUIPMENT AND FACILITIES

- Cadence Design Suite
- Mentor Graphics Tools
- Intel Quartus Prime Design Software
- Xilinx Vivado Design Suite
- FPGA Boards - Spartan 3E, Virtex 5, Kintex KC705, Artix 7, Zynq Zedboard and Pynq Boards
- Intel FPGA Max-10 Development Kit
- Matlab and Simulink
- HDL Coder
- Ansys Suite
- Network Simulator/ Emulator
- Digital Signal Oscilloscope
- Function Generator 3 MHz
- Solder Paste Printer
- Solder Paste Inspection
- Screen Printing Process-Stencil Design
- Pick and Place Machine
- Pick and Place Feeders
- Reflow Oven
- Automatic Optical Inspection
- NVIDIA DGX Station
- Benchmark Imaging System
- DIPLAB 1.0
- Cad Feko Software
- Handheld ECG machine
- Leica Digital Stereo Microscope
- Microwave office
- CEM Solutions
- NI- MIMO setup
- NI Academic Site License-LabVIEW
- National Instruments' Audio Processing Kits and Evaluation Boards
- Near IR camera
- High Speed Video Camera
- Thermal Image Processor and Analyzer
- Biometric Face Recognition System
- CORTEX-M3 Development Kit
- Electronic Workbench Basic
- Analog and Embedded Boards from TI
- DSP Code Development Tools and Evaluation Kits from TI
- ARM based Code Development Tools
- 5G Core
- 5G Radio
- NMS (with Dashboard)
- MEC and Application Server
- IoT Gateway
- 5G Mini Drone

MEMORANDUM OF UNDERSTANDING

MoUs for In-kind support, Internship, Project Mentorship and Co-development -

- Intel Corporation
- Seagate Technology
- Hella Automotive
- Infineon Technologies India Pvt Ltd
- ESCI-COMP India Pvt. Ltd.
- Whirlpool Corporation
- Wipro Limited
- Cadence-Tensilica Inc

HIGHLIGHTED PROJECTS

- Design and Fabrication of Band 40 RF SAW Ladder-Type Filter
- Design and Analysis of Combinational Circuits Using Memristor
- Implementation of Special Load and Store Instruction for the RST Unit
- Acceleration of Convolution Neural Network using FPGA
- Energy and Power Analysis of SE-6TSRAM based on MOS and FinFET Technology
- Design and Verification of a Cache Coherency Verification IP for AMBA ACE protocol using UVM.
- Development Of Verification IP For PCI Express 5.0 And It's Integration With A Hypothetical Slave Device
- Development of AXI4 Interconnect UVC using SV (UVM)
- Development Of Verification IP of Physical Layer Of PCIe
- Design of 2.4GHz PLL using a Gate Switched charge Pump and Active Loop Filter
- Designing Bandgap Reference Circuit and Sub-Bandgap Reference Circuit with low temperature coefficient
- Design of Similarity Detector using Hashing on FPGA
- A Power and Static Noise Margin Analysis of different SRAM cells at 180nm Technology
- Design and Implementation of 3-Bit Flash ADC using 180nm Technology in Cadence Virtuoso
- Design and Simulation of 32-Bit 5-Stage Pipelined MIPS Based RISC Processor capable of resolving data hazards with NVIC.
- Neuromorphic Computing: Modelling of 3D Integrated Circuit Components using TSV.
- Acceleration of Convolution Neural Network using FPGA
- Design of 100mV Low-Dropout Voltage Regulator having Fast Transient Response in 180nm Technology

COLLABORATION WITH INDUSTRY

INTERNSHIP / INDUSTRIAL PROJECTS -

- Intel Corporation
- Texas Instruments
- Seagate Technology
- Cadence Design Systems
- NXP Semiconductors
- Marvell India Pvt. Ltd.
- Imagination Technologies
- Phillips
- Ampere Computing
- Hella Automotive India
- Whirlpool Corporation
- ESCI-COM India Pvt. Ltd
- Infineon Technologies India Private Ltd
- Endurance Technologies Ltd
- Forvia Faurecia India Pvt. Ltd.

PLACEMENT OPPORTUNITY

- Intel Corporation
- Texas Instruments
- Seagate Technology
- Cadence Design Systems
- NXP Semiconductors
- Synopsys
- Xilinx AMD Incorporation
- SingularityAIX
- Marvell India Pvt. Ltd.
- Ampere Computing
- Imagination Technologies India Private Limited
- SiFive Incorporation
- Mercedes Benz Research and Development India
- Hella Automotive India
- Philips
- Whirlpool Corporation
- Leapfrog
- ESCI-COM India Pvt. Ltd
- Infineon Technologies India Private Ltd
- Endurance Technologies Ltd
- Forvia Faurecia India Pvt. Ltd.