M.Tech in Radio Frequency Design and Technology (RFDT)

Recruitment Brochure 2020-21

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The Centre for Applied Research in Electronics (CARE) was established in 1971 with the main objective of providing focus to coordinated research and training in specialized areas in Electronics. The scope of R&D was soon broadened to encompass the areas of Signal Processing, Microwaves, and Microelectronics.

**Microwave**  
**Signal Processing**  
**Microelectronics**

The Centre boasts of unique state of the art facilities like RF components fabrication and testing facilities, underwater test facility, DSP platforms, speech and audio processing facilities, non-destructive characterization of systems apart form high end industry standard softwares. The Centre consists of distinguished faculty members in these areas, renowned for their contribution through papers published in reputed journals, book publications and guest lecturers in various universities and conferences worldwide. They have also been recipients of national and international awards. Since 1982, over 30 technology transfers have taken place from the Centre which underscores the importance of the center at the national level.

**About MTech Programme:**

The M.Tech program in RFDT enrolls the brightest minds from across the country thus ensuring the competitiveness of the program. Students are shortlisted on the basis of scores obtained in GATE conducted by IITs and IISc and are interviewed subsequently by the center’s faculty. The completion of the above process leads to a miscellany of handpicked talent that is groomed at the institute in due course of the program. CARE has developed well-equipped state-of-the-art laboratory facilities due to the emphasis on advanced and contemporary experimental research and technology development work.

The Centre also participates in the inter-disciplinary M.Tech program VLSI Design Tools & Technology (VDTT). This is joint program of CARE, Computer Science and Engineering department and Electrical Engineering department. Students at CARE, are exposed to the major emerging VLSI and Communication technologies and are adequately skilled in these domains through the diverse and broad spectrum of courses offered.

**Courses**

- CAD of RF and Microwave Circuits
- RF and Microwave Measurements Lab
- Architectures & Algorithms for DSP System
- MOS VLSI Design
- CMOS RFIC Design
- Semiconductor Memory Design
- Analog IC Design
- Mixed Signal Circuit Design
- Basic Information Theory
- Digital Communication
- Signal Theory
- Technology of RF ad Microwave Solid State Devices
- Statistical Signal Processing
- Introduction to Machine Learning
- MIMO Wireless Communication
- Underwater Electronics System
- Selected Topics in Radars and Sonars

**Microwave**

The Microwave specialization is an integral part of CARE at IIT Delhi which offers highly specialized research facility which is one of it’s kind in the country. It’s focus areas are MMIC & RFIC Design, RF MEMS, Microwave antennas & RF power amplifier.

**Domain specific Courses:**

- RF and Microwave Active Circuits
- Radiating Systems for RF Communication
- Sensors and Transducers
- Basics of RF and Microwave
- Quasi-Optical table with 67 GHZ VNA for Dielectric Constant Measurement
- Advanced RF, MEMS and EM simulation Tools viz. Ansoft HFSS, Agilent ADS, CST Microwave Studio
- Anechoic chamber with automatic platform controller for antenna testing and characterization
- Photolithography facility for MIC & Metal deposition using RF sputtering/vacuum evaporation

**Lab Facilities:**

- VNAs up to 1000 GHz.
- Spectrum Analyzers up to 40 GHz.
- Microwave Signal Source up to 20 GHz.
- Mask making facility with computer controlled coordinatograph
- MIC fabrication facility
- 200 mm Probing system for submicron probing
- On-chip Antenna Measurement Facility
- Select Topics in Radars and Sonars
- Basics of RF and Microwave
**Signal Processing**

The signal processing specialisation offers a wide variety of courses including speech processing, under-water communication, Deep Learning, Virtual Reality, Multi sensor data fusion and IoT applications. The projects delivered by this group are nationally as well as internationally recognised.

**Domain specific Courses:**
- Human and Machine Speech Communication
- Advanced Digital Signal Processing
- Detection and Estimation Theory
- Sensor Array Signal Processing
- Wireless Communications
- Basics of Statistical Signal Analysis

**Lab Facilities:**
- TI's DSP, OMAP Processor and FPGA kits with multi core processors
- Full acoustic anechoic chamber for speech and audio applications
- Studio quality recording facility for Speech and audio signals
- NI's High speed Multi channel simultaneous data acquisition system.
- DSP lab equipped with software tools such as Matlab, Comsol, Code Composer Studio, LabView.
- 3D printing facility for rapid prototype development.
- Underwater tank for underwater acoustic signal processing.

**Microelectronics**

Microelectronics is one of the most sought after specialization at CARE attracting many candidates nationwide. This group majorly focuses on Silicon Micromachining, MEMS Sensors, SAW Devices, Nano Structured Materials, Quantum Dot Devices, Photonic and Memory Devices.

**Domain specific Courses:**
- Fabrication Techniques for RF and Microwave Devices
- Introduction to Quantum Electronic Devices
- RF MEMS Design and Technology
- RF and Microwave Solid State Devices
- Stress Measurement
- Alpha Step Measurement system
- Lab equipped with TCAD for device simulations.
- Thermal, Acoustics, Optical and Magnetic systems for Non-Destructive Characterization
- Clean Bench / Chemical Bench Facility
- Sheet Resistance Measurement equipment

**Lab Facilities:**
- RF/DC Sputtering System
- Thermal Evaporation System
- Reactive Ion Etching
- Diffusion and Oxidation Furnaces
- Photolithography Chamber
- Mask making and Mask Aligner Facility
- Surface Profiler for thickness measurement equipment

**Ongoing Projects**

**Microelectronics**
- InP based Schottky diode THz Detectors
- Electrically tuned THz modulator
- Design of RF Switch in SOI process for 5G Application
- Piezoelectric switch based bistable mems power gating for zero standby energy dissipation in cmos ics (simulation in tcad/comsol).
- MEMS based pirani pressure micro-sensor-design, simulation, fabrication and testing.
- TCAD/COMSOL simulation and testing for gate all around nanowire FET based MEMS pressure sensor.
- MEMS sensor based epidermal electronics for learning the physiological signatures.
- High Voltage Device and Circuit Design in TCAD
- GaN Device Design and Modeling using TCAD
- Transceiver Design for Wireless Surface Power Transfer
- Highly Stable Relexation Oscillator Circuit for Ultra low-power Applications
- Design of MIMO antenna for millimeter waves
- Mobile Phone Position detection
- High Quality Digital Voice Communication using 3G UWACS
- Keyword spotting in Speech and Speaker Identification
- Active noise Cancellation using Acoustic Beamforming
- Deep Learing Architecture for Spatial environment and Motion classification

**Microwave**
- GaN Power Amplifier
- Thin Film Filter Design
- 280-Ghz Heterodyne imager based on 40n CMOS Technology
- High Sensitivity Bolometer design at Thz frequency range
- Design of MIMO antenna for millimeter waves
- Power amplifier design for broadband application
- Design of SIW components in millimeter waves
- Millimeter waves Antennas for 5G mobile terminal and base station
- Design of data links for millimeter waves
Lab Facilities

Microelectronics
- Photolithography workbench
- RF Sputtering

Signal Processing
- Underwater Acoustic Facility
- Data Acquisition System

Microwave
- Anechoic Chamber
- THz based VNA

Industrial and Institutional Collaborations

International
- Agilent Technologies
- Keysight Technologies, USA
- Applied Nanostructures, USA
- Femto CNRS France
- Lockheed Martin USA
- Maxim Semiconductors, USA
- MEMS Cap, USA
- Mitsubishi, Japan
- NXP Semiconductors, Netherlands
- ST Microelectronics, USA
- University of Tokyo
- Delft Institute of Microelectronics
- University of Bath, UK
- Continental Automotive

National
- Astra Microwave
- BEL
- Cadence
- CEL
- DRDO (DEAL, LRDE, RCI, NPOL, NSTL, SASE, CABS)
- ISRO
- GAETECH Hyderabad
- Honeywell Bangalore
- Indian Navy
- NPMASS
- Space Application Centre, Ahmedabad
- Tektronix
PLACEMENT STATS FOR 2018-20 BATCH

<table>
<thead>
<tr>
<th>Category</th>
<th>Percentage</th>
<th>Avg. CTC In LPA</th>
<th>Highest CTC In LPA</th>
<th>Median CTC In LPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardware Design</td>
<td>62%</td>
<td></td>
<td></td>
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<tr>
<td>Communication</td>
<td>34%</td>
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<tr>
<td>Software (AI)</td>
<td>21%</td>
<td>22</td>
<td>42</td>
<td>17</td>
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<tr>
<td>RF</td>
<td>1%</td>
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Past Recruiters:
- Intel
- Analog Devices
- Qualcomm
- NVIDIA
- Texas Instruments
- MaxLinear
- AMD
- BECEEM
- TSMC
- MathWorks
- Bosch
- Samsung
- Marvell
- MediaTek
- Osiki
- Mavenir
- Applied Materials
- Cypress
- Sasken
- Fujikura
- Nokia
- HCL
- Tejas Networks
- Reliance Jio
- Powerwave
- Connexant
- John Deere
- Bharat Electronics
- Quality Technology Innovation
Student-in-charge or placement officer, Training and placement Cell shall provide the company a Job Notification Form (JNF) [https://tnp.iitd.ac.in/](https://tnp.iitd.ac.in/)

JNF requires details of the job offer – role offered, pay package, place of posting, eligible departments

Once the filled-in-JNF with all the required details is received, companies are assigned username/password to access their online account at [https://tnp.iitd.ac.in/](https://tnp.iitd.ac.in/)

Companies are also assigned space on the server on which they may upload any presentation, videos, data or other information they want the students to see

The JNF has to be frozen on the T&P website by the company till a deadline

Students shall be able to view all the details, and the eligible candidates may apply

After the application deadline for the students, the resumes are visible to the company. The company submits shortlist on its online account before a deadline

Short-listed students get notified

Placement office allots the dates for the campus interviews

After the completion of the selection procedure on campus, company is required to announce the final list of the students on the same day itself

Resume Verification: All claims made by students in resumes submitted for campus placements are duly verified by the placement office.

For Further details regarding Recruitment Process:

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Ms. Anishya Madan
Industrial Liaison Officer
Training And Placement Cell
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Faculty Profile

- **Prof. Arun Kumar (HOD)**
  Digital signal processing, Speech & Audio processing technologies for man machine interaction, underwater acoustics, acoustics for air and media.

- **Prof. Ananjan Basu**
  Microwave & millimeter wave engineering.

- **Prof. Monika Agarwal**
  Signal Processing and Communication.

- **Prof. Mahesh P Abegaonkar**
  Microwave and Millimeter wave Engineering

- **Prof. Samresh Das**
  Nano Electronics and Optoelectronics

- **Prof. Prabhu Babu**
  Signal processing and communications, Machine learning, Big Data analysis.

- **Prof. Ankur Gupta**

- **Prof. Pushparaj Singh**
  Microelectromechanical systems (MEMS) sensors and micro-systems.

- **Prof. Kirti Dhvaj**
  Antenna Systems

- **Prof. S K Koul**
  Microwave Integrated circuits, Microwave Phase Shifters, Optical and millimetre waves dielectric integrated guides and circuits, CAD.

- **Prof. Rajendar Bahl**
  Signal & image Processing, Acoustic imaging, Target definition, Sensor System simulator and design, bio Sonar.

- **Prof. Ulrich L. Rhode**
  Microwave circuits, (Amplifiers, Oscillators and Mixers) as well as Frequency Synthesizers.

- **Prof. Vikram Kumar**