## M. Tech. in Electronics Engineering
(Specialization: Microwave Engineering)

<table>
<thead>
<tr>
<th>Subject</th>
<th>Contact Hours (Per Week)</th>
<th>Credits</th>
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<tr>
<td><strong>First Semester</strong></td>
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<tr>
<td><strong>Theory:</strong></td>
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<tr>
<td>*1. EC-5101 : Signal Processing</td>
<td>03</td>
<td>03</td>
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<tr>
<td>2. EC-5102 : Electromagnetic Field</td>
<td>03</td>
<td>03</td>
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<td>3. EC-5103: Microwave O-Type Tubes</td>
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<td>4. EC-51-- :Elective-I</td>
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<td>5. : Elective-II</td>
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<td>03</td>
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<td><strong>Practical:</strong></td>
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<tr>
<td>6. EC-5171 : Practical</td>
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<td>02</td>
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<tr>
<td><strong>Total for First semester</strong></td>
<td>18</td>
<td>17</td>
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| Second Semester          |       |   |
| **Theory:**              |       |   |
| 1. :Open elective (from other Departments/ | 03 | 03 |
| School- approved by the Department) |       |   |
| 2. EC-52-- :Elective-III | 03 | 03 |
| 3. EC-52-- :Elective-IV  | 03 | 03 |
| 4. EC-52-- :Elective-V   | 03 | 03 |
| 5. EC-52-- :Elective-VI  | 03 | 03 |
| **Practical:**           |       |   |
| 6. EC-5271 : Practical/Project | 03   | 02  |
| 7. EC-5272: Seminar      | 02 | 01 |
|                           | 15 | 05 |
| **Total for Second semester** | 20 | 18 |

* Common to all specializations
### Third Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>EC-6171</td>
<td>Seminar on Dissertation</td>
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<tr>
<td>EC-6172</td>
<td>Dissertation-Interim Evaluation</td>
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### Fourth Semester

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<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>EC-6271</td>
<td>Dissertation Open Defence</td>
<td>05</td>
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<tr>
<td>EC-6272</td>
<td>Dissertation Evaluation</td>
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<td><strong>Total for Fourth semester</strong></td>
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<td><strong>Course Total</strong></td>
<td><strong>60</strong></td>
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Note: Dissertation topic should be allotted to students in the IIInd Semester

#### Electives: I & II (any approved two from the following):

1. AM-5105A: Mathematics
2. EC-5111: Microwave Circuits and Measurements
3. EC-5112: Vacuum and Tube Technology
4. EC-5113: MIC and MMIC
5. EC-5114: Remote Sensing
6. EC-5134: Microwave Solid State Devices and Applications

#### Electives: III, IV, V & VI (any approved two from the following):

1. EC-5211: Computer Aided Design of Microwave Tubes
2. EC-5212: Microwave M-Type Tubes
3. EC-5213: Radar Systems
4. EC-5214: Microwave Communication Systems
5. EC-5215: Countermeasures
6. EC-5216: Satellite Communication
7. EC-5217: Fast wave Devices
8. EC-5241: Mobile Communication System and Wireless Network
9. EC-5250: Optical Communication
**M. Tech. in Electronics Engineering**  
*(Specialization: Digital Techniques and Instrumentation)*

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<tr>
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### First Semester

**Theory:**

1. EC-5101 : Signal Processing  
   * Contact Hours: 03  
   * Credits: 03
2. EC-5104 : Switching Theory and Logic Design  
   * Contact Hours: 03  
   * Credits: 03
3. EC-5105: Microprocessor Engineering & Applications  
   * Contact Hours: 03  
   * Credits: 03
4. EC-51-- : Elective-I  
   * Contact Hours: 03  
   * Credits: 03
5. EC-51-- : Elective-II  
   * Contact Hours: 03  
   * Credits: 03

**Practical:**

6. EC-5176: Practical  
   * Contact Hours: 03  
   * Credits: 02
   
   **Total for First semester**  
   * Contact Hours: 15  
   * Credits: 03

### Second Semester

**Theory:**

1. Open elective (from other Departments/ School- approved by the Department)  
   * Contact Hours: 03  
   * Credits: 03
2. Elective-III  
   * Contact Hours: 03  
   * Credits: 03
3. EC-52-- : Elective-IV  
   * Contact Hours: 03  
   * Credits: 03
4. EC-52-- : Elective-V  
   * Contact Hours: 03  
   * Credits: 03
5. EC-52-- : Elective-VI  
   * Contact Hours: 03  
   * Credits: 03

**Practical:**

6. EC-5276 : Practical/Project  
   * Contact Hours: 03  
   * Credits: 02
7. EC-5277 : Seminar  
   * Contact Hours: 02  
   * Credits: 01

   **Total for Second semester**  
   * Contact Hours: 20  
   * Credits: 18

* Common to all specializations
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<td>EC-6176:</td>
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<tr>
<td>EC-6177:</td>
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<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tr>
<td>EC-6276:</td>
<td>Dissertation Open Defence</td>
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<tr>
<td>EC-6277:</td>
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<td><strong>Course Total</strong></td>
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Note: Dissertation topic should be allotted to students in the IIInd Semester

**Electives: I & II (any approved two from the following):**
1. EC-5121: Artificial Intelligence
2. EC-5133: Reliability Engineering
3. EC-5109: Data communication and Networks
4. EC-5141: DSP Architecture and Application
5. EC-5142: Computer Networking

**Electives: III, IV, V & VI (any approved two from the following):**
1. AM-5205A: Mathematics
2. EC-5221: Microprogramming
3. EC-5222: Computer Graphics
4. EC-5223: Fault tolerance Digital System Design
5. EC-5224: Neural Networks
6. EC-5231: LSI/VLSI Design
7. EC-5236: Digital Design and Modeling with VHDL
8. EC-5244: Multi-resolution Image Processing
**M. Tech. in Electronics Engineering**  
*(Specialization: Communication System Engineering)*

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<thead>
<tr>
<th>Subject</th>
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<th>Credit</th>
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<tr>
<td><strong>Theory:</strong></td>
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<tr>
<td>1. EC-5101: Signal Processing</td>
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<tr>
<td>2. EC-5108: Information and Coding Theory</td>
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<tr>
<td>3. EC-5109: Data communication and Networks</td>
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<td>4. EC-51-- : Elective-I</td>
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<td>5. EC-51-- : Elective-II</td>
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<td><strong>Practical:</strong></td>
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<td>6. EC-5186: Practical</td>
<td>03</td>
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<td>Total of First semester</td>
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<td><strong>Second Semester</strong></td>
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<td>1. : Open Elective (from other Departments/ School- approved by the Department)</td>
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<td>2. : Elective- III</td>
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<td>3. EC-52-- : Elective- IV</td>
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<td>4. EC-52-- : Elective-V</td>
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<td>5. EC-52-- : Elective-VI</td>
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<td>6. EC-5286: Practical/Project</td>
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<td>7. EC-5287: Seminar</td>
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<td>Total of Second semester</td>
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<td>* Common to all specializations</td>
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| **Third Semester**                                                     |                          |        |
| 1. EC- 6186: Seminar on Dissertation                                   | 05                       |        |
| 2. EC- 6187: Dissertation- Interim Evaluation                         | 05                       |        |
| Total of Third semester                                               | 10                       |        |

| **Fourth Semester**                                                    |                          |        |
| 1. EC- 6286: Dissertation Open Defence                                | 05                       |        |
| 2. EC- 6287: Dissertation Evaluation                                  | 10                       |        |
| Total of Third semester                                               | 15                       |        |
| **Course Total**                                                      | 60                       |        |

Note: Dissertation topic should be allotted to students in the IIInd Semester.
Electives: I & II (any approved two from the following):

1. EC-5105: Microprocessor Engineering and Applications
2. EC-5121: Artificial Intelligence
3. EC-5133: Reliability Engineering
4. EC-5141: DSP Architecture and Application
5. EC-5142: Computer Networking

Electives: III, IV, V & VI (any approved four from the following):

1. AM-5205A: Mathematics
2. EC-5216: Satellite Communication
3. EC-5231: LSI/VLSI Design
4. EC-5241: Mobile Communication Systems and Wireless Network
5. EC-5242: Broadband Networks and Network Management
6. EC-5243: Multimedia Communication
7. EC-5244: Multiresolution Image Processing
8. EC-5245: Data Compression
9. EC-5246: Pattern Recognition
10. EC-5247: Spread Spectrum Technique
11. EC-5248: Digital Telephony
12. EC-5249: Photonics and Optical Switching
13. EC-5250: Optical Communication
14. EC-5251: Decision and Estimation Theory

M. Tech. in Electronics Engineering  
(Specialization: Microelectronics)

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<td>Theory:</td>
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<tr>
<td>* 1. EC-5101: Signal Processing</td>
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<tr>
<td>2. EC-5106: IC-Technology</td>
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<tr>
<td>3. EC-5107: Analysis and Design of integrated Circuits</td>
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<td>4. EC-51-- : Elective-I</td>
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<td>5. EC-51-- : Elective-II</td>
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<td><strong>Practical:</strong></td>
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<td>02</td>
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<tr>
<td>6. EC-5181: Practical</td>
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Total of First semester

18 17
Second Semester

Theory:
1. : Open Elective (from other Departments/ School- approved by the Department) 03 03
2. EC-52--: Elective- III 03 03
3. EC-52--: Elective- IV 03 03
4. EC-52--: Elective-V 03 03
5. EC-52--: Elective-VI 03 03

Practical:
6. EC-5281: Practical/Project 03 02
7. EC-5282: Seminar 02 01

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Total of Second semester 20 18

* Common to all specializations

Third Semester

1. EC- 6181: Seminar on Dissertation 05
2. EC- 6182: Dissertation- Interim Evaluation 05

Total of Third semester 10

Fourth Semester

1. EC- 6281: Dissertation- Open Defence 05
2. EC- 6282: Dissertation Evaluation 10

Total of Fourth semester 15

Course Total 60

Note: Dissertation topic should be allotted to students in the IIInd Semester
Electives: I & II (any approved two from the following):

1. EC-5105: Microprocessor Engineering and Applications
2. EC-5121: Artificial Intelligence
3. EC-5131: Solid State Devices
4. EC-5132: Heterojunction Devices and Technology
5. EC-5133: Reliability Engineering
6. EC-5142: Computer Networking

Electives: III, IV, V &VI (any approved four from the following):

1. EC-5223: Fault Tolerant Digital System Design
2. EC-5231: LSI/VLSI Design
3. EC-5232: Analog VLSI Design
4. EC-5233: Hybrid Integrated Circuits
5. EC-5234: Semiconductor Power Devices
6. EC-5235: Characterization and Limitation of Devices and Circuits
7. EC-5236: Digital Design and Modeling with VHDL
8. EC-5237: High Speed Devices and Circuits
9. EC-5238: Optoelectronics Devices and Systems
10. EC-5250: Optical Communication

AM -5205A: Mathematics (Credits -3)


AM-5105A: Mathematics (Credits -3)

**EC-5101: Signal Processing (Credits -3)**


**EC-5102: Electromagnetic Field Theory and Microwave Antennas (Credits -3)**


**EC-5103: Microwave O –Type Tubes (Credits -3)**

High Frequency limitations in conventional tubes, UHF miniature tubes. Classification of Microwave tubes, O-type and M-type Tubes, Slow wave and Fast-wave devices. Sub-assemblies of Microwave Tubes: Electron Gun (Parallel flow and convergent beam guns, MIG guns), RF Input/Output Couplers, RF Interaction Structures, Magnetic Focussing structures and Collectors. RF-wave and beam interaction: localized and continuous. Transit time O-type Microwave Tubes: reflex klystrons, Klystrodes, multi-cavity klystrons, traveling wave tube amplifiers, Backward Wave Oscillators, Device operation, gain and efficiency calculations, operational characteristics, design criteria, and future trends. Efficiency enhancement and Broadbanding techniques.

**EC-5104: Switching Theory and Logic Design (Credits-3)**

EC-5105: Microprocessor Engineering & Applications  (Credits-3)


EC-5106: Integrated Circuit Technology  (Credits-3)


EC-5107: Analysis And Design Of Integrated Circuits (Credits-3)

Monolithic Integrated Circuits. Parasitics, general design principles and circuits layout, Design of transistors, operational amplifier and other linear integrated circuits. Design of logic circuits using bipolar and MOS devices. Hybrid integrated circuits- circuits and layout design thermal considerations and packaging

EC-5108: Information and Coding Theory (Credits-3)


EC-5109: Data Communication and Computer Networks (Credits-3)

EC-5111: Microwave Circuits and Measurements (Credits -3)


EC-5112: Vacuum and Tube Technology (Credits -3)

Fundamentals of Vacuum Technology: vacuum nomenclature and definitions, gas properties, molecular process and kinetic theory, throughput, pumping speed, evacuation rate, outgassing rate, leak rate, gas flow, conductance, flow calculations.
Vacuum generation: diaphragm pump, rotary pump, diffusion pump, cryogenic pump, turbomolecular pump, sputter-ion pump and getter pumps.
Vacuum Measurement scale, gauges and leak detection. U.H.V. techniques, Mass Spectrometer.
Surface Physics and its Relation to Vacuum Science: adsorptions, chemisorptions, isotherms, desorptions and photoactivation.
Materials for Vacuum tubes, Chemical and Thermal Cleaning.
Processing of Electron-Beam Devices.

EC-5113: MIC and MMIC (Credits -3)

Design aspects of strip lines, fin lines, Bandwidth, Power and frequency optimization. Impedance Matching. Micro-strip lines MIC & MMICs. MIC active devices.

EC-5114: Remote Sensing (Credits -3)

Matter energy interactions, passive microwave radiometry, imaging radar systems, remote sensors, communication and data transmission systems, data processing and reprocessing, pattern recognition and classification, software systems, digital hardware, fundamentals of image analysis-visible, thermal infra-red and microwave data, applications.

EC-5121: Artificial Intelligence (Credits-3)

Definition, history of AI, study of AI techniques, problem definition as state-space search. Search techniques- generate and test, hill climbing, problem reduction, means and analysis. Knowledge representation- representing facts in logic, predicate logic, resolution, forward verses backward reasoning.
Game playing, minimax algorithm, alphabeta heuristics.
Natural language processing - introduction, syntactic processing, semantic analyses.
Introduction to expert systems

EC-5131: Solid State Devices (Credits -3)

Metal semiconductor contact . transport phenomenon and barrier height measurement. MISFET: Si – SiO$_2$ interfaces, characteristics, sub-threshold condition, short geometry Effects, CCD, MESFET, IMPATT, BARITT, Gunn devices, Photodetectors, Solar cell, Semiconductor laser, LED.
**EC-5132: Heterojunction Devices & Technology (Credits-3)**

Isotype and anisotype heterojunctions
III-V and Si-SiGe technology: LPE, VPE, MOCVD, MBE, Ion-implantation, Bandgap Engineering, nanostructures.
III-V HBT, MODEFT, Nano-structure devices, Superlattice APD
Semiconductor heterostructure laser and LED, Wave guiding structures.

**EC-5133: Reliability Engineering (Credits -3)**

Quality and reliability, importance of reliability, reliability parameters, Methods of achieving reliability, Measure of central tendency and dispersion system reliability with constant and variable failure rates, Serial and parallel reliability maintainability and availability failure mechanisms, reliability data and analysis. Reliability improvement methods.
VLSI reliability: reliability screening and modeling, electrostatic discharge damage, Metal Electro-migration phenomena, dielectric breakdown, instabilities in ICs

**EC-5134: Microwave Solid State Devices and Applications (Credits-3)**

Varactor diode and parametric amplifiers, Gunn diode, logic circuits using Gunn diode IMPATT, BARITT, TRAPATT, Phase locking, phase shifter, harmonic Generation, power amplifiers MESFET, MODFET, MMIC.

**EC-5141: DSP Architecture and Application (Credits-3)**

Speech, Image & Graphics Input handling, File and Data Structure, Local and Global memory Management, Tight and Loose Coupling of parallel Multi-DSP systems. Example of Commercial DSP chips and their Development Tools.

**EC-5142: Computer Networking (Credits-3)**

EC-5211: Computer Aided Design of Microwave Tubes (Credits -3)

Numerical Integration and Differentiation.
Numerical solution of linear and non-linear differential equations of higher orders.
Finite difference, finite element and method of moments applied to microwave / millimeter wave electron beam device problems.
High power, high efficiency and broadband considerations.
Non linear analytical and numerical methods using disk, deformable disk and ring models of electron beam.
CAD of subassemblies including spent electron beam collector.
Simulation and optimization techniques for electron beam and RF wave interaction.
PIC simulation techniques.

EC 5212 Microwave M-Type Tubes (Credits -3)

Electron beam wave interactions. Performance and design principle of amplifiers and oscillators.
Magnetrons: device operation, Pi-mode of operation, strapping, mode jumping, frequency pulling and pushing, Performance Chart and Rickie Diagram. Design and Testing of Magnetrons.
Crossed field amplifiers: operating principle, device gain and efficiency.
Coaxial Magnetrons, Inverted Coaxial Magnetrons, Frequency Agile, Voltage Tunable Magnetrons, Carcinotrons, Amplitrons.

EC-5213 Radar Systems (Credits -3)

Radar antenna systems, ECCM techniques.

EC-5214: Microwave Communication System (Credits-3)

LOS Propagation and System performance, Active and passive repeater design.
Troposcatter propagation. FM/Digital. AM/FDM and AM/TDM systems.
Satellite Communication Systems, Earth Station design criteria and direct reception system.
Multiple access TDMA, FDMA and SSMA.
Noise consideration.

EC-5215: Counter Measures (Credits-3)


EC-5216: Satellite Communication (Credits-3)

EC-5217: Fast Wave Devices (Credits-3)


EC-5221: Microprogramming (Credits-3)


EC-5222: Computer Graphics (Credits-3)

Introduction, Point plotting, Line drawing, raster graphics and vector display. Two dimensional transformation, clipping & windowing, graphic input devices and input techniques. Graphic packages, segmented display files, geometric models and picture structures. Three dimensional graphic curves and surfaces, transformation & perspective projection.

EC-5223: Fault Tolerant Digital System Design (Credits-3)


EC-5224: Neural Networks (Credits-3)

EC-5231: LSI/VLSI design (Credits -3)

Evolution of circuit integration.
Modeling of MOSFETs. Device scaling, effect of short geometry.
Pass transistor, transmission gate and inverter based logic circuits. Their analysis and design.
Stick diagrams, λ-based design rules and layout designs.
Super buffers and buffer chains for driving large off chip capacitive loads.
Structural design concepts. Semi and full custom design. Gate arrays and standard cells.
Design of subsystems, PLA and FSM.
CAD tools for VLSI design

EC-5232: Analog VLSI Design (Credits -3)

Potential of analog VLSI, analog MOS technology, OP-AMP design technology, and CMOS, high performance OP-AMP, switched capacitor filters, A/D, D/A converters.
Analog VLSI interconnects, CAD of analog VLSI design testing.

EC-5233: Hybrid Integrated Circuits (Credits -3)

Monolithic, thin-film and thick-film circuits, hybridization components, circuits and layout design, fabrication techniques. Bonding and interconnections, packaging, system partitioning. Reliability of hybrid integrated circuits and their applications.

EC-5234: Semiconductor Power Devices (Credits -3)

Carrier transport and break-down voltages, junction termination. Power BJT, JFET and MOSFET: DMOS and VMOS, Thyristor, MOS-Bipolar devices MOS gated thyristor and insulated gate transistor.
Power integrated circuits.

EC-5235: Characterization and Limitation of Devices & Circuits (Credits -3)

Device performance at extreme current and voltage, temperature and power limitations of various solid state devices and components, speed limitations, design aspects of low-noise devices and circuits, comparative operating features of discrete and integrated circuit devices and components, modeling and equivalent circuits and parameter extraction

EC-5236: Digital Design and Modeling with VHDL (Credits -3)

Introduction to digital design automation, CAD software requirements and features supported by VHDL, VHDL terminology and constructs: entity declaration, architectural body, configuration declaration, package declaration and package body.
Language elements identifiers: identifiers, data object, data type operators.
Digital design using behavioral, data flow and structural description design case studies of combinational and sequential circuits. Simulation of clock, signal assignment, wait statement, test bench and testing
EC-5237: High Speed Devices and Circuits (Credits -3)

MESFET, MODFET, HBT, Superlattice devices.
Logic and functional devices, MMIC, Digital ICs.
Fabrication techniques of high speed devices.

EC-5238: Optoelectronics Devices and Systems (Credits-3)

LCD, LED & Lasers. Photodetectors: PIN, APD, superlattice structure, Photo-transistor, OPFET.
Optical amplifier: Fiber amplifier, Brillouin amplifier, Raman amplifier, Optical switching
devices, Kerr cell and Golay cell, optical fiber and wave guiding structures. Optical
communication systems, Optical processors and optical computing.

EC-5241: Mobile Communication Systems and Wireless Networks (Credits-3)

Wireless Transmission: Frequencies, regulations, Signals, Antennas.
Signal Propagation, path loss, Multi path and other effects.
Multiplexing: SDM, FDM, TDM, and CDMA.
Modulation Techniques: ASK, FSK, PSK, Multi-carrier and Spread Spectrum: their use in
Mobile and Wireless Communication Systems.
Wireless Networks: Satellite networks, Wireless LAN, Wireless ATM. OSI, Mobile Network and
transport layers, their protocols and implementation.
Wireless Application Protocol.

EC-5242: Broadband Network and Network Management (Credits-3)

Synchronous and Asynchronous Networks, Optical Fiber based Backbone and Information
Superhighways, SONET & SDH standards, IP over SONET and WDM, STS & STM Framing,
ATM and STM systems, ATM Layers. User Network & Network-Network Interfaces. Virtual
paths and Virtual circuits, Cell Loss Effects, Intelligent Networks.
Network Management and Control, TMN Architecture and Functional Requirements. Interface
and Protocol Requirements, Information Modeling and Model representations.
System Management Functions, OSI System Management, Internet SNMP, ODP/OMG. COBRA
as technologies for TMN.

EC-5243: Multimedia Communication (Credits-3)

Multimedia basics. Signal Processing for video & audio integration, Compression and
Transmission . Compression standards and their implementation. Multimedia Storage,
Database and Distribution.
Multimedia Networking requirements, Services and QOS parameters. Wireless and Wired
Broadband Networks. IEEE 802.11, Hyper-LAN, Magic-WAND, MMAC standards.
CDMA, OFDM and Multi-carrier CDMA,. Synchronization techniques, Rake receiver, Multipath
effects and Models, Mobile systems.
EC 5244: Multi-Resolution Image Processing (Credits-3)

Wavelets and Wavelet Transforms, Basic selection and CWT, Dyadic Transformation and DWT, Properties and Inverse Transforms, Mallat’s Algorithm, FIR Implementation, Image Recovery, Applications of Wavelet transform for Image compression and De-noising.

EC-5245: Data Compression (Credits-3)

Random signals and sources, sampling techniques and quantization, source coding, Lossy and loss-less compression and optimality.
Scalar coding: scalar quantizer, its structure, companding, quantizer performance measurement, conditions for optimality, predictive quantization, Bit allocation and transform coding, Entropy coding.
Vector coding: vector quantizer (VQ), its structure and characterization, quantizer performance measurement, optimality conditions for VQ, various types of VQs, tree and Trellis encoding.
Compression standards: JPEG, MPEG, and MP.

EC-5246: Pattern Recognition (Credits-3)


EC- 5247: Spread Spectrum Technique (Credits-3)

Problem of low bandwidth communication system, concept of larger bandwidth systems, Spectrum Spreading. Maximal length sequence, auto-correlation and cross-correlation properties, Golay codes, m sequence, gold, Kasmi & other sequences, selection, design, generation and application of MLS.
Types of SS system, DS, FH & TH. Comparative properties and relative advantages of DS, FH & TH. Receiver design for SS. Synchronization technique, application of SS in SSMA, LPI, CDMA, jamming resistance, TDR, secure communication and navigational aids, networking of SS system.

EC- 5248: Digital Telephony (Credits-3)

ECE- 5249: Photonics and Optical Switching (Credits-3)

Electro-absorption modulators, quantum well EAM, electro-optic modulators, quantum well EOM, self electro-optic effect device, bipolar controller modulator, optoelectronic amplification. Programmable memory device. Switching speed and energy.
Optical switches, temporal, spatial, wavelength and spectral domain switching, multidimensional and multilevel photonic switching. Self routing. ATM switching.

EC- 5250: Optical Communication (Credits-3)

Difference between bounded and free space optical communication, Propagation characteristics of IR, Visible, UV in Atmosphere and space, Optical fibre, preparation and transmission characteristics, loss and dispersion mechanisms, Single and Multimode fiber, Optical sources: principles of operation, modulation characteristics and driver circuits, photodetectors: principles of operation, circuits and performance, post detection amplifiers, optical receiver, fibre optic connectors, couplers, multiplexers and splices, wavelength converters, routers, fibre optic communication systems and link budget using direct detection, Optical Amplifiers, Modulators and switches, Coherent optical communication: Homodyne and Heterodyne receivers for optical communication.

EC- 5251 : Decision and Estimation Theory (Credits-3)