

**DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING**

## M.Tech. (Microelectronics & VLSI)

[illegible]



DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING  
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

Program Code: **567 M.Tech. (VLSI)**  
 Department: **EC Department of Electronics and Communication Engineering**  
 Year: **II**

[illegible]

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING  
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

Program Code: **567 M.Tech. (VLSI)**  
 Department: **EC Department of Electronics and Communication Engineering**  
 Year: **III**

| Teaching Scheme             |              |                                                         |              |           | Contact Hours/Week |   |   | Exam Duration |           | Relative Weight (%) |     |     |     |     |
|-----------------------------|--------------|---------------------------------------------------------|--------------|-----------|--------------------|---|---|---------------|-----------|---------------------|-----|-----|-----|-----|
| S. No.                      | Subject Code | Course Title                                            | Subject Area | Credits   | L                  | T | P | Theory        | Practical | CWS                 | PRS | MTE | ETE | PRE |
| <b>Semester- I (Autumn)</b> |              |                                                         |              |           |                    |   |   |               |           |                     |     |     |     |     |
| 1.                          | ECN-701A     | Dissertation Stage-I<br>(to be continued next semester) | DIS          | 12        | -                  | - | - | -             | -         | -                   | -   | -   | 100 | -   |
|                             |              | <b>Total</b>                                            |              | <b>12</b> |                    |   |   |               |           |                     |     |     |     |     |
| <b>Semester-II (Spring)</b> |              |                                                         |              |           |                    |   |   |               |           |                     |     |     |     |     |
| 1.                          | ECN-701B     | Dissertation Stage-II<br>(continued from III semester)  | DIS          | 18        | -                  | - | - | -             | -         | -                   | -   | -   | 100 | -   |
|                             |              | <b>Total</b>                                            |              | <b>18</b> |                    |   |   |               |           |                     |     |     |     |     |

| Summary                     |    |    |    |    |    |    |
|-----------------------------|----|----|----|----|----|----|
| Semester                    | 1  | 2  | 3  | 4  | 5  | 6  |
| Semester-wise Total Credits | 10 | 10 | 10 | 10 | 12 | 18 |
| Total Credits               | 70 |    |    |    |    |    |

### Program Elective Courses (Microelectronics & VLSI)

| Teaching Scheme |              |                                                          |              |         | Contact Hours/Week |   |   | Exam Duration |           | Relative Weight (%) |     |       |       |     |
|-----------------|--------------|----------------------------------------------------------|--------------|---------|--------------------|---|---|---------------|-----------|---------------------|-----|-------|-------|-----|
| S. No.          | Subject Code | Course Title                                             | Subject Area | Credits | L                  | T | P | Theory        | Practical | CWS                 | PRS | MTE   | ETE   | PRE |
| 1.              | ECN-571      | Semiconductor Device Modeling                            | PEC          | 4       | 3                  | 1 | 0 | 3             | 0         | 20-35               | -   | 20-30 | 40-50 | -   |
| 2.              | ECN-572      | MOS Device Physics                                       | PEC          | 4       | 3                  | 1 | 0 | 3             | 0         | 20-35               | -   | 20-30 | 40-50 | -   |
| 3.              | ECN-581      | Analog VLSI Circuit Design                               | PEC          | 4       | 3                  | 1 | 0 | 3             | 0         | 20-35               | -   | 20-30 | 40-50 | -   |
| 4.              | ECN-582      | Semiconductor Microwave Devices & Applications           | PEC          | 4       | 3                  | 1 | 0 | 3             | 0         | 20-35               | -   | 20-30 | 40-50 | -   |
| 5.              | ECN-583      | Optoelectronic Materials & Devices                       | PEC          | 4       | 3                  | 1 | 0 | 3             | 0         | 20-35               | -   | 20-30 | 40-50 | -   |
| 6.              | ECN-584      | Mixed Signal Circuit Design                              | PEC          | 4       | 3                  | 1 | 0 | 3             | 0         | 20-35               | -   | 20-30 | 40-50 | -   |
| 7.              | ECN-585      | VLSI System Design                                       | PEC          | 4       | 3                  | 1 | 0 | 3             | 0         | 20-35               | -   | 20-30 | 40-50 | -   |
| 8.              | ECN-586      | Device & Circuit Interaction                             | PEC          | 4       | 3                  | 1 | 0 | 3             | 0         | 20-35               | -   | 20-30 | 40-50 | -   |
| 9.              | ECN-587      | Nano Scale Devices                                       | PEC          | 4       | 3                  | 1 | 0 | 3             | 0         | 20-35               | -   | 20-30 | 40-50 | -   |
| 10.             | ECN-588      | Performance and Reliability of VLSI Circuits             | PEC          | 4       | 3                  | 1 | 0 | 3             | 0         | 20-35               | -   | 20-30 | 40-50 | -   |
| 11.             | ECN-589      | Advanced VLSI Interconnects                              | PEC          | 4       | 3                  | 1 | 0 | 3             | 0         | 20-35               | -   | 20-30 | 40-50 | -   |
| 12.             | ECN-590      | Organic Electronics                                      | PEC          | 4       | 3                  | 1 | 0 | 3             | 0         | 20-35               | -   | 20-30 | 40-50 | -   |
| 13.             | ECN-591      | VLSI Physical Design                                     | PEC          | 4       | 3                  | 1 | 0 | 3             | 0         | 20-35               | -   | 20-30 | 40-50 | -   |
| 14.             | ECN-592      | Compound Semiconductors and RF Devices                   | PEC          | 4       | 3                  | 1 | 0 | 3             | 0         | 20-35               | -   | 20-30 | 40-50 | -   |
| 15.             | ECN-593      | CAD for VLSI                                             | PEC          | 4       | 3                  | 1 | 0 | 3             | 0         | 20-35               | -   | 20-30 | 40-50 | -   |
| 16.             | ECN-594      | VLSI Digital Signal Processing                           | PEC          | 4       | 3                  | 1 | 0 | 3             | 0         | 20-35               | -   | 20-30 | 40-50 | -   |
| 17.             | ECN-595      | VLSI Testing and Testability                             | PEC          | 4       | 3                  | 1 | 0 | 3             | 0         | 20-35               | -   | 20-30 | 40-50 | -   |
| 18.             | ECN-596      | MEMS and NEMS                                            | PEC          | 4       | 3                  | 1 | 0 | 3             | 0         | 20-35               | -   | 20-30 | 40-50 | -   |
| 19.             | ECN-597      | Microelectronics Lab.-2                                  | PEC          | 2       | -                  | - | 2 | -             | -         | -                   | 100 | -     | -     | -   |
| 20.             | ECN-598      | Simulation Lab.-2                                        | PEC          | 2       | -                  | - | 2 | -             | -         | -                   | 100 | -     | -     | -   |
| 21.             | ECN-561      | Compact Modeling of Semiconductor Devices                | PEC          | 4       | 3                  | 1 | 0 | 3             | 0         | 20-35               | -   | 20-30 | 40-50 | -   |
| 22.             | ECN-634      | Low Voltage CMOS Circuit Operation                       | PEC          | 4       | 3                  | 1 | 0 | 3             | 0         | 20-35               | -   | 20-30 | 40-50 | -   |
| 23.             | ECN-635      | Magnetic Random Access Memory                            | PEC          | 4       | 3                  | 1 | 0 | 3             | 0         | 20-35               | -   | 20-30 | 40-50 | -   |
| 24.             | ECN-636      | ADVANCED MILLIMETER-WAVE CHARACTERIZATION AND TECHNIQUES | PEC          | 4       | 3                  | 1 | 0 | 3             | 0         | 20-35               | -   | 20-30 | 40-50 | -   |

|     |         |                                                     |     |   |   |   |   |   |   |           |   |           |           |   |
|-----|---------|-----------------------------------------------------|-----|---|---|---|---|---|---|-----------|---|-----------|-----------|---|
| 25. | ECN-637 | MICROWAVE<br>PHOTONIC ICs                           | PEC | 4 | 3 | 1 | 0 | 3 | 0 | 20-<br>35 | - | 20-<br>30 | 40-<br>50 | - |
| 26. | ECN-638 | RF INTEGRATED<br>CIRCUIT DESIGN FOR<br>mmWAVE RADIO | PEC | 4 | 3 | 1 | 0 | 3 | 0 | 20-<br>35 | - | 20-<br>30 | 40-<br>50 | - |

Program Elective Courses M.Tech. (VLSI)

| Teaching Scheme |              |                                                  |              |         | Contact Hours/Week |   |   | Exam Duration |           | Relative Weight (%) |     |       |       |     |
|-----------------|--------------|--------------------------------------------------|--------------|---------|--------------------|---|---|---------------|-----------|---------------------|-----|-------|-------|-----|
| S. No.          | Subject Code | Course Title                                     | Subject Area | Credits | L                  | T | P | Theory        | Practical | CWS                 | PRS | MTE   | ETE   | PRE |
| 1.              | ECN-591      | VLSI Physical Design                             | PEC          | 4       | 3                  | 1 | 0 | 3             | -         | 20-35               | -   | 20-30 | 40-50 | -   |
| 2.              | ECN-571      | Semiconductor Device Modeling                    | PEC          | 4       | 3                  | 1 | 0 | 3             | -         | 20-35               | -   | 20-30 | 40-50 | -   |
| 3.              | ECN-586      | Device & Circuit Interaction                     | PEC          | 4       | 3                  | 1 | 0 | 3             | -         | 20-35               | -   | 20-30 | 40-50 | -   |
| 4.              | ECN-593      | CAD for VLSI                                     | PEC          | 4       | 3                  | 1 | 0 | 3             | -         | 20-35               | -   | 20-30 | 40-50 | -   |
| 5.              | ECN-594      | VLSI Digital Signal Processing                   | PEC          | 4       | 3                  | 1 | 0 | 3             | -         | 20-35               | -   | 20-30 | 40-50 | -   |
| 6.              | ECN-595      | VLSI Testing and Testability                     | PEC          | 4       | 3                  | 1 | 0 | 3             | -         | 20-35               | -   | 20-30 | 40-50 | -   |
| 7.              | ECN-596      | MEMS and NEMS                                    | PEC          | 4       | 3                  | 1 | 0 | 3             | -         | 20-35               | -   | 20-30 | 40-50 | -   |
| 8.              | ECN-588      | Performance & Reliability of VLSI Circuits       | PEC          | 4       | 3                  | 1 | 0 | 3             | -         | 20-35               | -   | 20-30 | 40-50 | -   |
| 9.              | ECN-577      | VLSI Technology                                  | PEC          | 4       | 3                  | 1 | 0 | 3             | -         | 20-35               | -   | 20-30 | 40-50 | -   |
| 10.             | ECN-582      | Semiconductor Microwave Devices and Applications | PEC          | 4       | 3                  | 1 | 0 | 3             | -         | 20-35               | -   | 20-30 | 40-50 | -   |
| 11.             | ECN-583      | Optoelectronic Materials and Devices             | PEC          | 4       | 3                  | 1 | 0 | 3             | -         | 20-35               | -   | 20-30 | 40-50 | -   |
| 12.             | ECN-585      | VLSI System Design                               | PEC          | 4       | 3                  | 1 | 0 | 3             | -         | 20-35               | -   | 20-30 | 40-50 | -   |
| 13.             | ECN-587      | Nano Scale Devices                               | PEC          | 4       | 3                  | 1 | 0 | 3             | -         | 20-35               | -   | 20-30 | 40-50 | -   |
| 14.             | ECN-589      | Advanced VLSI Interconnects                      | PEC          | 4       | 3                  | 1 | 0 | 3             | -         | 20-35               | -   | 20-30 | 40-50 | -   |
| 15.             | ECN-590      | Organic Electronics                              | PEC          | 4       | 3                  | 1 | 0 | 3             | -         | 20-35               | -   | 20-30 | 40-50 | -   |

|     |         |                                             |     |   |   |   |   |   |   |       |     |       |       |   |
|-----|---------|---------------------------------------------|-----|---|---|---|---|---|---|-------|-----|-------|-------|---|
| 16. | ECN-592 | Compound Semiconductor and RF Devices       | PEC | 4 | 3 | 1 | 0 | 3 | - | 20-35 | -   | 20-30 | 40-50 | - |
| 17. | ECN-575 | Microelectronics Lab-1                      | PEC | 2 | 0 | 0 | 3 | 0 | 3 | -     | 100 | -     | -     | - |
| 18. | ECN-598 | Simulation Lab-2                            | PEC | 2 | 0 | 0 | 2 | 0 | - | -     | 100 | -     | -     | - |
| 19. | ECN-597 | Microelectronics Lab-2                      | PEC | 2 | 0 | 0 | 2 | 0 | - | -     | 100 | -     | -     | - |
| 20. | ECN-525 | Hardware Architecture for Deep Learning     | PEC | 4 | 3 | 1 | 0 | 3 | 0 | 20-35 | -   | 20-30 | 40-50 | - |
| 21. | ECN-579 | Foundations of Semiconductor Device Physics | PEC | 4 | 3 | 1 | 0 | 3 | 0 | 20-35 | -   | 20-30 | 40-50 | - |

**Note: The permissible range of credits in a semester to be 04-16 credits.**