

**BIRLA INSTITUTE OF TECHNOLOGY- MESRA, RANCHI**  
**NEWCOURSE STRUCTURE M.Tech Microwave Engineering- To be effective from academic session 2018- 19**  
*Based on CBCS & OBE model*  
**Recommended scheme of study for M.Tech. in Microwave Engineering**

| SEMESTER /<br>Session of Study<br>(Recommended)   | Course<br>Level | Category<br>of course         | Course<br>Code | Courses  | Mode of delivery & credits<br><i>L-Lecture; T-Tutorial;P-Practicals</i> |                            |                            | Total<br>Credits<br><i>C- Credits</i> |  |
|---|-----------------|-------------------------------|----------------|--|---|----------------------------|----------------------------|---------------------------------------|--|
|   |                 |                               |                |  | L<br><i>(Periods/week)</i>  | T<br><i>(Periods/week)</i> | P<br><i>(Periods/week)</i> | C                                     |  |
| <b>FIRST /<br/>Monsoon</b>                        | <b>FIFTH</b>    | Programme Core<br>(PC)        | EC501          | Microwave Semiconductor Devices                          | 3   | 0                          | 0                          | 3                                     |  |
|   |                 |                               | EC503          | Antennas and Diversity                                   | 3   | 0                          | 0                          | 3                                     |  |
|   |                 |                               | EC505          | Advanced Electromagnetic Engineering                     | 3   | 0                          | 0                          | 3                                     |  |
|   |                 | Programme<br>Elective (PE)    |                | PE-I   | 3   | 0                          | 0                          | 3                                     |  |
|   |                 | Open elective<br>(OE)         |                | OE-I   | 3   | 0                          | 0                          | 3                                     |  |
|   |                 | <b>LABORATORIES</b>           |                |  |   |                            |                            |                                       |  |
|   |                 | Programme Core<br>(PC)        | EC502          | Microwave Measurement Lab                                | 0   | 0                          | 4                          | 2                                     |  |
|   |                 |                               | EC504          | Antenna Lab.   | 0   | 0                          | 4                          | 2                                     |  |
| <b>TOTAL</b>                                      |                 |                               |                |  |   |                            |                            | <b>19</b>                             |  |
| <b>SECOND /<br/>Spring</b>                        | <b>FIFTH</b>    | Programme Core<br>(PC)        | EC550          | Microwave & Mm-wave Integrated Circuits and Applications | 3   | 0                          | 0                          | 3                                     |  |
|   |                 |                               | EC551          | RF Circuit Design  | 3   | 0                          | 0                          | 3                                     |  |
|   |                 |                               | EC553          | Numerical Techniques in Electromagnetics                 | 3   | 0                          | 0                          | 3                                     |  |
|   |                 | Programme<br>Elective (PE)    |                | PE-II  | 3   | 0                          | 0                          | 3                                     |  |
|   |                 | Open elective<br>(OE)         |                | OE-II  | 3   | 0                          | 0                          | 3                                     |  |
|   |                 | <b>LABORATORIES</b>           |                |  |   |                            |                            |                                       |  |
|   |                 | Programme Core<br>(PC)        | EC552          | Microwave Integrated Circuit Lab                         | 0   | 0                          | 4                          | 2                                     |  |
|   |                 |                               | EC554          | Computational Electromagnetics Lab                       | 0   | 0                          | 4                          | 2                                     |  |
| <b>TOTAL</b>                                      |                 |                               |                |  |   |                            |                            | <b>19</b>                             |  |
| <b>TOTAL FOR FIFTH LEVEL</b>                      |                 |                               |                |  |   |                            |                            | <b>38</b>                             |  |
| <b>THIRD /<br/>Monsoon</b>                        | <b>SIXTH</b>    | Programme Core<br>(PC)        | EC600          | Thesis (Part I)  |   |                            |                            | 8                                     |  |
|   |                 |                               | EC602          | Microwave Imaging  | 3   | 0                          | 0                          | 3                                     |  |
|   |                 | Programme<br>Elective (PE)    |                | PE-III   | 3   | 0                          | 0                          | 3                                     |  |
|   |                 | Massive Open<br>Online Course |                | MOOC   |   |                            |                            | 2                                     |  |
|   |                 | <b>TOTAL</b>                  |                |  |   |                            |                            |                                       |  |
| <b>FOURTH /<br/>Spring</b>                        | <b>XIXTH</b>    | Programme Core<br>(PC)        | EC650          | Thesis (Part II)   | 0   | 0                          | 16                         | 16                                    |  |
|   |                 | <b>TOTAL</b>                  |                |  |   |                            |                            |                                       |  |
| <b>TOTAL FOR SIXTH LEVEL</b>                      |                 |                               |                |  |   |                            |                            | <b>32</b>                             |  |
| <b>GRAND TOTAL FOR M.TECH PROGRAMME (38 + 32)</b> |                 |                               |                |  |   |                            |                            | <b>70</b>                             |  |

**List of Programme Elective (PE)(choose one from each)**

|               |       |  |
|---------------|-------|--|
| <b>PE-I</b>   | EC506 | Electromagnetic Interference & Electromagnetic Compatibility |
|               | EC507 | Electromagnetic and Microwave Applications of Metamaterials  |
|               | EC508 | Radar Signal Analysis  |
|               | EC509 | RF Microelectronics Circuit Design                           |
| <b>PE-II</b>  | EC555 | Advanced Array Synthesis                                     |
|               | EC556 | RF Micro-Electro-Mechanical System                           |
|               | EC557 | Microwave Photonics  |
|               | EC558 | Modern Optimization Techniques                               |
| <b>PE-III</b> | EC559 | Mixed Signal VLSI Design                                     |
|               | EC517 | Satellite Based Wireless communication                       |
|               | EC603 | mm wave Wireless Communications                              |
|               | EC604 | Microwave Measurement and Material Characterization          |

**Massive Open Online Course (MOOC)(choose one)**

|       |  |
|-------|--|
| EC615 | Basics of Software Defined Radio and practical application |
| EC616 | High Speed Semiconductor Devices                           |
| EC617 | Nanoelectronic Devices and Materials                       |

**DEPARTMENT OF ECE**  
**PROGRAMME ELECTIVES (PE)**  
**OFFERED FOR LEVEL 5-6 of M. Tech. in Microwave Engineering**

| PE / Level        | Code no. | Name of the PE courses                                       | Prerequisite/Corequisite courses with code   | L | T | P | C |
|-------------------|----------|--|--|---|---|---|---|
| PE / Level-5 (MO) | EC506    | Electromagnetic Interference & Electromagnetic Compatibility | EC257 Electromagnetic Fields and Waves   | 3 | 0 | 0 | 3 |
|                   | EC507    | Electromagnetic and Microwave Applications of Metamaterials  | EC323 Microwave Theory & Techniques  | 3 | 0 | 0 | 3 |
|                   | EC508    | Radar Signal Analysis  | EC323 Microwave Theory & Techniques, EC365 Radar & Navigation  | 3 | 0 | 0 | 3 |
|                   | EC509    | RF Microelectronics Circuit Design                           | EC201 Electronic Devices, EC253 Analog Circuits  | 3 | 0 | 0 | 3 |
| PE / Level-5 (SP) | EC555    | Advanced Array Synthesis                                     | EC325 Antenna and Wave Propagation Theory  | 3 | 0 | 0 | 3 |
|                   | EC556    | RF Micro-Electro-Mechanical system                           | EE101 Basics of Electrical Engineering, ME101 Basics of Mechanical Engineer, EC323 Microwave Theory & Techniques | 3 | 0 | 0 | 3 |
|                   | EC557    | Microwave Photonics  | EC 323 Microwave Theory & Techniques, EC201 Electronics Devices, EC425 Optoelectronics Devices                   | 3 | 0 | 0 | 3 |
|                   | EC558    | Modern Optimization Techniques                               | MA203 Numerical Methods  | 3 | 0 | 0 | 3 |
|                   | EC559    | Mixed Signal VLSI Design                                     | EC253 Analog Circuits, EC203 Digital system Design   | 3 | 0 | 0 | 3 |
| PE / Level-6 (MO) | EC517    | Satellite Based Wireless communication                       | EC369 Wireless Networks, EC419 Satellite Communication   | 3 | 0 | 0 | 3 |
|                   | EC603    | mm wave Wireless Communications                              | EC323 Microwave Theory & Techniques, EC369 Wireless Networks   | 3 | 0 | 0 | 3 |
|                   | EC604    | Microwave Measurement and Material Characterization          | EC323 Microwave Theory and Techniques, EC313 Electronic Measurements   | 3 | 0 | 0 | 3 |

\* PROGRAMME ELECTIVES TO BE OPTED ONLY BY THE DEPARTMENT STUDENTS

**DEPARTMENT OF ECE**  
**OPEN ELECTIVES (OE)\***  
**OFFERED FOR LEVEL 5-6 of M. Tech. in Microwave Engineering**

| <b>OE / LEVEL</b>  | <b>Code no.</b> | <b>Name of the OE courses</b> | <b>Prerequisites<br/>courses<br/>with code</b> | <b>L</b> | <b>T</b> | <b>P</b> | <b>C</b> |
|--------------------|-----------------|-------------------------------|--|----------|----------|----------|----------|
| OE/Level-5<br>(MO) | EC547           | Fundamentals of MEMS          |  | 3        | 0        | 0        | 3        |
|                    |                 |                               |  |          |          |          |          |
| OE/Level-5<br>(SP) | EC597           | Fundamentals of Microwaves    |  | 3        | 0        | 0        | 3        |

**\* OPEN ELECTIVES TO BE OPTED ONLY BY OTHER DEPARTMENT STUDENTS**