# 19EC3551 - Antenna Analysis and Synthesis Lab

| **Course Code** | 19EC3551 | **Year** | III | **Semester** | I |
|---|---|---|---|---|---|
| **Course Category** | Program Core | **Branch** | ECE | **Course Type** | Lab |
| **Credits** | 3 | **L-T-P** | 0-0-3 | **Prerequisites** | EMW, AA&S |
| **Continuous Internal Evaluation:** | 25 | **Semester End Evaluation:** | 50 | **Total Marks:** | 75 |

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| **Course Outcomes** | |
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| Upon successful completion of the course, the student will be able to | |
| **CO1** | Interpret the antenna software simulation tools L2 |
| **CO2** | Design and Simulate antennas used in wireless communications for different frequency band and obtain radiation characteristics L6 |
| **CO3** | Experiment with a pyramidal Horn antenna and waveguide and its radiation characteristics L3 |
| **CO4** | Construct a linear array and synthesize its radiation characteristics-L3 |

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**Mapping of course outcomes with Program outcomes (CO/ PO/PSO Matrix)**

Note: 1- Weak correlation 2-Medium correlation 3-Strong correlation

* - Average value indicates course correlation strength with mapped PO

| **COs** | **PO 1** | **PO 2** | **PO 3** | **PO 4** | **PO 5** | **PO 6** | **PO 7** | **PO 8** | **PO 9** | **PO 10** | **PO 11** | **PO 12** | **PSO1** | **PSO2** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | **1** | **1** | **2** | **2** | **2** | | | | | | | | **2** | **1** |
| **CO2** | **3** | **3** | **3** | **3** | **3** | | | | | | | | **3** | **2** |
| **CO3** | **2** | **2** | **2** | **2** | **3** | | | | | | | | **3** | **2** |
| **CO4** | **2** | **3** | **3** | **3** | **3** | | | | | | | | **3** | **2** |
| Average* (Rounded to nearest integer) | **2** | **2** | **3** | **3** | **3** | | | | | | | | **3** | **2** |

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| Syllabus | | |
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| **S.No.** | **Name of the Experiment** | **Mapped CO** |
| 1 | Introduction to Simulation software tools | CO1 |
| 2 | Design a half wave dipole for a frequency of 600MHz and determine its radiation pattern, reflection coefficient, VSWR | CO2 |
| 3 | Design a biconical antenna for a frequency of 600MHz and determine its radiation pattern, reflection coefficient, VSWR | CO2 |
| 4 | Measurement of radiation pattern of a pyramidal Horn antenna | CO3 |
| 5 | Design a rectangular microstrip antenna and obtain its radiation characteristics using simulation | CO2 |
| 6 | Design a Circular microstrip antenna and obtain its radiation characteristics using simulation | CO2 |
| 7 | Design a square loop antenna for a frequency of 6GHz and obtain its radiation pattern, reflection coefficient, VSWR | CO2 |
| 8 | Model a rectangular Waveguide and obtain its radiation characteristics | CO3 |
| 9 | For a linear array of elements obtain the radiation patterns | CO4 |
| 10 | Synthesize a linear array to generate sector radiation pattern | CO4 |

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| **Learning Resources** |
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| **Text Books** |
| 1. Antennas and Wave Propagation – J.D. Kraus, R.J. Marhefka and Ahmad S. Khan, TMH, New Delhi, 4th ed., (Special Indian Edition), 2010. |
| **Reference Books** |
| 1. Antenna Theory - C.A. Balanis, John Wiley & Sons, 3rd Ed., 2005.<br>2. Antenna Engineering Handbook –John Leonidas Volakis, 3rd edition, 2007 |
| **e- Resources & other digital material** |
| **1.** http://anlage.umd.edu/HFSSv10UserGuide.pdf<br>**2.** https://www.youtube.com/watch?v=kUDlCVOPlvY |