# 19EC3552 - Digital Signal Processing Lab

| Course Code | 19EC3552 | Year | III | Semester | I |
|---|---|---|---|---|---|
| Course Category | Program Core | Branch | ECE | Course Type | Lab |
| Credits | 1.5 | L-T-P | 0-0-3 | Prerequisites | Signals and Systems |
| 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** | Examine the frequency response and impulse response of discrete-time LTI systems (L3). |
| **CO2** | Interpret discrete-time signals using DFT (L3). |
| **CO3** | Apply FFT algorithms for various signal processing operations (L3). |
| **CO4** | Analyse IIR and FIR digital filters (L4). |
| **CO5** | Design IIR and FIR digital filters for real time DSP applications (L5). |

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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 | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | 2 | 3 | 2 | | | 2 | 2 | 3 | | 2 | 1 | 2 |
| CO2 | 2 | 3 | 3 | 2 | 3 | | | 2 | 2 | 2 | | 2 | 2 | 1 |
| CO3 | 3 | 2 | 2 | 3 | 3 | | | 3 | 3 | 2 | | 3 | 2 | 2 |
| CO4 | 3 | 2 | 3 | 2 | 2 | | | 2 | 2 | 3 | | 2 | 2 | 1 |
| CO5 | 2 | 3 | 2 | 3 | 3 | | | 3 | 2 | 2 | | 2 | 1 | 2 |
| Average* (Rounded to nearest integer) | 3 | 2 | 2 | 3 | 3 | | | 2 | 2 | 2 | | 2 | 2 | 2 |

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| Syllabus | | |
|---|---|---|
| **Expt. No.** | **Contents** | **Mapped CO** |
| | **Part A – Using MATLAB** | |
| I | Frequency response of a system described by a difference equation. | **CO1, CO4** |
| II | Implementation of discrete time systems in time domain. | **CO1, CO4** |
| III | DFT & IDFT of the given sequences. | **CO2** |

| | | |
|---|---|---|
| IV | Properties of DFT | **CO2** |
| V | Fast Fourier Transform | **CO3** |
| VI | Design of IIR Low Pass filter using Butterworth and Chebyshev approximations. | **CO4, CO5** |
| VII | Design of IIR High Pass filter using Butterworth and Chebyshev approximations. | **CO4, CO5** |
| VIII | Design of FIR Low Pass filters using window technique. | **CO4, CO5** |
| IX | Design of FIR High Pass filter using window technique. | **CO4, CO5** |
| **Part B – Using Code Composer Studio** | | |
| X | Linear convolution of two sequences. | **CO1, CO4** |
| XI | Circular convolution of two sequences. | **CO2** |
| XII | Generation of Sine wave & Square wave. | **CO4** |

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**Learning Resources**

**Text Books**

1. J. G. Proakis and D. G. Manolakis, Digital Signal Processing: Principles, Algorithms and Applications, 4/e, Pearson Education, 2007.
2. A.V. Oppenheim, R. W. Schafer, Discrete-Time Signal Processing, 3/e, Prentice Hall of India, 2009.

**Reference Books**

1. Fundamentals of Digital Signal Processing - Lonnie C Ludeman, John Wiley & Sons, 2003
2. Digital Signal Processing "A – Computer Based Approach" - Sanjit K Mitra, Tata Mc Graw Hill 2nd Edition, 2003
3. Theory and Application of Digital Signal Processing - Lawrence R Rabiner & Bernard Gold, Prentice Hall.

**e- Resources & other digital material**

1. http://www.nptel.iitm.ac.in/
2. http://www.ee.umanitoba.ca/~moussavi/dsp815/LectureNotes/index.html
3. http://www.ece.cmu.edu/~ee791
4. http://cobweb.ecn.purdue.edu/~ipollak/ee438/FALL04/notes/notes.html

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