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| Course Code | 2ICDE58 |
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| Course Title | **Digital Signal Processing** |

**Course Learning Outcome:**
At the end of the course, students will be able to –
- understand and analyze LTI systems in z-domain and frequency domain
- apply FFT algorithms
- design IIR and FIR digital filters and implement structures

| **Syllabus** | **Teaching Hours** |
|---|---|

**UNIT 1: Introduction to digital signal processing and its applications**   02

Introduction to various signal signal processing algorithms and applications

**UNIT 2: The Z-Transform and Analysis of LTI Systems**   05

Pole and zeros, Pole location and time-domain behavior for causal signals, System function of LTI system, Analysis of LTI system in z – domain, One-sided z- transform

**UNIT 3: Fast Fourier Transform Algorithms**   07

FFT algorithms, Radix-2 FFT algorithm, Radix-4 FFT algorithm, Implementation of FFT algorithms, Applications of FFT algorithms, Quantization effects in the computation of DFT

**UNIT 4: Implementation of Discrete Time Systems**   06

Structures for FIR systems, Structures for IIR systems, Representation of

numbers, Quantization of filter coefficients, Round-off effects in digital filters

**UNIT 5: Design of Digital Filters**                                        **10**

Practical frequency selective filters, Design of linear-Phase FIR Filters using Windows, Frequency sampling method, Comparison of design methods, IIR filter design by Approximation of derivatives, Impulse invariance, Bilinear transformation, Characteristics of analog filters, Frequency transformation in analog and digital domain

**Self Study:**

The self study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self study contents.

**Laboratory Work:**
Laboratory work will consist of minimum 10 experiments based on the above syllabus.

**References:**
1. John G. Proakis & Dimitrics G. Manolakis, Digital Signal Processing Principles, Algorithms    and Applications, Pearson Publication.
2. Emmanuel C. Ifeachor & Barrie W. Jervis, Digital Signal Processing a practical approach, Pearson Publication.
3. Alan V. Oppenheim, Ronald W. Schafer & John R. Buck, Discrete-time Signal Processing, Pearson Publication.
4. B. Venkataramani & M. Bhaskar, Digital Signal Processors, Architecture, Programming and Applications, Tata McGraw Hill Publication.