

**DSP DESIGN WITH FPGAs**

<b>Course Code</b>	19EC4601C	<b>Year</b>	III	<b>Semester</b>	II
<b>Course Category</b>	Program Elective-II	<b>Branch</b>	ECE	<b>Course Type</b>	Theory
<b>Credits</b>	3	<b>L-T-P</b>	3-0-0	<b>Prerequisites</b>	Digital Logic Design
<b>Continuous Internal Evaluation:</b>	30	<b>Semester End Evaluation:</b>	70	<b>Total Marks:</b>	100

**Course Outcomes**

Upon successful completion of the course, the student will be able to

<b>CO1</b>	Analyze signal processing architectures and implement them on FPGA platforms. [L4]
<b>CO2</b>	Explain number formats for computers [L2]
<b>CO3</b>	Analysis and comparison of digital filters for processing of discrete time signals[L4]
<b>CO4</b>	Analyze Fourier transforms on signals and acquire knowledge about Systems[L4]

**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
<b>CO1</b>	3		3		3					3			3	
<b>CO2</b>	3		3		3					3			3	
<b>CO3</b>	3	3								3			3	
<b>CO4</b>	3	3								3			3	
Average* (Rounded to nearest integer)	3	3	3	3	3					3			3	

**Syllabus**

Unit No.	Contents	Mapped CO
I	Overview of Digital Signal Processing, FPGA Technology, DSP Technology Requirements, Design Implementation	CO-1
II	Computer Arithmetic: Number Representation, Binary Adders, Binary Multipliers, Fixed Point, Arithmetic Implementation, Floating Point Arithmetic Implementation, CORDIC.	CO-2
III	FIR Digital Filters: Digital Filters, FIR Theory, Designing FIR Filters, Constant Coefficient FIR Design: Direct FIR Design, FIR Filter with Transposed Structure.	CO-3
IV	IIR Digital Filters: IIR Theory, IIR Coefficient Computation, IIR Filter Implementation	CO-3
V	Fourier Transforms: DFT algorithms: Fourier Transform Approximations using the DFT, Properties of the DFT, FFT algorithms: Cooley-Tukey FFT algorithm.	CO-4

**Learning Resources****Text Books**

1. Uwe Meyer-Baese, Digital Signal Processing with Field Programmable Gate Arrays, Fourth Edition, Springer Publications, 2014

**Reference Books**

1. Roger Woods, John McAllister, Dr. Ying Yi, FPGA-based Implementation of Signal Processing Systems, Wiley Publications, 2011.
2. Shoab Ahmed Khan, Digital Design of Signal Processing Systems, Wiley Publications, 2011.
3. Keshab Parhi, VLSI Digital Signal Processing, Wiley Student Edition, 2010.