Kadi Sarva Vishwavidyalaya

Faculty of Engineering & Technology

Fourth Year Bachelor of EC Engineering

VIIth sem Academic Year 2020)

Subject Code: EC701-N	**Subject Title: Digital Signal Processing**

Course Objective:

- To present a problem oriented introductory knowledge of Digital Signal Processing.
- To address the underlying concepts and methods behind Digital Signal Processing.

Teaching Scheme (Credits and Hours)

Teaching scheme				Total Credit	Evaluation Scheme					
L	T	P	Total		Theory		IE Marks	CIA Marks	Pract. Marks	Total Marks
Hrs	Hrs	Hrs	Hrs		Hrs	Marks				
04	00	02	06	05	03	70	30	20	30	150

Outline of the Course:

Sr. No.	Title of the Unit	Hours
1	Introduction to DSP	8
2	Introduction to Z-transform	9
3	The Discrete Fourier Transform	9
4	Computation of the DFT	9
5	Structures for Discrete Time Systems	9
6	Filter Design Techniques	9
7	Architecture of DSP Processors & applications	7
	Total	60

Total hours (Theory): 60

Total hours (Tutorial):

Total hours: 60

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Detailed Syllabus:

Unit No.	Topic	Lecture Hours	Weightage (%)
1.	**Introduction to DSP:** Discrete Signals and classification, systems and Its Classification, LTI Systems and its properties in signal processing, Elements of digital signal processing system, concept of frequency in continuous and discrete time signals, Sampling theorem, Frequency domain representation of sampling, Reconstructions of band limited signals from its samples.	**8**	**10**
2.	**Introduction to Z-transform :** Introduction to Z transform, Properties of Region of Convergence for the Z transform, The Inverse Z transform, Z transform properties, Convolution (linear and circular).	**9**	**15**
3.	**The Discrete Fourier Transform :** Representation of sequences by discrete time Fourier Transform (DTFT), Properties of DTFT and correlation of signals, Introduction to DFT, Relation between DTFT and DFT, Properties of DFT.	**9**	**15**
4.	**Computation of the DFT:**Efficient computation of the Discrete Fourier Transform. The Goertzel Algorithm, Decimation in Time FFT Algorithms, Decimation in Frequency Algorithms.	**9**	**15**
5.	**Structures for Discrete Time Systems:** Introduction, Block-Diagram representation of Linear Constant co-efficient difference equations, Basic structures for IIR systems: Direct Forms, Cascade Form, Parallel Form. Basic network structures for FIR systems: Direct Form, Cascade form.	**9**	**15**
6.	**Filter Design Techniques:** Design of Discrete-Time IIR filters from Continuous-Time filters: Filter design by impulse invariance, Bilinear Transformation, Examples. Design of FIR filters by windowing: Properties of commonly used windows, Incorporation of Generalized linear phase, The Kaiser window filter design method.	**9**	**15**
7.	**Architecture of DSP Processors & applications:** Harward architecture, pipelining, Multiplier-Accumulator (MAC) hardware, architectures of fixed and floating point (TMSC6000) DSP processors. Applications.	**7**	**15**
	Total	**60**	**100**

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Instructional Method and Pedagogy (Continuous Internal Assessment (CIA) Scheme)

- At the start of course, the course delivery pattern , prerequisite of the subject will be discussed
- Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & equal weightage should be given to all topics while teaching and conduction of all examinations.
- Attendance is compulsory in lectures and laboratory, which may carries five marks in overall evaluation.
- One/Two internal exams may be conducted and total/average/best of the same may be converted to equivalent of 30 marks as a part of internal theory evaluation.
- Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carry an importance of ten marks in the overall internal evaluation.
- Surprise tests/Quizzes/Seminar/Tutorial may be conducted and having share of five marks in the overall internal evaluation.

Learning Outcomes:

On successful completion of the course

- The student can identify different areas of signal processing. One can find the applications of all the areas in day to day life.
- Digital signal processing of a signal facilitates the sharing of single processor among a number of signals by time sharing. This reduces the processing cost per signal.

TEXT BOOKS:

1. A.V. Oppenheim and Schafer, Discrete Time Signal Processing, Prentice Hall
2. John G.Proakis and D.G. Manolakis, Digital Signal Processing: Principle, Algorithms and Applications, Prentice Hall
3. L.R. Rabiner and B. Gold, Theory and Application of Digital Signal Processing,Prentice Hall
4. D.J. DeFatta, J.G.Lucas and W.S. Hodgkiss, Digital Signal Processing, J Wiley and Sons, Singapore.
5. Digital Signal Processing, S.Salivahanan, A.Vallavaraj, C.Gnapriya TMH

LIST OF EXPERIMENTS

Sr. No.	Experiment Title
1.	To Generate basic discrete signal used in Digital Signal Processing.
2.	To Perform graphical representation of Exponential Decreasing and Increasing signal.
3.	To Perform Convolution Operation on Two Discrete Sequences.
4.	To Perform Correlation operation on two discrete sequences.
5.	To Perform circular shifting operation on discrete sequence and prove.
6.	Write a Program to determine the Z-transform of the Finite Duration Signals.
7.	To Perform DTMF Signal Generation for the given Mobile Number.
8.	Design Low Pass Filter as per the given specification and plot the Frequency Response.
9.	To design the following Low Pass analog filters with the given specification.
10.	To Generation of ECG signals used in Medical Processing.
11.	Case Study