SWARNANDHRA
(AUTONOMOUS)
(Approved by AICTE, Accredited by NBA,NAAC,
Affiliated to JNTU KAKINADA)
SEETHARAMPURAM,NARSAPUR-534280.W.G.DT.,
DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

## TEACHING PLAN

| Course Code | Course Title | Semester | Branch | Contact Period /Week | Academic Year | Semester Commencement Date |
|---|---|---|---|---|---|---|
| 20EC5T02 | Digital signal processing (R-20) | V | ECE | 5 | 2024-25 | 05-6-24 |

**Corse Outcomes**

At the end of the course students are able to

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|---|---|
| 1 | Illustrate digital signals, systems and their significance. (K3) |
| 2 | Develop the digital signals using various digital transforms DFT, FFT etc. (K3) |
| 3 | Estimate the FIR and IIR structures from the designed digital filter. (K4) |
| 4 | Use the Multirate Processing concepts in various applications. (K3) |

| Unit No. | Out Come/Bloom's Level | | TOPIC(S) | Reference Text book | Contact Periods | Delivery Method |
|---|---|---|---|---|---|---|
| | | | **UNIT INTRODUCTION** | | | |
| 1 | CO1: Illustrate digital signals, systems and their significance. (K3) | 1.1 | Introduction to Digital Signal Processing | T1, T2 | 1 | Chalk & Talk, Smart board |
| | | 1.2 | Applications & advantages of DSP | T1, T2 | 1 | |
| | | 1.3 | Discrete time signals (DTS) & sequences | T1, T2 | 1 | PPT |
| | | 1.4 | Problems on DTS | T1, T2 | 2 | Chalk & Talk, Smart board |
| | | 1.5 | linear shift invariant systems | T1, T2 | 1 | |
| | | 1.6 | stability, and causality | | 1 | |
| | | 1.7 | Linear constant coefficient difference equations. | T1, T2 | 1 | |
| | | 1.8 | Problems on difference equations | T1, T2 | 1 | |
| | | 1.9 | Frequency domain representation of discrete time signals and systems. | T1, T2 | 1 | |
| | | 1.10 | Problems on frequency domain | T1, T2 | 1 | Chalk & Talk, Smart board |
| | | 1.11 | Review of Z-transforms | T1, T2 | 1 | |
| | | 1.12 | Solution of Difference equations using Z-transforms | T1, T2 | 1 | |
| | | 1.13 | System function | T1, T2 | 1 | |
| | | 1.14 | Class Test-1 | | 1 | |

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|---|---|---|---|---|---|---|
| | TOTAL | | | | 15 | |
| | UNIT II DFS & FT | | | | | |
| 2 | CO2: Develop the digital signals using various digital transforms DFT, FFT etc. (K3) | 2.1 | Discrete Fourier transforms: Computation of DFT | T1, T2 | 1 | Chalk & Talk, Smart board |
| | | 2.2 | Problems | T2 | 1 | |
| | | 2.3 | Properties of DFT, linear and circular convolution of sequences using DFT | T1, T2 | 1 | |
| | | 2.4 | Problems on convolution | T2 | 1 | |
| | | 2.5 | Overlap add method , Overlap-save method | T1, T2 | 1 | |
| | | 2.6 | Problems | T2 | 1 | |
| | | 2.7 | Fast Fourier transforms (FFT) - Radix-2 decimation in time | T1 | 1 | |
| | | 2.8 | Problems | T2 | 1 | |
| | | 2.9 | Decimation in frequency FFT Algorithms. | T1 | 1 | |
| | | 2.30 | Inverse FFT | | 1 | |
| | | 2.31 | Class Test-2 | | 1 | |
| | TOTAL | | | | 11 | |
| | UNIT III DESIGN OF IIR DIGITAL FILTERS & REALIZATION | | | | | |
| 3 | CO3: Estimate the FIR and IIR structures from the designed digital filter. (K4) | 3.1 | Analog filter approximations | T1, T2 | 1 | Chalk & Talk, Smart board |
| | | 3.2 | Problems | | 1 | |
| | | 3.3 | Butterworth filter | T1, T2 | 1 | |
| | | 3.4 | Problems | | 1 | |
| | | 3.5 | Chebyshev filter | T2 | 1 | |
| | | 3.6 | Problems | T2 | 1 | |
| | | 3.7 | Design of IIR digital filters from analog filters, | T1, T2 | 1 | |
| | | 3.8 | Problems | T1, T2 | 1 | |
| | | 3.9 | Design examples : Analog-Digital transformations | T1, T2 | 1 | |
| | | 3.10 | Problems | T1, T2 | 1 | |
| | | 3.11 | Class Test-3 | | 1 | |
| | TOTAL | | | | 11 | |
| | CYCLE-I EXAM | | | | | |
| | UNIT IV DESIGN OF FIR DIGITAL FILTERS & REALIZATION | | | | | |
| | | 4.1 | Characteristics of FIR Digital Filters | T1 | 1 | Chalk & Talk, Smart |
| | | 4.2 | Problems | T1 | 1 | |

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| 4 | CO3: Estimate the FIR and IIR structures from the designed digital filter. (K4) | 4.3 | Frequency response Design of FIR Digital Filters using Window Techniques | T1, T2 | 1 | board |
| | | 4.4 | Window (Gibbs phenomenon) | T1 | 1 | |
| | | 4.5 | Problems on Windows | T1 | 1 | |
| | | 4.6 | Frequency Sampling technique | | 1 | |
| | | 4.7 | Problems | T1, T2 | 1 | |
| | | 4.8 | Comparison of IIR & FIR filters | T1 | 1 | |
| | | 4.9 | Applications | T1 | 1 | |
| | | 4.10 | Basic structure of FIR systems | T1 | 1 | |
| | | 4.11 | Lattice structures | T1, T2 | 1 | |
| | | 4.12 | Lattice ladder structures | T1, T2 | 1 | |
| | | 4.13 | Class Test-4 | | 1 | |
| | **TOTAL** | | | | 13 | |
| **UNIT V MULTIRATE DIGITAL SIGNAL PROCESSING** | | | | | | |
| 5 | CO4: Use the Multirate Processing concepts in various applications. (K3) | 5.1 | Introduction | T1, T2 | 1 | Chalk & Talk, Smart board |
| | | 5.2 | Down sampling, Decimation | T2 | 1 | |
| | | 5.3 | Up sampling, Interpolation | T1, T2 | 1 | |
| | | 5.4 | Problems | T2 | 1 | |
| | | 5.5 | Sampling rate conversion | T2 | 1 | |
| | | 5.6 | Conversion of band pass signals | T2 | 1 | |
| | | 5.7 | Concept of resampling | T2 | 1 | |
| | | 5.8 | Applications of multi rate sampling | T2 | 1 | |
| | | 5.9 | DSP processors | T2 | 1 | |
| | | 5.10 | Class Test-5 | | 1 | |
| | **TOTAL** | | | | 10 | |
| | **Content beyond syllabus** | Architecture of TMS320C5X | | | 2 | |
| | | **TOTAL** | | | **62** | |

| **AUTHORS/BOOK TITLE/EDITION(latest)/PUBLISHER/YEAR OF PUBLICATION** |
|---|
| 1. John G. Proakis, D.G.Manolakis, Digital Signal Processing: Principles, Algorithms and Applications – Pearson Education/PHI, 2018 |
| 2. A.V.Oppenheim and R.W.Schafer, Digital Signal Processing – PHI, 2017. |
| 3. B.Venkataramani, M.Bhaskar, Digital Signal Processors - Architecture, Programming and Applications –TATA McGraw Hill, 2019. |
| **AUTHORS/BOOK TITLE/EDITION(latest)/PUBLISHER/YEAR OF PUBLICATION** |
| 1. Andreas Antoniou, Digital Signal Processing – TATA McGraw Hill, 2006 |

2. MH Hayes, Digital Signal Processing – Schaum's Outlines, TATA McGraw Hill, 2007

**WEB Details**

1.www.slideshare.net

2. www.ocw.mit.edu

3. www.gnits.ac.in/sites/default/files/ONLINERESOURCES/ECE/dsp.pdf

4. *https://lecturenotes.in/subject/44/digital-signal-processing-dsp*

| | | NAME | Signature with Date |
|---|---|---|---|
| 1 | Faculty I | K. V. B. C. Rao | |
| 2 | Faculty II | M.Kanaka Durga | |
| 3 | Course Coordinator | K. V. B. C. Rao | |
| 4 | Module Coordinator | Dr. B.Sada Siva Rao | |
| 5 | Programme Coordinator | Dr.B.S.RAO | |

**Principal**
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