# UTKALMANI GOPABANDHU INSTITUTE OF ENGINEERING, ROURKELA

## LESSON PLAN

**SESSION: 2022-2023**

## DEPARTMENT OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING

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| **SUBJECT CODE: Th.3** |
| **NAME OF THE SUBJECT: DIGITAL SIGNAL PROCESSING (DSP)** |
| **BRANCH: ELECTRONICS & TELECOMMUNICATION** |
| **SEMESTER: 6TH** |
| **NUMBER OF CLASSES ALLOTED PER WEEK : 4** |
| **TOTAL PERIODS ALLOTED TO THE SUBJECT ACCORDING TO SCTEVT: 60** |
| **NAME OF THE FACULTY: MANASI PRIYADARSHINI** |

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| **NAME OF THE SUBJECT :** | **DIGITAL SIGNAL PROCESING (DSP)** |
| **BRANCH:** | **ELECTRONICS & TELECOMMUNICATION** |
| **SEMESTER:** | **DIPLOMA 6th SEM** |
| **PERIODS PER WEEK:** | **4 (14/02/2023 to 23/05/2023)** |

| Week/Date | Lecture | Topic to be covered | Remarks |
|---|---|---|---|
| 1st week<br><br>14/02/2023<br>To<br>18/02/2023 | 1st | Chapter-1:<br><br>Basics of Signals, Systems & Signal processing- basic element of a digital signal processing system. | |
| | 2nd | Advantages ofdigital signal processing over analog signal processing. | |
| | 3rd | Classification of signals - Multi channel& Multi-dimensional signal, Continuous time verses Discrete -times Signal, Continuousvalued verses Discrete -valued signals. | |
| | 4th | Deterministic signal, random signal , analog signal and digital signal | |
| 2nd week<br><br>20/02/2023<br>To<br>25/02/2023 | 1st | Concept of frequency in continuous time & discrete time signals-Continuous-time sinusoidal signals-Discrete-time sinusoidal signals-Harmonically related complex exponential | |
| | 2nd | Analog to Digital & Digital to Analog conversion & explanation of the following thefollowing.<br>Sampling of Analog signal and The sampling theorem. | |
| | 3rd | Quantization of continuous amplitude signals and Coding of quantized sample.<br>Digital to analog conversion | |
| | 4th | Analysis of digital signals vs. discrete time signals | |

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| 3rd week<br><br>27/02/2023<br>To<br>04/03/2023 | 1st | **Chapter 2:**<br>**DISCRETE TIME SIGNALS & SYSTEMS.**<br>Concept of Discrete time signals.<br>Elementary Discrete time signals. | |
| | 2nd | Classification Discrete time signal: energy and power signals and related problems | |
| | 3rd | Periodic and aperiodic signals, even and odd signals | |
| | 4th | Simple manipulation of discrete time signal: shifting, scaling and folding | |
| 4th week<br>06/03/2023<br>To<br>11/03/2023 | 1st | Discrete time system:<br>Input-output of system. Block diagram of discrete- time systems | 07/03/2023 TO 08/03/2023(Holi holidays )Need three extra classes for adjustment |
| | 2nd | Classification of discrete time system: static vs. dynamic, causal vs. non causal system | |
| | 3rd | Linear vs. non linear system | |
| | 4th | Time variant vs.time invariant system, stable vs. unstable system, interconnection of discrete time system. | |

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| 5th week 13/03/2023 To 18/03/2023 | 1st | Different techniques for the Analysis of linearsystem.<br>Resolution of a discrete time signal into impulses. | According to notice classes will remain suspended from 13/03/2023 TO 16/03/2023 due to semester exam. Need four extra classes for adjustment. |
| | 2nd | Problems related to convolution sum | |
| | 3rd | Response of LTI system to arbitrary inputs usingconvolution sum.<br>Convolution & interconnection of LTI system -properties. | |
| | 4th | Study systems with finite duration and infiniteduration impulse response. | |
| 6th week 20/03/2023 To 25/03/2023 | 1st | Discrete time system described by difference equation.<br>Recursive & non-recursive discrete time system | |
| | 2nd | Determine the impulse response of linear time invariant recursive system | |
| | 3rd | Correlation of Discrete Time signals | |
| | 4th | Chapter 3:**THE Z-TRANSFORM & ITS APPLICATION TO THE ANALYSIS OF LTI SYSTEM.**<br>Introduction to Z-transform & its application to LTI system. | |

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|---|---|---|---|
| 7th week 27/03/2023 To 01/04/2023 | 1st | Z transform of infinite duration signals | |
| | 2nd | Properties of ROC and some problems related to elementary signals | |
| | 3rd | Properties of z transform | |
| | 4th | Definition of poles and zeros of a rational function | |
| 8th week 03/04/2023 To 08/04/202 | 1st | Pole location time domain behaviour for casualsignals. System function of a linear time invariant system | 07/04/2023(holiday ).Need one extra class for adjustment |
| | 2nd | Introduction to inverse z transform | |
| | 3rd | Inverse Z-transform by partial fraction expansion and long division method | |
| | 4th | continued | |
| 9th week 10/04/2023 To 15/04/2023 | 1st | Some problems related to partial fraction expansion | 14/04/2023(holiday )Need one extra class for adjustment |
| | 2nd | continued | |
| | 3rd | Causality and stability test | |
| | 4th | continued | |

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| 10th week<br>17/04/2023<br>To<br>22/04/2023 | 1st | **Chapter-4:**<br>**DISCUSS FOURIER TRANSFORM: ITS APPLICATIONs AND PROPERTIES**<br>Concept of discrete Fourier transform , Frequency domain sampling and reconstruction of discrete timesignals. | |
| | 2nd | Discrete Time Fourier transformation(DTFT) Discrete Fourier transformation (DFT). | |
| | 3rd | Problems on DFT | |
| | 4th | Computation of DFT as a linear transformation | |
| 11th week<br>24/04/2023<br>To<br>29/04/2023 | 1st | IDFT and problems related to IDFT | |
| | 2nd | Relation of DFT to other transforms. | |
| | 3rd | Properties of the DFT. | |
| | 4th | Multiplication of two DFT & circular convolution | |

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| 12th week<br>01/05/2023<br>To<br>06/05//2023 | 1st | Problems related to circular convolution | 05/05/2023(holiday)Need one extra class for adjustment |
| | 2nd | **Chapter-5:**<br>**FAST FOURIER TRANSFORM ALGORITHM & DIGITAL FILTERS.**<br>Computation of DFT & FFT algorithm.<br>Direct computation of DFT. | |
| | 3rd | Divide and Conquer Approach to computation of DFT<br>Radix-2 algorithm. (Small Problems) | |
| | 4th | DIT ALGORITHM | |
| 13th week<br>08/05/2023<br>To<br>13/05//2023 | 1st | Problems related to DIT ALGORITHM | |
| | 2nd | DIF ALGORITHM | |
| | 3rd | Problems related to DIF ALGORITHM | |
| | 4th | Application of FFT algorithms | |

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| 14th week<br><br>15/05/2023<br>TO<br>20/05/2023 | 1st | Introduction to digital filters.(FIR Filters)& General considerations | 19/05/2023(holiday)Need one extra class for adjustment |
| | 2nd | Introduction to DSP architecture, familiarisation of different typesof processor | |
| | 3rd | CHAPTERWISE short question discussion and previous year question discussion | |
| | 4th | continued | |
| 15th Week<br><br>22/05/2023<br>TO<br>27/05/2023 | 1st | CHAPTERWISE long question discussion and previous year question discussion | Classes will be continued upto 23/05/2023 as per academic calender |
| | 2nd | continued | |
| | 3rd | NA | |
| | 4th | NA | |