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Description generated with very high confidence

**Course Plan**

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| **Department :** | Instrumentation & Control Engineering |
| **Course Name & code :** | Digital Signal Processing & ICE-3251 |
| **Semester & branch :** | VI & Electronics & Instrumentation |
| **Name of the faculty :** | Dr. Sandra D'Souza, Dr.Anjan Gudigar |
| **No of contact hours/week:** | |  |  |  |  | | --- | --- | --- | --- | | **L** | **T** | **P** | **C** | | 3 | 1 | 0 | 4 | |

**Course Outcomes (COs)**

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|  | ***At the end of this course, the student should be able to:*** | **No. of Contact Hours** | **Marks** |
| CO1: | Evaluate Z-transform for analysis of LTI systems. | 12 | 24 |
| CO2: | Evaluate discrete fourier tranaform and fast fourier transforms for discrete signals. | 10 | 22 |
| CO3: | Understand the design of digital filters. | 16 | 34 |
| CO4: | Understand the structures and implementation of digital filters | 6 | 12 |
| CO5: | Apply the principles of digital signal processing to real world problems | 4 | 8 |
|  | **Total** | 48 | 100 |

**Assessment Plan**

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| **Components** | **Assignments** | **Sessional Tests** | **End Semester/**  **Make-up Examination** |
| **Duration** | 20 to 30 minutes | 60 minutes | 180 minutes |
| **Weightage** | 20 % (4 X 5 marks) | 30 % (2 X 15 Marks) | 50 % (1 X 50 Marks) |
| **Typology of Questions** | Understanding; Applying; Analyzing; Evaluating; Creating | Remembering;  Understanding; Applying | Understanding; Applying; Analyzing; Evaluating; Creating |
| **Pattern** | Answer one randomly selected question from the problem sheet (Students can refer their class notes) | MCQ (10 marks):  10 questions of 0.5 marks each  Short Answers (10 marks): questions of 2 or 3 marks | Answer all 5 full questions of 10 marks each. Each question may have 2 to 3 parts of 3/4/5/6/7 marks |
| **Schedule** | As notified by Associate Director (Academics) at the start of each semester | Calendared activity | Calendared activity |
| **Topics Covered** | Assignment 1 (L 1-12& T 1-3) **(CO1)** | Test 1  (L 1-24& T 1-6)  **(CO1,2)** | Comprehensive examination covering full syllabus. Students are expected to answer all questions **(CO1-5)** |
| Assignment 2 (L **13-24**& T 4-6) **(CO2)** |
| Assignment 3 (L 25-36& T 7-9) **(CO3)** | Test 2  (L 25-45& T 7-10)  **(CO3,4)** |
| Assignment 4 (L 37-48& T 10-11) **(CO4-5)** |

**Lesson Plan**

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| **L. No./ T. No.** | **Topics** | **Course Outcome Addressed** |
| **L0** | Introduction to the subject | CO1 |
| **L1** | Overview of systems – Introduction to signal processing, signals, systems, classification of signals, introduction to transforms | CO1 |
| **L2** | Operations on signals, Digital signal Processing, advantages, limitations | CO1 |
| **L3** | Discrete time fourier transform, convlution and correlation | CO1 |
| **L4** | TUTORIAL-Convolution of different types of signals, correlation | CO1 |
| **L5** | Relationship between Laplace transform and z transform | CO1 |
| **L6** | Representation in Z plane , ROC and its significance | CO1 |
| **L7** | Z transform of causal and anticausal sequences and the corresponding ROC | CO1 |
| **L8** | TUTORIAL- Z Transform and ROC | CO1 |
| **L9** | Z-transform and its properties | CO1 |
| **L10** | Inverse Z transform | CO1 |
| **L11** | Analysis of LTI systems using Z transform | CO1 |
| **L12** | TUTORIAL- analysis of discrete time LTI systems using z transform | CO1 |
| **L13** | Discrete Fourier Transform – relationship with Fourier Transform-frequency domain sampling and reconstruction | CO2 |
| **L14** | DFT computation, Properties of DFT | CO2 |
| **L15** | Relation between DFT and Z transform, Analysis using DFT | CO2 |
| **L16** | TUTORIAL-discrete Fourier Transform computation | CO2 |
| **L17** | Fast Fourier Transform - radix 2 decimation in time algorithm (DITFFT) | CO2 |
| **L18** | Fast Fourier Transform - decimation in frequency algorithm (DIFFFT) | CO2 |
| **L19** | properties of DFT, DFT computation using FFT algorithms | CO2 |
| **L20** | TUTORIAL- Analysis of LTI systems using DFT | CO2 |
| **L21** | Inverse DFT (IDFT), Computation of Inverse DFT | CO2 |
| **L22** | Computation of DFT,IDFT,FFT | CO2 |
| **L23** | IIR Filter Design –introduction to classical filter design | CO3 |
| **L24** | TUTORIAL-Filter design using Butterworth. approximation | CO3 |
| **L25** | Chebyshev and elliptic approximations | CO3 |
| **L26** | transformations-impulse invariance method | CO3 |
| **L27** | Bilinear Transformation method of filter design | CO3 |
| **L28** | TUTORIAL-Impulse Invariant method of IIR filter design | CO3 |
| **L29** | Design of IIR filters using above methods | CO3 |
| **L30** | Design of lowpass, high pass filters | CO3 |
| **L31** | Frequency transformations | CO3 |
| **L32** | TUTORIAL-filter design using bilinear transformation | CO3 |
| **L33** | FIR Filters – Introduction, Gibbs phenomenon | CO3 |
| **L34** | Linear phase FIR filters- characteristics | CO3 |
| **L35** | Linear phase FIR filters-frequency response, design | CO3 |
| **L36** | TUTORIAL- Filter design using Windows-Rectangular, Bartlett, Hamming and Kaiser window. | CO3 |
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**References:**

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**(Signature of the faculty)**

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**(Signature of HOD)**

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**Faculty members teaching the course (IF MULTIPLE sections EXIST):**

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| **FACULTY** | **Section** | **FACULTY** | **Section** |
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