GUJARAT TECHNOLOGICAL UNIVERSITY
M.E. SEMESTER-II
MECHATRONICS ENGINEERING

Subject Name: **Mechatronics Signal Processing (Elective – III)**
Subject Code: **1724707**

Sr. No	Course Content	Total Hrs.
1.	**Introduction:** Signals, systems and signal processing, classification of signals, elements of digital signal processing system, concept of frequency in continuous and discrete time signals, Periodic Sampling, Frequency domain representation of sampling, sampling low pass signals, sampling bandpass signals, ,spectral inversion in bandpass sampling, general applications of DSP	**05**
2.	**Discrete-Time Signals and Systems:** Discrete-Time Signals, Discrete-Time Systems, LTI Systems, Properties of LTI Systems, linear convolution and its properties, Linear Constant Coefficient Difference equations,.	**05**
3.	**The Z- Transform and its Application in to Analysis of LTI System:** Z-Transform, Properties Z-transform, Rational Z-transform, the inverse Z-transform methods, Analysis of LTI systems in Z domain	**06**
4.	**Discrete-Fourier Transform and Fast Fourier Transform:** Discrete Fourier transform and its properties, Inverse DFT, Fourier Transform of Periodic Signals, Linear Convolution using DFT, efficient computation of DFT:FFT, Frequency analysis of continues and discrete time signal, Properties of discrete time Fourier Transform, and correlation of signals, Fourier Transform Theorem	**08**
5.	**Filter Design Techniques:** Design of Discrete-Time IIR filters from Continuous-Time filters Approximation by derivatives, Impulse invariance and Bilinear Transformation methods; Design of FIR filters by windowing techniques, Illustrative design examples of IIR and filters.	**09**
6.	**Application of DSP in Mechatronics Engineering: Case study**	**02**

- **All Experiments using MATLAB software**

Text Books:

1. "Digital Signal Processing: Principles, Algorithm & Application",4th edition,Proakis,Manolakis, Proakis, Manolakis, Pearson

2. "Understanding Digital Signal Processing", 2nd edition, Richard G Lyons, Pearson Education

Reference Books:

1. Digital Signal Processing: A Computer-Based Approach, S K Mitra, McGraw-Hill
2. Discrete Time Signal Processing, Oppeheim, Schafer, Buck Pearson education publication, 2nd Edition, 2003.
3. Fundamentals of Signal Processing for Sound and Vibration Engineers, Kihong Shin Joseph K. Hammond John Wiley & Sons, Ltd