KONKAN GYANPEETH

KARJAT COLLEGE OF ARTS, SCIENCE AND COMMERCE

Digital Signals and Systems

B.Sc. (IT) Sem. VI

EVALUATION SYSTEM

	Time	Marks
Theory Exam	3 Hrs.	100
TW / Tutorial	–	50

SYLLABUS

1. **Classification of Signals and systems**
   Introduction, Continuous Time and discrete time signals, classification of signals, simple manipulations of discrete time signals, amplitude and phase spectra, classification of systems, analog to digital conversion of signals.

   Fourier Analysis of Periodic and Aperiodic Continuous Time Signals & Systems :
   Introduction, trigonometric Fourier series, Complex or exponential form of Fourier series, Parsevals identity for Fourier series, Power spectrum of a periodic function. Fourier transform and its properties, Fourier transforms of some important signals, Fourier transforms of power and energy signals.

2. **Applications of Laplace Transform to System Analysis**
   Introduction, definition, region of convergence (ROC) LT of some important functions, Initial and final value theorems, convolution integral, Table of Laplace transforms, partial fraction expansions, network transfer function. S-plane Poles and zeros. LT of periodic functions. Application of LT in analysing networks.

3. **Z Transform:**
   Introduction, definition of z-transform, properties of z-transform, evaluation of inverse z-transform.

4. **Linear Time Invariant Systems:**
   Introduction, properties of DSP system, Discrete convolution, solution of linear constant coefficient difference equation. Frequency domain representation of discrete time signals and systems. Difference equation and its relationship with system function, impulse response and frequency response.

5. **Discrete and Fast Fourier Transforms:**
   Introduction, discrete Fourier series. Discrete time Fourier transform (DTFT), Fast Fourier transform (FIT). Computing an inverse DFT by doing direct DFT. Composite radix FIT, Fast (Sectioned) convolution, Correlation.

6. **Finite Impulse Response (FIR) Filters**
   Introduction, magnitude response and phase response of digital filters, frequency response of linear phase FIR filters, Design techniques of FIR filters, design of optimal linear phase FIR filters.

   Infinite Impulse Response (IIR) Filters :
   Introduction, IIR filter design by approximation of derivatives, IIR filter design by impulse invariant method, IIR filter design by the bilinear transformation. Butterworth filters. Chebyshev filters, Elliptic filters, frequency transformation.

References :

1. Digital Signal Processing (*S. Salivahanan, C. Gnanapriya*) Second Edition, TMH
2. Digital Signal Processing (*Sanjit K. Mitra*), Third Edition, TMH
3. Signals and Systems (*Alan V. Oppenheim and Alan S. Willsky with S. Hamid Nawab*), Second Edition, PHI (EEE)