Exam.Code:0937
Sub. Code: 33786

2125

B.E. (Electrical and Electronics Engineering)
Seventh Semester
PE-EE-703: Digital Signal Processing

Time allowed: 3 Hours Max. Marks: 50

NOTE: *Attempt five questions in all, including Question No. I which is compulsory and selecting two questions from each Unit.*

x-x-x

I. Attempt the following:-

a) Define discrete-time signal and give one example.

b) What is aliasing in the context of sampling?

c) State any two properties of the Discrete Fourier Transform (DFT).

d) Mention two differences between FIR and IIR filters.

e) What is quantization noise? (5x2)

UNIT - I

II. a) Explain the sampling theorem and derive the Nyquist criterion.

b) Determine the circular convolution of $x(n) = \{1, 2, 3\}$ and $h(n) = \{1, 1, 1\}$ using the DFT method. (2x5)

III. a) Derive the general expression for the N-point Discrete Fourier Transform (DFT).

b) Compute the 4-point DFT of the sequence $x(n) = \{1, 0, -1, 0\}$. (2x5)

IV. a) Explain the Radix-2 Decimation-in-Time (DIT) FFT algorithm with a neat flowgraph.

b) Show one stage of an 8-point Radix-2 FFT and describe the butterfly computations. (2x5)

UNIT - II

V. a) Describe the design procedure for FIR filters using the windowing technique.

b) Explain the characteristics and ideal response of an ideal low-pass filter. (2x5)

VI. a) Define quantization. Explain how quantization noise affects digital systems.

b) Discuss the impact of finite word length on digital filter performance. (2x5)

VII. a) Describe the Direct Form-I and Direct Form-II structures of IIR filters.

b) Explain the bilinear transformation technique used for IIR filter design. (2x5)

x-x-x