

Code No: 136BE**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD****B. Tech III Year II Semester Examinations, November/December - 2020****DIGITAL SIGNAL PROCESSING****(Common to ECE, EIE, ETM)****Time: 2 hours****Max. Marks: 75**

Answer any five questions
All questions carry equal marks

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- 1.a) What are the properties of LTI system? Explain them.
b) Find the impulse response of the system described by the following difference equation: Assume all initial conditions are zero. [7+8]
 $y(n) - 2y(n-1) + 4y(n-2) = x(n) + x(n-1)$
- 2.a) Realize the following system with minimum number of multipliers.
 $H(Z) = 0.5 + 0.75Z^{-1} + 0.8Z^{-2} + 0.9Z^{-3} + 2Z^{-4} + 0.9Z^{-5}$.
b) Check $y(n) = 3x(n-2) + 3x(n+2)$ is a causal linear system. [9+6]
- 3.a) Determine the DFT of a sequence $X(n) = \{1, 1, 0, 0\}$.
b) Prove time shifting and frequency shifting properties of discrete fourier transform. [8+7]
- 4.a) Determine DFT of the sequence $x(n) = \{1, 0, 0, 0\}$ using FFT algorithm.
b) Determine the 4 - point IDFT of the sequence $x[k] = \{1, -j, 0, j\}$ using DIT - FFT algorithm. [8+7]
- 5.a) Discuss magnitude characteristics of an analog Butterworth filter and give its pole locations.
b) Find $H(z)$ using impulse invariant method for given analog system: [7+8]
 $H(s) = 1/(S + 0.5)(S^2 + 0.5S + 2)$.
- 6.a) Describe the IIR filter design approximation using Bilinear transformation method.
b) Differentiate between Butterworth and Chebyshev filter method. [9+6]
- 7.a) Outline the steps involved in the design of FIR filter using Hanning window.
b) Write the magnitude and phase functions of FIR filter when impulse response is symmetric and N is odd. [8+7]
- 8.a) Explain about the Fixed-Point Quantization Errors and Floating Point Quantization errors.
b) Explain in detail about Interpolation and decimation with examples. [7+8]

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