Hall Ticket Number :										

R-11 / R-13

Code: 1G372

IV B.Tech. I Semester Supplementary Examinations August 2020

Digital Signal Processing

(Common to EEE & ECE)

Max. Marks: 70 **Time: 03 Hours**

Answer *any five* questions

All Questions carry equal marks (14 Marks each)

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1. a) Test the stability of LTI systems, whose impulse responses are,

i). $h(n) = (0.2)^n u(n)$. ii). $h(n) = (0.3)^n u(n) + 2^n u(n)$. 8M

b) A causal system is represented by the following difference equation $y(n) + \frac{1}{4} y(n-1) = x(n) + \frac{1}{2} x(n-1)$. Find the system transfer function H(z) and the impulse response. 6M

2. Let x(n) be a real sequence of length – N and its N - point DFT is given by X(K), Show that:

a. X(N-K) = X^*(k)

b. X(0) is real,

c. If N is even, then X(N/2) is real. 14M

3. a) Find the 8–point DFT of real sequence x(n)={1,1,1,1,0,0,0,0} by using DIF-FFT algorithm. 10M

b) What is in-place algorithm and what is the advantage of this algorithm? 4M

4. a) A linear time invariant system is described by the following input-output relation 2y(n)-y(n-2)-4y(n-3) = 3x(n-2).Realize the system in the following form:

i) Direct form-I realization.

ii) Transposed realization of Direct form-II. 7M

b) Realize the given system function $H(z) = 1 + \frac{1}{4} z^{-1} + \frac{17}{8} z^{-2} + \frac{1}{4} z^{-3} + z^{-4}$ by using :

i. Direct form

ii. The linear phase form. 7M

5. Given $H_a(s) = \frac{16(s+2)}{(s^2 + 2s + 5)(s+3)}$. Find H(z) using impulse invariant transformation. Assume T=0.2 sec. 14M

6. A low pass filter is to be designed with the following desired frequency response $H_d(e^{jw}) = H_d(w) = \begin{cases} e^{-j2w}, & |w| < \frac{®}{4} \\ 0, & \frac{®}{4} < |w| < ® \end{cases}$. Determine the filter coefficients $h_d(n)$ and h(n) if w(n) is rectangular window defined as follows: $w_R(n) = \begin{cases} 1, 0 \le n \le 4 \\ 0, otherwise \end{cases}$.

Also, find the frequency response, H(w) of resulting FIR filter. 14M

7. a) Show that the up-sampler and down-sampler satisfy the property of commutation if they are co-prime. 7M

b) Explain the ploy phase decomposition of an IIR filter with example. 7M

8 Explain about Discrete Multitone Transmission of digital data. 14M

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