https://www.sgbauonline.com

M.E. First Semester (Electrical (Electronics & Power) Engineering) (New-CGS)

13315 : Advanced Digital Signal Processing : 1 EEPME 3

P. Pages : 3

Time : Three Hours

AX - 3579

Max. Marks : 80

Notes :
1. Due credit will be given to neatness and adequate dimensions.
2. Assume suitable data wherever necessary.
3. Diagrams and chemical equations should be given wherever necessary.
4. Illustrate your answer necessary with the help of neat sketches.
5. Use of pen Blue/Black ink/refill only for writing the answer book.

1. a) The first five points of the eight – point DFT of a real – valued sequence are $\{0.25, 0.125 - j0.3018, 0, 0.125 - j0.0518, 0\}$. Determine the remaining three points. **7**

b) Show that the energy (power) of a real – valued energy (power) signal is equal to the sum of the energies (powers) of its even and odd components. **7**

OR

2. a) Compute the eight – point circular convolution for the following sequence, **7**

$$x_1(n) = \{1,1,1,1,0,0,0,0\}$$

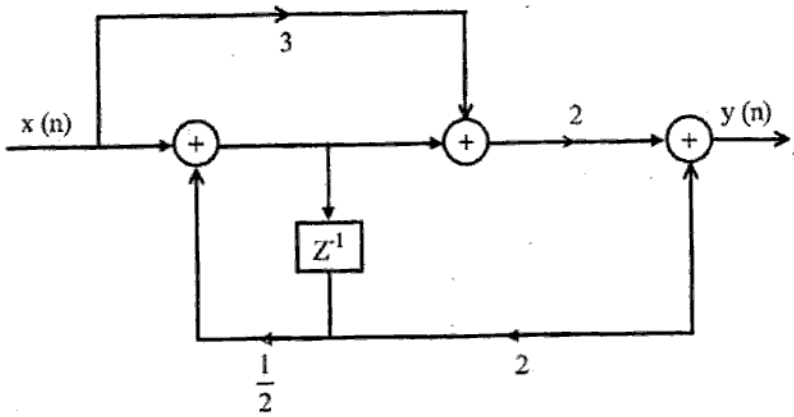
$$x_2(n) = \sin\frac{3\pi}{8}n \quad 0 \le n \le 7$$

b) Determine the circular convolution of sequences **7**

$$x_1(n) = \{\underset{\uparrow}{1},2,3,1\} \qquad x_2(n) = \{\underset{\uparrow}{4},3,2,2\}$$

using the time domain formula.

3. a) Determine the system function & the impulse response of the system shown in figure below. **7**



b) Obtain the direct form I, direct form II, cascade, and parallel structures for the following system, **6**

$$y(n) = \frac{3}{4}y(n-1) - \frac{1}{8}y(n-2) + x(n) + \frac{1}{3}x(n-1)$$

OR

https://www.sgbauonline.com

4. a) Determine a direct form realization for the following linear phase filter. 6

$$h(n) = \{1, 2, 3, 4, 3, 2, 1\}$$
$$\uparrow$$

b) Sketch the lattice – ladder structure for the system 7

$$H(z) = \frac{1 - 0.8z^{-1} + 0.15z^{-2}}{1 + 0.1z^{-1} - 0.72z^{-2}}$$

5. a) Compare between Butterworth filter and Chebyshev filter. 6

b) Given the specification $\alpha_p = 1dB, \alpha_B = 30dB, \Omega_p = 200r/s, \Omega_s = 600r/s$. 7
Determine the order of system.

OR

6. Design an FIR low pass filter satisfying the following specifications, 13
$\alpha_p \leq 0.1dB, \alpha_s \geq 44.0dB$,
$w_p = 20 rad/sec$, $w_s = 30 rad/sec$,
$w_{sf} = 100 rad/sec$

7. a) The Bartlett method is used to estimate the power spectrum of a signal $x(n)$ consisting of 2400 samples. 7
a) Determine the smallest record length of each segment that yields a frequency resolution of $\Delta_f = 0.07$.
b) Determine the quality factor Q_B.

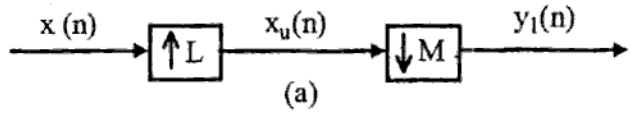
b) What are the performance characteristics of non – parametric power spectrum estimators. 7

OR

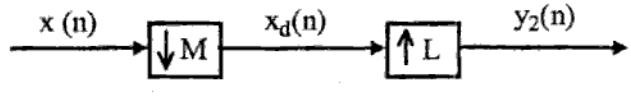
8. a) If the sample sequence of a random process has N = 1000 samples. 7
i) Determine the frequency resolution of the Bartlett, Welch (50% overlap), and Blackman Tukey methods for a quality factor Q = 10.
ii) Determine the record length for the Bartlett, Welch (50% overlap), and Balckman – Tukey methods.

b) Explain Durbin Algorithm. 7

9. a) Show that the following two systems are identical if L and M are relatively prime. 6



(a)

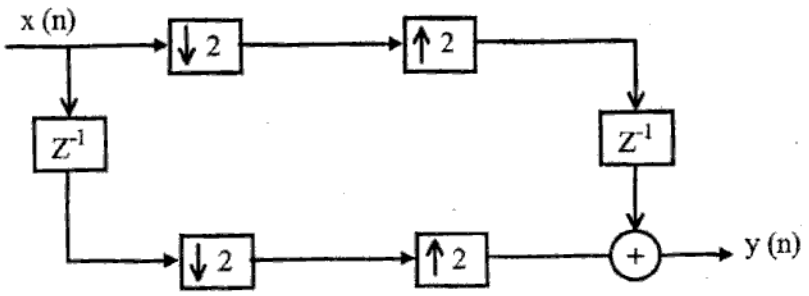


https://www.sgbauonline.com

b) For the system $H(z)=\frac{1}{1-az^{-1}}$. Determine $P_0(z)$ and $P_1(z)$ for the two – component decomposition. 7

OR

10. a) A multi-rate system is shown in figure below, find the relation between $x(n)$ & $y(n)$. 7



b) Explain in detail Quadrature Mirror Filter bank. 6

11. Explain in detail, all general purpose processor. 13

OR

12. a) Explain the various issues involved in selection of DSP processor. 7

b) Explain in detail how digital signal processor can be used for digital filtering. Give suitable example. 6

****