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B.E. /B.Tech DEGREE END SEMESTER EXAMINATIONS, APR/MAY 2014

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

FOURTH SEMESTER

EE8402 – DIGITAL SIGNAL PROCESSING
(REGULATION – 2012)

Time: 3 Hrs. Max. Marks: 100

Answer **ALL** Questions

Part - A [10 x 2 = 20]

1. Differentiate energy and power signals.
2. Find whether the system is static or dynamic. $Y(n)=a^2x^4(n)$.
3. What is the need of transformations in DSP?
4. Draw the ROC for $x(n)=a^n u(n)$, $a>0$.
5. Differentiate DFT and FFT.
6. Define the twiddle factor.
7. Compare and contrast the digital vs analog filters.
8. What are the basic steps of designing an FIR filter?
9. Draw the concept of pipelining for a basic 3-pipestage processor.
10. Give the names of any two DSP processors available in market.

Part - B [5 x 16 = 80]

11. Explain the special features of DSP processors with diagrams. [16]

12. a] Find whether the following systems are linear or non linear.
i. $y(n) = x^2(n) + x^2(n-1)$. [8]
ii. $y(n)= 2x(n) + 4$. [8]

Or

b] i) Test the periodicity of $x(n)= 4\, e^{j4\pi((n+1/3)/5)}$ [8]
ii) Determine the fundamental period of the signal $x(n)=1+e^{j(4\pi n/7)}-e^{j(2\pi n/5)}$ [8]

13. a] Explain the following properties of z-Transform.
i. Multiplication by an exponential sequence.
ii. Time Reversal.
iii. Differentiation of X(z).
iv. Convolution theorem. [16]

Or

b] Find x(n) using partial fraction method.

$X(z) = z(z+10)/((z-1)(z^2-8z+20))$ [16]

14. a] Compute the 8-point DFT of x(n) by radix-2 DIT-FFT for the sequence
$x(n) = \{ -1, 1, 2, -1, 1, 2, -1, 1\}$, (the first value is at origin). [16]

Or

b] Compute the 8-point IDFT of X(z) by radix-2 DIT-IDFT for the sequence
$X(k) = \{ 0, 2\sqrt{2}(1-j), 0, 0, 0, 0, 0, 2\sqrt{2}(1+j)\}$, (the first value is at origin). [16]

15. a] Find the values for Hamming window for M=5. Use the window to find the modified impulse response for
$h(n) = \sin(n \pi/2) / 2 ((\pi/n) /2)$. [16]

Or

b] Design a Butterworth high pass digital filter using BZT for a passband of 2-4 kHz, stopband of 0-500Hz, passband ripple 3dB, stopband attenuation 20dB and sampling frequency 8kHz. [16]

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