Roll No.									

BE DEGREE EXAMINATIONS APRIL/MAY 2012

Fourth Semester

Electrical and Electronics Engineering (R 2009)

EE 9254 Digital Signal Processing

Answer ALL Questions

Max marks:100 **Time: 3 Hrs**

Part-A (10x2=20)

1. What are basic elements of Digital Signal Processing?
2. List the major applications of DSP.
3. FIR filter has linear phase response. What are its implications?
4. Why is it necessary to define ROC with every z-transform?
5. Determine the region of convergence of two sided infinite duration signals.
6. Compare the performance of FIR and IIR filters.
7. What is Gibb's phenomenon?
8. Distinguish between decimation in time and decimation in frequency FFT algorithms.
9. What are the advantages of Digital Signal processors?
10. What is the difference between Von-Neumann and Harvard Architecture?

Part-B (5x16=80)

11. a. i. Check the following systems for linearity, causality, time invariance and stability using appropriate tests. [10]

    - $y(n) = n \cos [x(n)]$
    - $y(n) = x(n)\, u(n)$
    - $y(n) = e^{ax(n)}$
    - $y(n) = a[x(n)^2]$

    ii. Write a short technical note on 'Aliasing effect' and 'Quantization error'. [6]

12. a. i. An LTI system is described by the equation, $y(n)=x(n)+0.81x(n-1)-0.81x(n-2)-0.45y(n-2)$. Determine the transfer function of the system. Sketch the poles and zeroes on the Z-plane. [8]

    ii. Determine the causal signal x(n) having the Z-transform. [8]

$$X(Z) = \frac{(1+2z^{-1}+z^{-2})}{4(1-2z^{-1})(3-z^{-1})}$$

[OR]

b. i. Determine the impulse response of the system described by the difference equation y(n)-3y(n-1)-4y(n-2)=x(n)+2x(n-1) using Z transform. [8]

ii. Realize the following system with minimum number of multipliers
$H(Z) = 0.5+0.75Z^{-1}+0.8Z^{-2}+0.9Z^{-3}+2Z^{-4}+0.9Z^{-5}+0.8Z^{-6}+0.75Z^{-7}+0.5Z^{-8}$ [8]

13. a. i. Implement the Decimation in frequency FFT algorithm of N-point DFT where, N-8. Also explain the steps involved in this algorithm. [10]
ii. What is FFT? Calculate the number of multiplications needed in the calculation of DFT using FFT algorithm with 32 point sequence. [6]

[OR]

b. i. Compute the DFT of the three point sequence x(n) = {2, 1, 2}. Using the same sequence, compute the 6 point DFT and compare the two DFTs. [8]

ii. Draw the butterfly line diagram for 8 - point FFT calculation and briefly explain. Use decimation -in-time algorithm. [8]

14. a. i. An analog integrator is described by a transfer function Ha(S) = 1/S. Obtain a digital integrator using bilinear transformation method. [8]
ii. Compare Butter worth and Chebyshev approximations. [8]

[OR]

b. Design and realize a Butterworth low pass filter using the bilinear transformation method to satisfy the following characteristics.
Monotonic stop band and pass band,
-3dB cut off frequency of0.57π rad,
Stop band attenuation of 15dB at 0.77π rad. [10]

ii. Compare the performances of rectangular window, hamming window and triangular window. [6]

15. a. Discuss in detail, about the architectural features of any one type of fixed point *DSP* architecture with neat sketches. [16]

[OR]

b) Explain the basic addressing modes of *TMS 320 C 54 XX* processor with examples. [16]
