VASAVI COLLEGE OF ENGINEERING (Autonomous), HYDERABAD
B.E. (I.T.) III Year I-Semester Main & Backlog Examinations, December-2017
Digital Signal Processing

Time: 3 hours

Max. Marks: 70

Note: Answer ALL questions in Part-A and any FIVE questions from Part-B

Part-A (10 × 2=20 Marks)

1. List any four advantages of DSP.
2. Test whether the following system $y(n) = n.x(n)$ is linear time invariant or not.
3. Specify the conditions for a FIR system to have linear phase.
4. State the properties of Bartlett window.
5. Apply impulse invariance transform to analog filter transfer function $H(s) = \frac{1}{s^2+3s+2}$ to obtain digital filter transfer function H(z).
6. Define warping. How it can be avoided in digital filters?
7. Define the different stages in pipelining?
8. Give the functions of data read address bus?
9. Explain function of various blocks in DSP-based biometry receiver system.
10. Differentiate between DSP and other microprocessors architectures.

Part-B (5 × 10 = 50 Marks)

11. a) A System is described by the difference equation   [5]
    y(n) = 3y(n-1) + 2y (n-2) + x(n).
    i) Find the impulse response of the system *(ii)* Is it stable?

    b) Compute 8 point DFT of x(n) = {4, 3, 2, 1}using DIF FFT algorithm.   [5]

12. a) Discuss the various characteristic features of windows used in FIR filter design.   [5]

    b) Design an ideal band pass filter with a frequency response   [5]
    $H_d(e^{jw}) = 1$ for $\frac{\pi}{4} \le w \le \frac{3\pi}{4}$ and $H_d(e^{jw}) = 0$ otherwise. Using Triangular window for N=11.

13. a) Design an analog Butterworth filter that has the following specification, pass-band [5]
    attenuation $\alpha_p = 3dB$ at frequency $f_p = 10kHz$ and stop-band attenuation $\alpha_s = 18dB$ at frequency
    $f_s = 25kHz$.

    b) Realize the second order system described by a difference equation   [5]
    $y(n) = 2r.\cos(\omega).y(n-1) - r^2.y(n-2) + x(n) - r.\cos(\omega).x(n-1)$
    using direct form I and direct form II realization.

14. a) Discuss various DSP computational building blocks.   [6]

    b) Explain the various addressing modes used in TMS 320C54XX processor.   [4]

15. a) Implement speech processing system using TMS 320C54XX processor.   [5]

    b) Explain how heart rate obtained from ECG signal using DSP processor.   [5]

16. a) Perform linear convolution of a finite duration sequences   h(n) = {1,1,0,1} and   [5]
    x(n)={1,-1,1,2,1,0,1-4,3,2,1,1,0,2} using overlap-add method.

    b) Compare various FIR window techniques.   [5]

17. Answer any *two* of the following:
a) Differentiate between Butterworth and Chebyshev approximation.   [5]
b) Distinguish between Harvard architecture and Von-Neumann architecture for processors. [5]
c) Explain the JPEG algorithm.   [5]

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