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**Code No.: 32314 AS**

# VASAVI COLLEGE OF ENGINEERING *(Autonomous)*, HYDERABAD

**B.E. (E.C.E.) III Year II-Semester Advanced Supplementary Examinations, June/July-2017**

**Digital Signal Processing**

Time: **3** hours Max. Marks: **70**

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

***Part-A (10 × 2 = 20 Marks)***

1. Determine the stability of the system whose impulse response is $y(n) = \left(\frac{1}{2}\right)^n u(n)$.
2. Compare the computational complexity of direct DFT and FFT algorithms during the determination of DFT.
3. Write the magnitude and phase functions of Finite Impulse Response filter when response is symmetric & odd h (n).
4. Explain about the Gibb's Phenomenon.
5. What is meant by pre-warping?
6. Compare Analog and Digital Filters.
7. Draw the efficient traversal structure of the Decimator used in Multirate Signal Processing.
8. Justify the need for employing an anti-aliasing filter before the down-sampler.
9. List the On-Chip peripheral of TMS520C54XX processor.
10. Distinguish between Von Neumann and Harvard architectures.

***Part-B (5 ×10 = 50 Marks)***

11. a) Compute 8 point DFT of the following sequence x(n) using radix -2 DIT-FFT Algorithm, x(n) = {2, 2, 2, 2, 1, 1, 1, 1}. [7]

    b) State and prove any two properties of DFT. [3]

12. a) Design a Finite Impulse Response low pass filter with a cut-off frequency of 1 kHz and sampling rate of 4 kHz with eleven samples using Fourier series method. [7]

    b) Compare Hanning and Blackman windows in all respects. [3]

13. a) Design a Chebyshev-I filter using impulse invariance method for the following specifications: [7]

$$0.8 \le \left|H\left(e^{j\omega}\right)\right| \le 1, for\ 0 \le \omega \le 0.2\pi$$

$$\left|H\left(e^{j\omega}\right)\right| \le 0.2, for\ 0.6\pi \le \omega \le \pi$$

    b) Convert the analog transfer function $H(s) = \frac{1}{(s+1)(s+2)}$. Find H (z) using Impulse Invariance method. Assume T = 1sec. [3]

14. a) With the help of block diagram explain the sampling rate conversion by a rational factor 'I/D'. Obtain necessary expressions. [6]

    b) Describe the interpolation process with a factor of 'I '.Obtain necessary expression. [4]

*Contd... 2*

15. a) Discuss various addressing modes used in TMS320C 54XX processor. [6]

    b) Describe the architecture of MAC unit used in TMS320C 54XX processor. [4]

16. a) Find the circular convolution using concentric circles method for the given sequences $x(n) = \{1,2,3,4\}$ and $h(n) = \{1,2,1,2\}$ [5]

    b) Realize the following system function using minimum number of multipliers. [5]

$$H(z) = 1 + \frac{1}{3}z^{-1} + \frac{1}{4}z^{-2} + \frac{1}{4}z^{-3} + \frac{1}{3}z^{-4} + z^{-5}$$

17. Write short notes on any ***two*** of the following:

    a) Compare IIR and FIR Filters. [5]

    b) Identities used in Multi rate Digital Signal Processing. [5]

    c) Bus Structure of TMS 320C54XX architecture. [5]