Hall Ticket Number:

Code No. : 16405 O

VASAVI COLLEGE OF ENGINEERING *(Autonomous)*, HYDERABAD

B.E. (E.C.E.) III Year II Semester Old Examinations, May-2019

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. Distinguish between DFT and DTFT.
2. Compute the DFT of the sequence $x(n) = \{1,2,3\}$.
3. Give the importance of the Gibb's phenomenon.
4. Which filter is always stable filter. Justify the same.
5. When do you choose an IIR filter instead of an FIR filter?
6. A system is represented by $H(z) = 3 + \frac{4z}{z-0.5} - \frac{2}{z-0.25}$. Does this $H(z)$ represent an FIR or IIR filter and why?
7. Define sampling-rate conversion?
8. How is it possible to avoid aliasing using decimation by a factor D?
9. What is 'pipelining' in digital signal processor?
10. Define a RISC processor and list its features.

Part-B (5 × 10=50 Marks)

11. a) Compute the DIT-FFT of an 8-valued sequence $x(n) = \{1,-1,-1,-1,1,1,1,-1\}$. [8]

    b) Draw the 2-point DIF-FFT Butterfly diagram. [2]

12. a) Explain the procedure for designing FIR filters using windowing technique with appropriate expressions and sketches. [5]

    b) Design an FIR filter by the windowing method to meet the following specification. [5]

    $H_d(e^{j\omega}) = e^{-j3\omega}; |\omega_c| \le \frac{3}{4}\pi$. Use Hamming window with N=7.

13. Design a Chebyshev Type-I digital filter with the following specifications [10

    $|H(e^{jw})| \le 0.2; \qquad 0 \le w \le 0.2\pi$

    $0.8 \le |H(e^{jw})| \le 1; \qquad 0.6\pi \le w \le \pi$

    Using impulse invariant transformation

14. a) Describe the method to increase the sampling rate by an integer factor of I. [6]

    b) Discuss the applications of multirate signal processing. [4]

15. a) Mention the differences between Digital Signal Processor and Microprocessor architectures. [3]

    b) Discuss the architecture of TMS320C54XX processor with the help of block diagram. [7]

Contd...2

16. a) State and prove symmetry properties of DFT.

b) Compare various windowing techniques in terms of their transition width and stop band. [6]

17. *Answer any **two** of the following:* [4]

a) What is impulse invariance technique? Obtain a digital filter from the analog filter given by $H(s)=\frac{(s+a)}{(s+a)^2+b^2}$ using the impulse invariance procedure. [5]

b) Mention the noble identities used in multirate signal processing and prove the same. [5]

c) What are the addressing modes used in TMS320C54xx processors and explain anyone with an example. [5]

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