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Code No. : 15606 O

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD
B.E. (I.T.) III Year I-Semester (Old) Examinations, May/June-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 ($10 \times 2 = 20$ Marks)

1. Classify various discrete time systems.
2. State the relation between DTFT and DFT.
3. Compare Rectangular and Triangular windows used in FIR filter design.
4. What is the condition for a FIR filters to have both constant phase delay and group delay?
5. Determine the order of a Butterworth filter that has the following specifications $\alpha_p=1\text{dB}$, $\alpha_s=30\text{dB}$, $\Omega_p=200\text{ rad/sec}$, $\Omega_s=600\text{ rad/sec}$.
6. What are the different types of structures available for IIR Filters?
7. List various data addressing modes available in programmable DSP devices?
8. Explain about the MAC unit used in programmable DSPs.
9. List the applications of digital signal processors.
10. Explain how a PPM signal is used for encoding two biomedical signals.

Part-B ($5 \times 10 = 50$ Marks)

11. a) Determine whether the following systems are linear or non-linear. [6]
i) $y(n) = x(n) + \frac{1}{x(n-1)}$ ii) $y(n) = x^2(n)$
b) Consider $x_1(n) = \{1, 2, 3, 1\}$, $x_2(n) = \{4, 3, 2, 2\}$ such that $X_3(k) = X_1(k).X_2(k)$, Find $x_3(n)$. [4]
12. a) Design an optimal FIR low pass filter of length 3 to meet the following specifications. [6]
Pass band cut off frequency: 600 Hz
Stop band cut off frequency: 200 Hz
Assume the tolerances are in the ratio of 1:2.
b) With an example discuss various implementation of FIR Filters. [4]
13. a) Compare Butterworth and Chebyshev filters. [5]
b) Apply Bilinear Transformation to $H(s) = \frac{2}{(s+1)(s+2)}$ to obtain digital filter transfer function $H(z)$. [5]
14. a) Explain DSP computational building blocks. [5]
b) Discuss special addressing modes in DSP processors. [5]
15. a) Explain the working of DSP based speech processing system in detail. [6]
b) Discuss about the ECG signal processing for heart rate determination using DSP. [4]
16. a) The discrete time system $y(n) = 3x(-n)$ where a is a non-zero constant. Determine, whether or not the system defined is a) Linear b) Casual c) Time invariant. [5]
b) What are the desirable characteristics of a window? Why is it necessary for FIR filter design? [5]
17. Write short notes on any *two* of the following:
a) Round off effect in digital filters. [5]
b) Speed issues in programmable DSPs. [5]
c) JPEG algorithm. [5]
