Reg. No. : | | | | | | | | | | |

Question Paper Code: 31467

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2016

Sixth Semester

Electrical and Electronics Engineering

01UEC624 - APPLIED DIGITAL SIGNAL PROCESSING

(Common to EIE and ICE brnaches)

(Regulation 2013)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 2 = 20 Marks)

1. Compare deterministic and random signals.
2. Show that the discrete time system described by the input-output relationship $y(n) = nx(n)$ is linear?
3. Summarize three methods of doing inverse Z-transform.
4. Deduce the convolution sum of two sequences of $x(n) = \{3, 2, 1, 2\}$ and $h(n) = \{1, 2, 1, 2\}$.
5. Express the 2-point radix-2 DIT-FFT butterfly structure for DFT. What is its advantage?
6. Determine the spectra of the signals, $x_p(n) = \{1,1,0,0\}$ with period N=4.
7. Point out the merits and demerits of FIR filters.
8. Give the expression for poles and zeroes of a Chebyshev type2 filter.
9. Illustrate the block diagram of Modified Harvard architecture.
10. Classify the addressing modes of TMS320C5x Processors?

PART - B (5 x 16 = 80 Marks)

11. (a) Identify whether the following systems are linear or not

(i) $y(n) = ax(n) + bx(n-1)$

(ii) $y(n) = cosx(n)$

(iii) $y(n) = x(n)cos\omega n$

(iv) $y(n) = Ax(n) + B$ (16)

Or

(b) (i) Give few lines about Sampling and Aliasing. (8)

(ii) A signal $x(t) = sinc(50\pi t)$ is sampled at a rate of (a) 20Hz (b) 50Hz (c) 75Hz. For each of these three cases, examine whether you can recover the signal $x(t)$ from the sampled signal. (8)

12. (a) Discover the general solution of the difference equation $y(n) = x(n) - 3y(n-1)$ with initial condition $y(-1) = 0$ and input $x(n) = n^2 + n$. (16)

Or

(b) Estimate the inverse z-transform through residue theorem method for the given function. $H(z) = \frac{1}{3}(z + 1 + z^{-1})$ ROC is entire z-plane except z=0 and z=∞. (8)

13. (a) Calculate the DFT of the following sequence x(n) using the DIT-FFT algorithm. x(n)={1, -1, -1, -1, 1, 1, 1, -1}. (16)

Or

(b) (i) Examine the Fourier transform and the energy density spectrum of the sequence,

$$x(n)=\begin{cases} A; 0 \le n \le N-1 \\ 0 \quad ; otherwise \end{cases}$$

(8)

(ii) Explain any five properties of DFT in detail. (8)

14. (a) Design a single pole low pass digital IIR filter with -3dB bandwidth of 0.2π, by use of bilinear transformation. (16)

Or

(b) Design a band-pass FIR filter that approximates the following frequency response,

$$H(f)=\begin{cases}1; & 160 \le f \le 200Hz \\ 0; elsewhere\ in\ the\ range\ 0 \le f \le \frac{f_s}{2}\end{cases}$$ when the sampling frequency is 800sps. Limit the duration of impulse response to 20ms. (8)

15. (a) Describe the internal architecture of TMS320C5X processor. (16)

Or

(b) (i) Explain assembly language instructions with suitable examples. (8)

(ii) Write a simple assembly language program and discuss the complete operation step by step. (8)

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