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

Question Paper Code: 36424

B.E. / B.Tech. DEGREE EXAMINATION, APRIL 2019

Sixth Semester

Electrical and Electronics Engineering

01UEC624 - APPLIED DIGITAL SIGNAL PROCESSING

(Common to EIE and ICE)

(Regulation 2013)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 2 = 20 Marks)

1. List out the applications of digital signal processing.
2. What is aliasing? How can it be eliminated?
3. State the scaling property of the Z transforms.
4. Define discrete Fourier series.
5. What do mean by the term “bit reversal” as applied to FFT?
6. Define twiddle factor of FFT.
7. Give the steps in the design of a digital filter from analog filter.
8. Distinguish between FIR filters and IIR filters.
9. What is the principle feature of Harvard architecture?
10. Define pipelining.

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) State and prove the sampling theorem for strictly band limited signals of finite energy. (16)

12. (a) Apply Z-Transform and show that *u[n]*u(n-1)= n u(n)* and hence find the inverse z transform of $X|z| = \frac{1-\frac{1}{3}z^{-1}}{(1-z^{-1})(1+2z^{-1})}$. (16)

Or

(b) Determine the output sequence *y(n)* if *x(n)={1, 2, 3, 2}* and *h(n)={1, 2, 2}* using linear convolution graphical method. (16)

13. (a) (i) State and Prove the properties of DFT (a) Periodicity (b) Time Reversal of a sequence. (6)

(ii) Determine the DFT sequence for (i) $x(n) = 2^n$ (ii) $x(n) = \{0, 1, 0, -1\}$ (10)

Or

(b) Calculate the DFT of the following sequence x(n) using the DIT-FFT algorithm. x(n)={0, 0, 0, 0, 1, 1, 1, -1}. (16)

14. (a) (i) Apply Impulse invariant method for the analog transfer function $H(s) = \frac{10}{s^2+7s+10}, T = 0.2\ sec$ (8)

(ii) Apply bilinear transformation method for the given analog transfer function $(s) = \frac{2}{(s+1)(s+2)}$, where T=1 sec. (8)

Or

(b) Design an ideal low pass filter with a frequency response

$$H_d(e^{j\omega}) = \begin{cases} e^{-j3\omega} & , \frac{-\pi}{4} \leq \omega \leq \frac{\pi}{4} \\ 0 & , \frac{\pi}{4} < |\omega| \leq \pi \end{cases},$$

Find the values of *h(n)* using hanning window and determine the transfer function H(z). (16)

15. (a) Describe in detail the architectural aspects of TMS320C54 digital signal processor using an illustrative block diagram. (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)