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

Question Paper Code: 56424

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2022

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. 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. 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. Illustrate the block diagram of Modified Harvard architecture.
10. Mention various stages in pipelining.

PART - B (5 x 16 = 80 Marks)

11. (a) Explain the process of reconstruction of the signal from its samples with expression. (16)

Or

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

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) 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) Compute the eight-point DFT of the sequence$x(n) = \{n + 1\}$, Using the radix-2 decimation-in-time algorithm. (16)

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) Design a low pass filter using rectangular window by taking 9 samples of *W(n)* and with a cutoff frequency of 1.2 *rad /sec*. (16)

Or

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

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

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

15. (a) Explain the architecture of TMS320C50 with a neat 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)