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

Question Paper Code: 96421

B.E. / B.Tech. DEGREE EXAMINATION, APRIL 2024

Sixth Semester

Electronics and Electrical Engineering

19UEC621– Digital Signal Processing for Electrical Engineers

(Regulation 2019)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (5 x 1 = 5 Marks)

1. For the signal, x(n)=log(cos(aπn+d)) for a =50 Hz, What is the time period of the signal , if CO1-U

   (a) 0.14s (b) 0.16s (c) 0.12s (d) 0.04s

2. The ROC of a causal signal is the _____ of a circle of same radius r. CO1-U

   (a) interior (b) exterior (c) both a and b (b) none of these

3. Find the DFT of y(n)={1,1,0,0} CO3-App

   (a) y(n)= {-2,3-3i,0,3+3i} (b) y(n) = {2,1+i,0,1-i }

   (c) y(n)={2,1- i,0,1+i} (d) y(n) = {-2,3+3i,0,3-3i }

4. A direct partial-fraction expansion of the transfer function in Z leads to CO4- R

   (a) The parallel form II structure (b) The parallel form I structure

   (c) Cascaded structure (d) None of the above

5. Which peripheral on C 6 X processor allows buffering of serial samples in memory by port automatically & especially with an assistance of EDMA controller? CO5- U

   (a) Boot Loader (b) HPI (c) EMIF (d) McBSP

PART – B (5 x 3= 15 Marks)

6. Show that the discrete time system described by the input – Output relationship y[n] =n x(n) is linear. CO1- App

7. Convolve of the following using z-Transform CO2- App

$X(z) = 1 + 2z^{-1} + z^{-2}$ and $H(z) = 1 + z^{-1} + z^{-2}$

8. Convolute x (n) = {4,3,2,1 } and h(n) = {2,1,2,1} using linear properties CO3- U

9. Define Gibbs Phenomenon. CO4- U

10. List out the latest DSP Processor series. CO5- U

PART – C (5 x 16= 80 Marks)

11. (a) Check whether the system is memory less, linear, causal, variance and stable? CO1- App (16)

(i) $y(n) = x(-n)$

(ii) $y(n) = \log x(n)$

Or

(b) Check whether the given signal is an energy or power signal. CO1- App (16)

$x(t) = A \cos\omega t \; ; -T < t < T$

12. (a) Compute the following $Z[\sin(n\pi/2)]$ and $Z[-5^n u(n)]$. CO2- App (16)

Or

(b) Find $Z^{-1}[(3z^2) / (z^2 + 7z + 10)]$. Using convolution method. CO2- App (16)

13. (a) Draw the neat butterfly diagram using FFT-DIT algorithm with Examples. CO3- App (16)

Or

(b) Find IDFT for the sequence x(n)= {1,2+j, 2,2-j, -2,2+j,2,2-j} using matrix method and direct method. CO3- App (16)

14. (a) Build an IIR filter using impulse invariance technique for the given CO4- App (16)

$0.6 \leq |H(w)| \leq 1$ for $0 \leq w \leq 0.35\pi$

$|H(w)| \leq 0.1$ for $0.7\pi \leq w \leq \pi$

Assume T = 1 sec. Realize this filter using direct form I and direct form II.

Or

(b) Design a butterworth digital IIR filter using Bilinear Transform by taking T= 1 sec to satisfy the following specification CO4- App (16)

$0.6 \leq |H(w)| \leq 1$ for $0 \leq w \leq 0.35\pi$

$|H(w)| \leq 0.1$ for $0.7\pi \leq w \leq \pi$

15.	(a)	Explain the operation of TDM serial ports in P-DSPs	CO5- U	(16)
		Or		
	(b)	What are the different buses of TMS 320 C54 processor? Give their functions.	CO5- U	(16)