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Question Paper Code: 96421

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2023

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)

- For the signal, $x(n)=\log(\cos(a\pi n+d))$ 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
- 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
- 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) $y(n)=\{-2,3+3i,0,3-3i\}$
- 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
- 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)

- Show that the discrete time system described by the input – Output relationship $y[n] =n x(n+1)$ 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 $h(n) = \{2,2,2,2\}$ 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-DIF 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 CO4- App (16)
 by taking $T = 1$ sec to satisfy the following specification
 $0.6 \leq |H(w)| \leq 1$ 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) Explain the architecture of TMS 320 C54 processor? CO5- U (16)

