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Reg. No. :

Question Paper Code: 96421

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

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. $y(n) = x(n-2) + x(2-n)$ is   CO1-App

    (a) Causal   (b) Time variant   (c) Non Causal   (d) All of the mentioned

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. In TMS 320 C6x processor architecture, which functional unit is   CO5- U
    adopted for transferring the data from register to and from control
    register?

    (a) L2   (b) M2   (c) S2   (d) D2

PART – B (5 x 3= 15 Marks)

6. A discrete-time signal x(n) is defined as   CO1- App

    $x(n) = \{1+ n/3 , -3 \leq n \leq -1$
    $1, 0 \leq n \leq 3$ and 0, elsewhere

    Draw x(n) and its inverse.

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. Compare DFT and DTFT.   CO3- U

9. Define Gibbs Phenomenon.   CO4- U

10. Define pipelining.   CO5- U

<div align="center">PART – C (5 x 16= 80 Marks)</div>

11. (a) With neat sketch explain the classification of signals.   CO1- U   (16)

<div align="center">Or</div>

   (b) Determine the following systems are linear, stability and time   CO1- App   (16)
        invariance of the system.
        (i) y[n]=x[2n]
        (ii) y[n]=sin x[n]

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

<div align="center">Or</div>

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

13. (a) By means of the DFT and IDFT, determine the response at the   CO3- App   (16)
        FIR filter with the impulse response h(n) = [1,2,3] and the input
        sequence x(n) = [1,2,2,1].

<div align="center">Or</div>

   (b) Find X(k) using radix-2 DIT-FFT algorithm, when   CO3- App   (16)
        x(n) = {2,1,2,1,2,1,2,1}

14. (a) Design a linear phase FIR Low pass filter using hamming   CO4- App   (16)
        window with cut off $\omega_c = 0.8\pi$ rad/sample by taking N=7 samples.

<div align="center">Or</div>

   (b) Design a butterworth digital IIR filter using Bilinear Transform   CO4- App   (16)
        by taking T= 1 sec to satisfy the following specification
        $0.6 \le |H(w)| \le 1$ for $0 \le w \le 0.35\pi$
        $|H(w)| \le 0.1$ for $0.7\pi \le w \le \pi$

15. (a) Describe the function of on chip peripherals of TMS 320 C54   CO5- U   (16)
        processor.

<div align="center">Or</div>

   (b) What are the different buses of TMS 320 C54 processor? Give   CO5- U   (16)
        their functions.

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