**A** **Reg. No. :** | | | | | | | | | | |

# Question Paper Code: 56421

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

Sixth Semester

Electrical and Electronics Engineering

15UEC621 – SIGNAL PROCESSING

(Common to Electronics and Instrumentation Engineering)

(Regulation 2015)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. The causal continuous system with impulse response should satisfy ____ equation. CO1- R

   (a) $h(t)=0,t<0$ (b) $h(t)=0,t>0$ (c) $h(t)\neq0,t<0$ (d) $h(t)\neq0,t\leq0$

2. Sampling theorem: CO1- R

   (a) fm<fs (b) fs>fm (c) $fs \geq 2fm$ (d) fs=2fm

3. For what kind of signals one sided z-transform is unique? CO2- R

   (a) All signals (b) Anti-causal signal (c) Causal signal (d) None of the above

4. Determine the convolution sum of two sequences CO2- R

   x(n) = {3, 2, 1, 2} and h(n) = {1, 2, 1, 2}

   (a) y(n) = {3,8,8,12,9,4,4} (b) y(n) = {3,8,3,12,9,4,4}

   (c) y(n) = {3,8,8,12,9,1,4} (d) y(n) = {3,8,8,1,9,4,4}

5. How many complex additions are required to be performed in linear filtering of a sequence using FFT algorithm? CO3- R

   (a) (N/2)logN (b) 2Nlog2N (c) (N/2)log2N (d) Nlog2N

6. For a decimation-in-time FFT algorithm, which of the following is true? CO3- R

   (a) Both input and output are in order (b) Both input and output are shuffled

   (c) Input is shuffled and output is in order (d) Input is in order and output is shuffled

7. Which of the following is not suitable either as low pass filter or a High pass filter CO4- R

(a) h (n) symmetric and 'M' odd (b) h (n) symmetric and 'M' even

(c) h (n) anti-symmetric and 'M' odd (d) h (n) anti-symmetric and 'M' even

8. What is the approximate transition width of main lobe of a Hamming window? CO4- R

(a) $4\pi/M$ (b) $8\pi/M$ (c) $12\pi/M$ (d) $2\pi/M$

9. Size of the ALU of TMS320C54X DSP processor CO5- R

(a) 8-bit (b)16-bit (c) 40-bit (d) 32-bit

10. VLIW means CO5- R

(a)Very Long Instruction word (b) Very Long Input word

(c) Verified Long Instruction word (d) None of the above

PART – B (5 x 2= 10 Marks)

11. Find whether the signal x(t)=e j(2t) is energy or power signal. CO1- R

12. Obtain the Z-transform of the signal x(n)=(2)nu(n) CO2- R

13. Differentiate between DIT and DIF algorithm. CO3- R

14. Write the expression for order of Butterworth filter. CO4- R

15. What are the different buses of TMS320C5X and their functions? CO5- R

PART – C (5 x 16= 80 Marks)

16. (a) Determine whether the following systems are static or dynamic, linear or non-linear, causal or non-causal, time invariant or variant CO1- App (16)

y(n)= nx(n)

y(n)=x(2n)

y(t) = x(t+10)+x(t)

Or

(b) (i) Find whether the signal x(t) = 2 cos (10 t+1) – sin(4t-1) is periodic or not. CO1- App (8)

(ii) Determine the following signals are energy or power signals CO1- App (8)

x(n)=sin(πn/3)

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| 17. | (a) | (i) State any five properties of Z-transform. | CO2- App | (8) |
| | | (ii) Determine the Z-transform of the sequences x(n)={5,3,2,4}. | CO2- App | (8) |
| | | Or | | |
| | (b) | (i) Determine the Z transform and ROC of the sequence $x(n) = an \cos((\omega n)u(n)$. | CO2- App | (8) |
| | | (ii) Evaluate the system function of the discrete time system described by the difference equation. $y(n) = 0.5y(n-1)+x(n)$. | CO2- App | (8) |
| 18. | (a) | Find the DFT of a sequence x(n)={1,2,3,4,4,3,2,1} using DIT algorithm. | CO3- App | (16) |
| | | Or | | |
| | (b) | Compute 8-point DFT of the following sequence using DIF algorithm. $x(n) = 1$ for $0<n<7$ $= 0$ for otherwise | CO3- App | (16) |
| 19. | (a) | Develop the given analog filter with transfer function H(S)=2/(S+1)(S+2) into a digital IIR filter using bilinear transformation. Assume T=1sec. | CO4- App | (16) |
| | | Or | | |
| | (b) | Design a digital FIR band pass filter with lower cut off frequency 2000Hz and upper cut off frequency 3200Hz using Hamming window of length N=7.Sampling rate is 10000Hz. | CO4- App | (16) |
| 20. | (a) | With suitable block diagram explain in detail about TMS320C54X DSP processor. | CO5- U | (16) |
| | | Or | | |
| | (b) | Explain the addressing modes of TMS320C54X DSP processor with a suitable example. | CO5- U | (16) |

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