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

Question Paper Code: 46424

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2018

Sixth Semester

Electrical and Electronics Engineering

14UEC624 - APPLIED DIGITAL SIGNAL PROCESSING

(Regulation 2014)

(Common to EIE and ICE branches)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. The system y (t) =3x (t) +5 is a _____ system.

   (a) Non-linear (b) Dynamic (c) Non-Causal (d) unstable

2. Integration of step signal results in _____ signal.

   (a) ramp (b) delta (c) Sinusoidal (d) triangular

3. The LTIDT system with system function $h(n)=a^n u(n)$ is stable, only if

   (a) $a>1$ (b) $1/a<\infty$ (c) $a<\infty$ (d) $a<1$

4. Convolution in time domain is equal to _____ in frequency domain.

   (a) addition (b) multiplication (c) compression (d) expansion

5. _____ multiplications are required to compute N-point DFT using radix-2 FFT.

   (a) $N/2 \log_2 N /2$ (b) $N/2 \log_2 N$ (c) $1/N \log_2 1/N$ (d) $N \log_2 N$

6. Compute the X(0) of the sequence x(n)={1, 0, 1, 0, 1, 0, 1, 0}

   (a) 8 (b) 4 (c) 2 (d) 1

7. The condition for linear phase characteristic in FIR filter is, the impulse h(n)=_____ where N is the duration of the sequence.

(a) h(n+N-1) (b) h(N+1-n) (c) h(N-1-n) (d) h(n-N-1)

8. When s=_____ LPF is converted to HPF in analog domain.

(a) $\frac{s}{\Omega_c}$ (b) $\frac{\Omega_c}{s}$ (c) $s\Omega_c$ (d) s^2

9. The pipeline depth of TMS320C50 is

(a) 6 (b) 4 (c) 2 (d) 0

10. _____ phase leads decode phase in pipelining.

(a) execute (b) fetch (c) write (d) read

PART - B (5 x 2 = 10 Marks)

11. Check Whether the system $y(t) = 3x^2(t) + 5$ is Stable or not.

12. State and Prove Final Value theorem of Z-transform.

13. What are the differences and similarities between DIF and DIT algorithms?

14. What is the necessary and sufficient condition for linear phase characteristic in FIR filter?

15. What is pipelining?

PART - C (5 x 16 = 80 Marks)

16. (a) Show that unit impulse response can be used to obtain the response for any input for an LTI system. Also, determine whether the following systems are linear, time-invariant and causal.

(i) $y(t) = x(t/3)$
(ii) $y(n) = x\log(n)$
(iii) $y(t) = x(t^2)$
(iv) $y(n) = x^2(2n+1)$ (16)

Or

(b) State and prove sampling theorem for low pass band limited signal and explain the process of reconstruction of the signal from its samples. (16)

17. (a) Using residue method find the inverse Z transform of

$X(z) = [1 + 3z^{-1}] / [(1 + 3z^{-1} + 2z^{-2})]$, $|z| > 2$. (16)

Or

(b) State and prove the time shifting and convolution property of Z-transform. (16)

18. (a) Evaluate 8-point DFT of the following sequence using DIF-FFT

x[n]={ 2, 1, 2, 1, 0, 2, 0, 2}. (16)

Or

(b) Derive the butterfly diagram of 8 point radix-2 decimation in Time FFT algorithm. (16)

19. (a) Design a digital low-pass Butterworth IIR filter using bilinear z-transform with a 3dB cut-off frequency of 2kHz and minimum attenuation of 30dB at 4.25kHz for a sampling rate of 10kHz. (16)

Or

(b) Design a filter with $H_d(e^{j\omega}) = \begin{cases} e^{-j3\omega}, & \frac{-\pi}{4} \leq |\omega| \leq \frac{\pi}{4} \\ 0, & \frac{\pi}{4} < |\omega| \leq \pi \end{cases}$

Using a Hamming window with N = 7. (16)

20. (a) With a neat block diagram explain in detail about the architecture of TMS320C50. (16)

Or

(b) (i) Explain the internal memory organization of TMS320C50 processor (8)

(ii) Explain various addressing modes of TMS processor. (8)

———————