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 **Reg. No. :**

**Question Paper Code: 46040**

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2017

Sixth Semester

Electronics and Communication Engineering

14UEC624- Applied Digital Signal Processing

(Common to EIE,ICE)

 (Regulation 2014)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. Let x1(t) and x2(t) be periodic signals with fundamental periods T1 and T2 respectively. Which of the following must be a rational number for x(t)=x1(t)+x2(t) to be periodic?

(a) T1+T2 (b) T1-T2 (c) T1/T2 (d) T1\*T2

2. The system described by the input-output equation y(n)=nx(n)+bx3(n) is a:

(a) Static system (b) Dynamic system (c) Identical system (d) None of the mentioned

3. If X(z) is the z-transform of the signal x(n) then what is the z-transform of anx(n)?

 (a) X(az) (b) X(az-1) (c) X(a-1z) (d) None of the mentioned

4. Which of the following justifies the linearity property of z-transform?[x(n)↔X(z)]

 (a) x(n)+y(n) ↔X(z)Y(z) (b) x(n)+y(n) ↔X(z)+Y(z)

 (c) x(n)y(n) ↔X(z)+Y(z) (d) x(n)y(n) ↔X(z)Y(z)

5. If X1(k) and X2(k) are the N-point DFTs of x1(n) and x2(n) respectively, then what is

 the N-point DFT of x(n)=ax1(n)+bx2(n)?

 (a) X1(ak)+X2(bk) (b) aX1(k)+bX2(k)

 (c) eakX1(k)+ebkX2(k) (d) None of the mentioned

6. How many complex multiplications are need to be performed for each FFT algorithm?

 (a) (N/2)logN (b) Nlog2N (c) (N/2)log2N (d) None of the mentioned

7. For an analog LTI system to be stable, where should the poles of system function H(s)

 lie?

 (a) Right half of s-plane (b) Left half of s-plane

 (c) On the imaginary axis (d) At origin

8. The anti-symmetric condition with M even is not used in the design of which of the

 following linear-phase FIR filter?

 (a) Low pass (b) High pass (c) Band pass (d) Band stop

9. Which window function is also regarded as 'Raised-cosine window'?

(a) Hamming window (b) Hanning window (c) Barlett window (d) Blackman window

10. In bilinear transformation, the left-half s-plane is mapped to which of the following in

 the z-domain?

 (a) Entirely outside the unit circle |z|=1

 (b) Partially outside the unit circle |z|=1

 (c) Partially inside the unit circle |z|=1

 (d) Entirely inside the unit circle |z|=1

 PART - B (5 x 2 = 10 Marks)

11. Define time variant and time invariant system.

12. Establish the relation between Z-transform and DFT.

13. What is zero padding? What are its uses?

14. What are the properties of bilinear transformation?

15. What is Pipelining?

 PART - C (5 x 16 = 80 Marks)

16. (a) Explain Different types of systems. (16)

Or

(b) Explain Representation of Signals. (16)

17. (a) Perform the Circular Convolution for the two Sequences

 X1(n) = {0.2,0.4,0.6,0.8,1.0,1.2,1.4,1.6} and X2(n) = {0.1, 0.3,0.5,0.7,0.9,1.1,1.3,1.5$\}$ (16)

 Or

 (b) Explain the properties of Z Transform. (16)

18. (a) Find the 8 point DFT of the sequence $x\left(n\right)=\left\{0, 1, 2, 3, 3, 2, 1, 0\right\}$. (16)

 Or

 (b) (i) Find the response of the system with impulse response $h\left(n\right)=\left\{2, 1\right\}$ and input

$ x\left(n\right)=\left\{1, 3, 2\right\}$ using DFT method. (8)

 (ii) Find the 8 point DFT of the sequence $x\left(n\right)=\left\{1, 2, 3, 4, 4, 3, 2, 1\right\}$ using DIFFFT

 algorithm. (8)

19. (a) Design a FIR ideal low pass filter with cut off frequency of 1 KHz and sampling

 frequency of 4 KHz with 11 samples using Fourier Series Method. (16)

Or

(b) Design a Digital Butterworth filter satisfying the following conditions. (16)

$$\sqrt{0.5}\leq \left|H\left(e^{jω}\right)\right|\leq 1, 0\leq ω\leq {π}/{2}$$

$$\left|H\left(e^{jω}\right)\right|\leq 0.2, {3π}/{4}\leq ω\leq π$$

 with $T=1 sec$. Apply Impulse Invariant Transformation.

20. (a) Explain VLIW Architecture and state the Advantage and Disadvantages of the

 Architecture. . (16)

Or

(b) Explain the TMS320C54X Architecture with the Block Diagram. (16)