KUMARAGURU
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Register Number: …….

B.E DEGREE EXAMINATIONS: APRIL/MAY 2016

(Regulation 2013)

Sixth Semester

ELECTRICAL AND ELECTRONICS ENGINEERING

U13ECT631: Digital Signal Processing

Time: Three Hours **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. The energy of the signal x(n) = $\left(\frac{1}{3}\right)^n$ u(n) is

   a) $\frac{1}{3}$ b) $\frac{1}{9}$

   c) $\frac{8}{9}$ d) $\frac{9}{8}$

2. A system is said to be …….. if the output of the system at any time n depends only on present and past input, but does not depend on future inputs.

3. The Z transform of a digital impulse signal is

   a) 1 b) 0

   c) $\frac{z}{(z-1)}$ d) $\frac{(z-1)}{z}$

4. The Fourier transform of a sequence x(n) is ……..

5. Which of the following is the circular convolution property of the DFT in frequency domain

   a) $X_1(k) + X_2(k)$ b) $X_1(k) . X_2(k)$

   c) $X_1(k) - X_2(k)$ d) $X_1(k) / X_2(k)$

6. If X(k) is DFT of a sequence x(n), then DFT of imaginary part of x(n) is ……..

7. Which of the following method is used for design of FIR filter

   a) Window method b) Time sampling method

   c) Minimum design d) Maximum design

8. ……..filters are of recursive type where the present output sample depends on the present input, past input samples and output samples.

9. The pipeline depth of TMS320C54x is

   a) 2 b) 4

   c) 6 d) 8

10. TMS320C54x CPU consists of ……..bit ALU

PART B (10 x 2 = 20 Marks)

(Answer not more than 40 words)

11. Distinguish between continuous and discrete systems.
12. What is aliasing effect?
13. Define Z transform.
14. Find the convolution for x(n)={1,2,1} ; h(n) ={1,1,1} signals using Z transform.
15. List the properties of DFT.
16. Draw 4 point radix -2 DIF-FFT butterfly structure for DFT.
17. Distinguish between FIR filter and IIR filter.
18. Classify the windowing techniques.
19. What are the features of TMS320C54XX processor?
20. What are the uses of MATLAB in Digital signal processing?

PART C (5 x 14 = 70 Marks)

(Answer not more than 400 words)

Q.No. 21 is Compulsory

21. Explain with a neat block diagram, the architecture of TMS320C54XX processor.

22. (a) (i) Determine the power and energy values for the signals (8)

$x(n) = e^{2n}u(n)$ and $x(n) = sin\left(\frac{\pi}{4}n\right)$

(ii) Describe the different types of digital signal representations. (6)

(OR)

(b) (i) Explain the process of quantization with necessary illustrations. (7)

(ii) Explain with a neat diagram the sample and hold circuit with input and output waveforms. (7)

23. (a) (i) List the Z transform properties (7)

(ii) Find the inverse Z transform of (7)

$$X(z) = \frac{1}{1 - 3z^{-1} + 2z^{-2}}$$

Using convolution method.

(OR)

(b) (i) Determine the Z transform and sketch the ROC of the signal (6)

$$x(n) = \begin{cases} \left(\frac{1}{3}\right)^{n}, n \geq 0 \\ \left(\frac{1}{2}\right)^{-n}, n < 0 \end{cases}$$

(ii) Determine the response of the system represented by (8)
$y(n) = 0.7y(n-1) - 0.12y(n-2) + x(n-1) + x(n-2)$ to input $x(n) = nu(n)$ and Examine the stability of the system.

24. (a) (i) Compute the 4-point DFT sequence $x(n) = \{0,1,2,3\}$ using DIT and DIF algorithm. (8)

(ii) Summarize the steps of radix -2 DIT-FFT algorithm (6)

(OR)

(b) (i) Find the 8-point DFT for the sequence $x(n) = \{2,2,2,2,1,1,1,1\}$ by radix-2 DIT FFT algorithm. (8)

(ii) Summarize the steps of radix -2 DIF-FFT algorithm (6)

25. (a) (i) Realize the system given by difference equation (8)
$y(n) = -0.1y(n-1) + 0.72y(n-2) + 0.7x(n) - 0.252x(n-2)$ in parallel form

(ii) Summarize the steps to design an analog Chebyshev low pass filter. (6)

(OR)

(b) (i) Design an analog Butterworth filter that has a -2 dB passband attenuation at a frequency of 20 rad/sec. and atleast -10 dB stopband attenuation at 30 rad/sec. (10)

(ii) Distinguish between Butterworth and Chebyshev filters (4)

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