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Question Paper Code : 21459

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2015.

Fifth Semester

Electrical and Electronics Engineering

EC 2314/10144 EC 502/EC 2361/10133 EE 502 — DIGITAL SIGNAL PROCESSING

(Common to Electronics and communication Engineering and Instrumentation and Control Engineering)

(Regulations 2008/2010)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is quantization error?
2. What is Nyquist rate of the analog signal?
3. What is Region of Convergence?
4. What are the properties of frequency response?
5. List any two properties of DFT?
6. What is FFT algorithms?
7. What is anti aliasing filter?
8. What is warping effect?
9. List the addressing modes of TMS320C50 DSP processor.
10. Name notable key features of DSP processor.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Discuss the properties of discrete time sinusoidal signals and continuous time sinusoidal signal. (8)

(ii) Consider the analog signal $x(t) = 3 \cos 100\pi t$

(1) Determine the minimum sampling rate required to avoid aliasing.

(2) If the signal is sampled at the rate Fs=200 Hz, What is the discrete time signal obtained after sampling? (8)

Or

(b) (i) Discuss the quantization of analog signal. (8)

(ii) Discuss the sampling of analog signals. (8)

12. (a) (i) Determine the one sided Z transform of (8)
$y(n) + 1/2\, y(n-1) - 1/4\, y(n-2) = 0;\ y(-1) = y(-2) = 1$

(ii) An anti causal signal $x(n)$ is given by

$$x(n) = -a^n u(-n-1) = \begin{cases} 0 & n \geq 0 \\ -a^n & n < 0 \end{cases}$$

Determine the z transform and ROC. (8)

Or

(b) (i) Consider a signal $x(n)$ is given by
$x(n)=(1/2)^n\, u(n) + (-1/4)^n\, u(n)$, determine $x(z)$ and ROC. (8)

(ii) Determine the inverse z transform of the following z domain functions. (8)

(1) $x(z) = (3z^2+2z+1)/(z^2-3z+2)$

(2) $(z-0.4)/(z^2+z+2)$

13. (a) An 8 point sequence is given by $x(n)=\{2,2,2,2,1,1,1,1\}$ compute 8 point DFT of $x(n)$ by radix 2 DIT FFT. Also sketch the magnitude and space spectrum. (16)

Or

(b) Find the circular convolution of two finite duration sequences $x(n) = \{1,-1,-2,3,-1\}$, $x(2) = \{1,2,3\}$ (16)

14. (a) (i) Explain the bilinear transformation method of obtaining digital filter from analog filter. (8)

(ii) Using impulse variance method with T = 1 Sec determine

$H(z)$ if $H(s) = 1/(s^2+\sqrt{2}\, s + 1)$. (8)

Or

(b) (i) Discuss the characteristics of Butterworth filter. (8)

(ii) Discuss the design procedure for analog Chebyshev low pass filter. (8)

15. (a) Draw the architecture of ADSP2181 DSP processor and explain. (16)

Or

(b) Explain the different addressing modes of TMS320C50 DSP processor. (16)
