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Question Paper Code : 51206

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2015.

Fifth Semester

Electronics and Communication Engineering

EC 1302 — DIGITAL SIGNAL PROCESSING

(Regulation 2008)

Time : Three hours Maximum : 100 marks

(Codes/Tables/Charts to be permitted, if any, may be indicated)

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is in place computation in FFT algorithm?
2. State any two properties of discrete Fourier transform.
3. Prove that filter with the following response has linear phase response and find the expression for phase response $h(n)=\{2,1,1,2\}$.
4. State the drawbacks of impulse invariance method.
5. What are the different quantization methods in DSP?
6. Draw the quantization noise model for a second order system.
7. What is periodogram?
8. Mention any two limitations of non parametric method.
9. What is the function of parallel logic unit?
10. What are the addressing modes supported by TMS 320C5X processor.

PART B — (5 × 16 = 80 marks)

11. (a) Find the circular convolution of the following two sequences using over lap add overlap save method.

$x(n)=(n+1); 0\le n\le 9$

$h(n)=(1,0,-1)$. (16)

Or

(b) Find the DFT of the sequence

$x(n)=\{1,-1,-1,-1,1,1,1,-1\}$ using Decimation in time FFT algorithm. (16)

12. (a) (i) Find the impulse response h(n) of the following system

$$Hd(e^{jw}) = \begin{cases} e^{-j3w} & \text{for} \quad 0 \le |w| \le \pi/2 \\ 0 & \text{for} \quad \pi/2 \le |w| \le \pi \end{cases}$$

use frequency sample method and N = 7 (10)

(ii) Explain the different types of window functions. (6)

Or

(b) Design the butterworth digital filter using bilinear transformation to meet the following specifications

$$\begin{aligned} 0.8 \le |H(e^{jw})| \le 1 \quad &\text{for} \quad 0 \le w \le 0.2\pi \\ |H(e^{jw})| \le 0.2 \quad &\text{for} \quad 0.6\pi \le w \le \pi \end{aligned} \qquad (16)$$

13. (a) Given a second order IIR filter with $H(Z) = \dfrac{1}{1 - 0.9z^{-1} + 0.2z^{-2}}$

Find the effect of quantization on pole location in direct form and cascade form upto 3 bits. (16)

Or

(b) Write short notes on the following

(i) Fixed and floating point arithmetic (8)

(ii) Limit cycle Oscillation. (8)

14. (a) Explain how Bartlet and Turkey method is used in smoothing the periodogram. (16)

Or

(b) (i) Derive the expression for energy density spectrum of discrete time signal. (8)

(ii) Prove that the estimated auto correlation is a consistent estimate of the true autocorrelation function. (8)

15. (a) Explain the following

(i) Harvard architecture. (8)

(ii) Pipelining. (8)

Or

(b) Explain the architecture ofTMS320C5X. with neat diagram. (16)
