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Question Paper Code : 23382

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2013.

Fifth Semester

Electronics and Communication Engineering

EC 1302/EC 1303 A — DIGITAL SIGNAL PROCESSING

(Regulation 2004/2007)

(Common to B.E (Part – Time) Fourth Semester Electronics and Communication Engineering, Regulation 2005)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. List any four properties of DFT.

2. What is radix-2 FFT?

3. List the characteristics of FIR filters designed using windows.

4. What is frequency warping?

5. Sketch the noise probability density functions for rounding.

6. Define Noise transfer function.

7. List the non-parametric methods for power spectral estimation.

8. What is Auto Correlation?

9. What is pipelining?

10. List the instruction set of C54X.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Formulate the steps involved in the decimation in time algorithm. (10)

(ii) Explain the advantages of FFT over direct computation of DFT. (6)

Or

(b) (i) Compute the 8 point DFT of $x(n)$ using DIF-FFT $X(n) = (-1,-1,2,2,-1,-1,2,2)$ (10)

(ii) Describe how IDFT can he obtained using the FFT algorithm. (6)

12. (a) (i) Derive expression for frequency response of linear phase FIR filter when impulse response is symmetrical and N is odd. (10)

(ii) Enumerate the steps involved in design of linear phase FIR filters using windows. (6)

Or

(b) (i) Convert the analog filter with system transfer function

$$H_a(s) = (s+0.1)/\left[(s+0.1)^2 + 9\right]$$

into a digital IIR filter by means of the impulse invariant method. (10)

(ii) Explain the design of low pass digital Chebyshev filter. (6)

13. (a) (i) Describe product quantization noise models of IIR systems for direct form realization. (10)

(ii) Explain overflow limit cycle. (6)

Or

(b) (i) Explain the characteristics of the limit cycle in the filter

$$y(n) = 0.85\,y(n-2) + 0.72\,y(n-1) + x(n)$$

Determine the dead band of the filter. (10)

(ii) Explain how scaling is done to prevent overflow and derive the scaling factor. (6)

14. (a) (i) Explain the procedural steps involved in the power spectrum estimation of random signals. (10)

(ii) How is DFT used in Power Spectrum Estimation? Explain. (6)

Or

(b) Describe the following methods in Power Spectral Estimation.

(i) Barlett Method (8)

(ii) Blackman Method (8)

15. (a) (i) With a neat block diagram,explain Harvard Architecture. (10)

(ii) Describe the format of MAC unit. (6)

Or

(b) (i) With examples, describe the various addressing modes in DSP. (10)

(ii) Explain the instruction set used in TMS320C5X. (6)