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Question Paper Code : 31215

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2012.

Fifth Semester

Electronics and Communication Engineering

EC 1302 — DIGITAL SIGNAL PROCESSING

(Regulation 2008)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Distinguish between DFT and DTFT.

2. Write any two properties of DFT.

3. Why FIR filters are stable?

4. State the advantages of IIR filter over FIR.

5. What is the cause for limit cycle oscillation?

6. List the advantages of floating point number representation.

7. Define periodogram.

8. What is the goal of power spectrum estimation?

9. Can embedded general-purpose RISC processors be used as DSP? Justify.

10. Describe about Harvard architecture?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Determine the 6-point DFT of the signal $x(n) = \{3, 2, 1, 0, 1, 2\}$. (10)

(ii) Represent DFT and IDFT in matrix form. (6)

Or

(b) Develop 8-point radix-2 decimation in time algorithm with input in normal order and output in digit reversed order. Derive the necessary equations and show the flow diagrams.

12. (a) Design an FIR digital low pass filter with desired system function.

$$H_d(w) = e^{-j3w}, \quad 0 \le |w| \le \pi/3$$
$$= 0, \qquad \pi/3 \le |w| \le \pi.$$

Use Hamming window with N = 7.

Or

(b) Design an IIR digital low pass filter to meet the following requirements

Ripples in passband $\le$ 1 dB, Passband cutoff freq. = 4 KHz

Ripples in stopband $\ge$ 40 dB, Stopband cutoff freq. = 6 KHz

Sample rate = 24 KHz.

Use bilinear transformation.

13. (a) Present the analysis of sensitivity to quantization of filter coefficients by deriving suitable equations. Why this analysis is important?

Or

(b) Write a short notes on the following :

(i) Limit cycle oscillation

(ii) Signal scaling. (8 + 8)

14. (a) Explain the Bartlett method of power spectrum estimation. Why it is called averaging periodograms?

Or

(b) What is parametric method of power spectrum estimation? Explain the Yule-Walker method for the AR model parameters.

15. (a) List and explain the different addressing modes of TMS320C5X processors.

Or

(b) Sketch and explain the architecture of TMS320C50 processor.
