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Question Paper Code : R 3644

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2009.

Fifth Semester

Computer Science and Engineering

CS 331 — DIGITAL SIGNAL PROCESSING

(Regulation 2001)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Consider an LSI system of $h(n) = (0.5)^n u(n)$. Verify the system for stability.
2. State the initial and final value theorems of z -transform.
3. State the Parseval's theorem.
4. State the main advantage of the FIR filter over IIR filter.
5. What do you understand by linear phase response?
6. What is Gibbs phenomenon?
7. If A, B, C and D are the matrices of discrete time system, write the formula for finding transfer function.
8. Compare fixed point representation of coefficients with floating point representation.
9. Distinguish between first order and second order filters.
10. What is the need for scaling in digital filters?

PART B — (5 × 16 = 80 marks)

11. (a) Explain in detail Recursive and Non-Recursive discrete time systems. (16)

Or

- (b) Find the frequency response of the LTI system governed by the difference equation $y(x) - a_1 y(x-1) - a_2 y(x-2) = x(x)$. (16)

12. (a) Determine the closed form expression for frequency response $G(e^{j\omega})$ of an LTI system with impulse response given by,

$$g(n) = a^n, \quad 0 \leq n \leq M-1 \\ = 0, \quad \text{otherwise}$$

Or

- (b) Compute the DFT of each of the following :

(i) $x(n) = \delta(n-n_0)$

(ii) $y(n) = x_1(n) x_2(n)$.

13. (a) Derive the algorithm to obtain FFT in decimation in frequency and draw the flow chart for data length $N=8$. (16)

Or

- (b) (i) Describe the method of design of FIR filters using window technique. (8)

- (ii) Discuss the different impulse response of a linear phase filters. (8)

14. (a) (i) Discuss the round off effects in Digital filters. (10)

- (ii) Compare FIR and IIR filters. (6)

Or

- (b) Explain the designing methods of IIR filters from analog filters. (16)

15. (a) Explain interpolator and decimator with applications of multivariate signal processing. (16)

Or

- (b) (i) Using DFT find power spectrum of $x(n) = 5 \sin(2\pi (0.175) n)$ for $n = 0, 1, \dots, 7$. (8)
- (ii) Find auto correlation of $\{1, 0, 1, 2, 3, 0, 1, 2\}$. (8)

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