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A 1251

B.E/B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2008.

Sixth Semester

Electrical and Electronics Engineering

EE 337 — DIGITAL SIGNAL PROCESSING

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Differentiate analog and digital signal processing.
2. Give an example for discrete time signal.
3. State two properties of Z-transform.
4. What is ROC?
5. State two properties of Fourier transform.
6. What is the need to go for a FFT algorithm to compute Fourier transform rather than using the simple DFT algorithm?
7. State the Nyquist criterion.
8. State the need for antialiasing filter in digital signal processing.
9. What is frequency warping in bilinear transformation?
10. State the advantage of Direct form – II over Direct form – I structure.

PART B — (5 × 16 = 80 marks)

11. (a) Name any four application areas of digital signal processing with suitable examples. (16)

Or

- (b) Represent a Cosine signal with 5 V amplitude and frequency 1 Hz. Sample the signal at the rate of 20 samples per second. Generate and represent another signal with the same data and shift this signal by 10 samples to the right. Perform the following operations

- (i) Add the first signal and the time shifted version of the second signal.
(ii) Multiply the first signal by 4 and represent this signal and add it with the time shifted second signal.

Draw waveforms in all cases. (16)

12. (a) Find the Z-transform of the following signals and plot its ROC. (16)

(i) $x_1(n) = a^n u(n)$

(ii) $x_2(n) = a^{-n} u(-n - 1)$

Or

- (b) Discuss any four properties of LTI system with examples for each. (16)

13. (a) Find the FFT of the following system using DIT algorithm for the system given by $x(n) = \cos(n\pi/2)$ for $0 \leq n \leq 7$ using radix - 2 algorithm. (16)

Or

- (b) Find the FFT of the following system using DIF algorithm for the system given by $x(n) = 2^n$ for $0 \leq n \leq 7$ using radix - 2 algorithm. (16)

14. (a) Discuss on the design of reconstruction filters and explain it with neat diagrams. (16)

Or

- (b) Explain any 4 types of A/D converters with neat diagrams. (16)

15. (a) Convert the following analog filter characterized by the transfer function to digital filter using impulse invariance method with $T = 1$ sec. (16)

$$H(s) = \frac{36}{(S + 0.1)^2 + 36}$$

Or

- (b) Convert the following analog filter characterized by the transfer function to digital filter using bilinear transformation method with $T = 1$ sec. (16)

$$H(s) = \frac{36}{(S + 0.1)^2 + 36}$$
