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**G 1247**

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2009.

Sixth Semester

Mechatronics Engineering

EE 351 — DIGITAL SIGNAL PROCESSING

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Draw basic block diagram of a digital signal processor.
2. Briefly explain multiplexing.
3. Find transfer function of the system  
$$y(n) = 7x(n) - 5x(n - 1)$$
4. Test the system  $y(n) = x(n) - y^2(n - 1)$  is BIBO system or not.
5. Draw the butterfly structure of 2 point DIF algorithm.
6. State and prove convolution property of DFT.
7. State Sampling theorem.
8. Discuss the register-ladder D/A converter.
9. Explain the characteristic of Hamming window.
10. Compare IIR and FIR filters.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Explain about Echo cancellation in telephone network. (10)  
(ii) Explain briefly multi dimensional signal. (6)

Or

- (b) (i) Explain sound (speech) processing. (10)  
(ii) Compare analog and digital signal processing. (6)

12. (a) Find transfer function and impulse response of a system. Which produces {5, 6, 7, 3, 2} as output for the input {1, 3, 0, 2} ? (16)

Or

- (b) Check the system for the properties Linear, Static, Casual, Stable, Recursive and Time invariance. (16)

$$y(n) = C x(n^2)$$

13. (a) Derive and draw 8 point FFT-DIT Radix-2 butterfly structure.

Or

- (b) Find DFT for {1, 0, 2, 1, 1, 2, 0, 1}. Plot the spectrum.

14. (a) Discuss in detail about analog to digital conversion process.

Or

- (b) Design a low pass analog filter with -3 db loss at 1 KHz and -30 db loss at 2.5 KHz.

15. (a) Realize the filter using DF1 and DFII methods.

$$\frac{(8z^{-2} + 3z^{-1} + 1)(4z^{-4} + 2z^{-2} + 1)}{(1 + 5z^{-1} + 2z^{-2})(1 - 2z^{-2} + z^{-4})}$$

Or

- (b) (i) Design a digital filter using impulse invariant technique.

$$\frac{S + 0.4}{(S + 0.4)^2 + 16} \quad (10)$$

- (ii) List four different windows used in FIR filter design and discuss about them. (6)