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M.E. DEGREE EXAMINATION, MAY/JUNE 2007.

First Semester

VLSI Design

VL 1601 — DIGITAL SIGNAL PROCESSING INTEGRATED CIRCUITS

(Common to M.E. Applied Electronics)

(Regulation 2005)

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is ASIC?

2. Draw the CMOS two input NOR gate circuit.

3. State Sampling Theorem.

4. Find the DFT of the sequence $\delta(n-1)$. Assume $N = 16$.

5. Distinguish between coefficient quantization and round off noise.

6. Find the magnitude and phase at $w = \pi/4$. Given that $H(z) = 1 + 0.5z^{-1} + 1.5z^{-2}$.

7. Compare DSP architecture with microprocessor architecture.

8. Draw the ideal DSP Architecture.

9. What are the advantages of Bit serial arithmetic?

10. Mention a few applications of complex multipliers employed in DSP systems.

PART B — (5 × 16 = 80 marks)

11. (a) Explain any one ASIC for DSP systems and its Design methods. (16)

Or

(b) Explain the VLSI process in the fabrication of DSP systems. (16)

12. (a) For the filter transfer function given below draw (i) Cascade structure (ii) Parallel structure (iii) Direct form II structure. (16)

$$H(z) = \frac{(z+1)^2}{(z+0.5)(z^2+0.2z-0.03)}.$$

Or

(b) (i) Explain DIF algorithm for computing DFT coefficients. Assume $N = 8$. (12)

(ii) How much reduction in computation when radix – 2, DIT algorithm is used for $N = 1024$. (4)

13. (a) Develop an expression for output $y(n)$ as a function of input $x(n)$ for the multirate system shown in Fig. 1. (16)
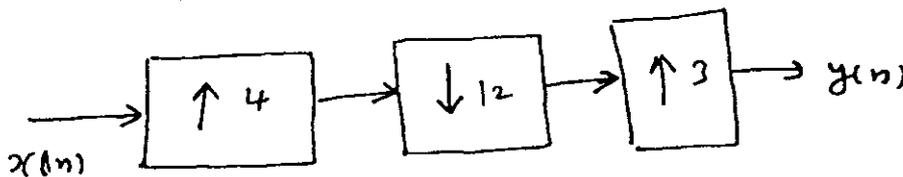

Fig. 1

Or

(b) (i) Explain any one method of measurement of round off noise. (8)

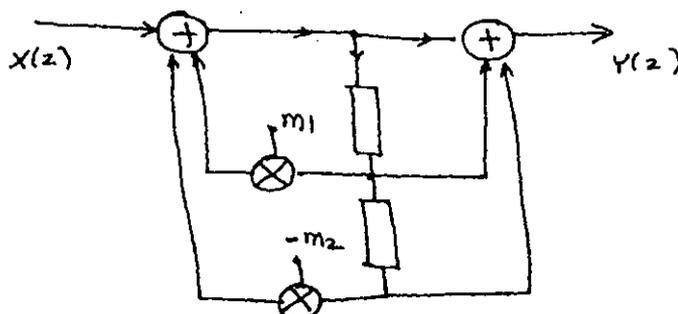(ii) For the IIR structure shown in Fig. 2. Find the first order sensitivity $S_{m_1}^H$ and $S_{m_2}^H$. (8)

Fig. 2

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14. (a) Explain systolic array design of FIR system by taking suitable example.

(16)

Or

(b) Write short notes on :

(i) Multicomputer DSP system.

(ii) Bit-serial Processing Element (PE).   (8 + 8)

15. (a) Design and test bit serial multiplier. Assume 4 bit binary number.   (16)

Or

(b) Describe the FFT processor and its applications.   (16)

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