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Dept. of ECE, CEG Campus, Anna University
End Semester Examination May 2013 B.E(ECE) VII Semester (FT)
EC 9076 CMOS Analog IC Design II – Functional Blocks

Answer All Questions

Part A (10x2=20 Marks)

- Q1. Draw any one circuit for carrying out offset cancellation in a switched capacitor amplifier.
- Q2. Explain the problem of glitch in binary weighted DACs
- Q3. Define the term oversampling ratio (OSR).
- Q4. Sketch the input output characteristics of a comparator and explain how comparator offset can modify this.
- Q5. How does oversampling help in relaxing the requirements of antialias filter.
- Q6. What is meant by metastability in a comparator.
- Q7. State the main differences between a flash ADC and Sigma Delta ADC.
- Q8. Quantization noise can be reduced by properly designing the anti alias filter. Discuss if this is true or false.
- Q9. Define the terms INL, DNL and Effective Number of Bits (ENOB)
- Q10. Explain how the use of a preamplifier helps in reducing the effective offset voltage of a comparator.

Part B(16x5=80 Marks)

Q11. (i) Explain the charge injection problem in CMOS switches and explain how this can be reduced using bottom gate sampling.

(ii) Derive the expression for the regeneration time constant of a comparator and explain how it affects the performance of a comparator.

Q12.a. Draw the block diagram of a current steering DAC and explain its principle of operation. Explain how the use of thermometer codes helps in reducing certain errors.

OR

Q12.b Explain the problem of nonlinearity in sampling and hold circuits and explain how bootstrapped S/H circuits can reduce this problem

Q13a. Draw the complete block diagram of a pipeline ADC and explain the functions of the various stages.

OR

Q13.b Explain the operation of any one comparator with the help of a circuit diagram.

Q14.a. Draw the complete block diagram of a flash A/D converter and explain the functions of the various blocks

OR

Q14.b Draw the complete block diagram of a sigma delta A/D converter and explain its operation. How does oversampling alter the quantization spectral characteristics. Obtain an expression relating the oversampling ratio and possible improvement in quantization SNR of a bandlimited signal.

Q15.a Draw the circuit diagram of any one switched capacitor pre amplifier, give its expression for gain, and explain how its offset voltage can be cancelled.

OR

Q15.b Explain the various sources of error that affect the performance of an ADC.