The first 10 Questions are very short answer questions:

1. (3pts) How far apart must valid code words be to allow Single Error Detection (SED)?
Single Error Correction (SEC)?
Double Error Detection Triple Error Correction (DECTED)?

2. (3pts) What is the difference between the Mealy and Moore models of sequential design?

3. (2pts) Write next to each of the following equations if they are SOP or POS.

$\overline{A}B\overline{C}+AB\overline{C}$

$(\overline{A}+B+\overline{C})(A+B+\overline{C})$

4. (3pts) Write down an example of a 4-bit 1-hot code. Which common combinational circuit produces this kind of code?

5. (2pts) What is the Hamming distance between these two bit pattens: 0111 and 1000?

6. (2pts) Why are circuits designed using bipolar technology hotter than circuits using CMOS?

7. (5pts) List a functionally complete set of gates. Show how to make this set using only NAND gates.

8. (3pts) Draw the logic that comprises an SR latch.

9. (2pts) What is the difference between a latch and a Flip-Flop?

10. (5pts) Write the equation for the carry into the 8th adder cell in an ALU using carry-lookahead, in terms of P's and G's.

11. (10 pts) Design a single-bit full adder using 2 4-input Muxes. (A 4-input Mux has 4 data inputs and 2 control lines).

12. (10 pts) Assume you have 8-bit data words, and your memory system supports Single Error Correction. For each of the following patterns recieved from memory identify and correct any errors that may have occurred during transmission or storage.

1 0 1 0 0 1 0 0 0 1 1 0	**Data Word: 10101001**
0 1 1 0 1 1 0 0 1 1 1 0	**Data Word:**
0 0 1 0 1 0 0 0 1 1 1 0	**Data Word:**

13. (50 pts) Implement the following sequential machine using a Toggle FF for Y1, a JK FF for Y2, and an RS FF for Y3. You do not need to draw the gates, but you do need to write down the input equations for each of the inputs of each of the Flip Flops in the circuit.

Present	Next State		Output	
State	X=0	X=1	X=0	X=1
000	000	001	0	0
001	010	011	0	1
010	100	101	0	0
011	110	100	0	1
100	001	010	1	0
101	011	010	0	1
110	101	110	0	1