

The University of Alabama in Huntsville
ECE Department
EE 202 – 02
Fall 2010
Sample Final Exam

Name: _____

J	K	Q(t+1)
0	0	Q(t)
0	1	0
1	0	1
1	1	Q'(t)

D	Q(t+1)
0	0
1	1

T	Q(t+1)
0	Q(t)
1	Q'(t)

1. (1 point) A major trend in digital design methodology is the use of a _____
 _____ to describe and simulate the functionality of a digital circuit.
2. (1 point) _____ is the average transition delay time for a signal to propagate from input to output.
3. (1 point) A _____ is an extra bit included with a binary message to make the number of 1's either odd or even.
4. (1 point) A multiplexer can be constructed with three-state gates: high, low and _____.
5. (1 point) A register capable of transferring the binary information held in each cell to its neighboring cell, in a selected direction, is called a _____.
6. (5 points) Convert (32445_6) to decimal:

7. (10 points) Convert decimal +12 and +17 to binary, using the signed-2's-complement representation and enough digits to accommodate the numbers. Then perform the binary equivalent of $(+12) + (-17)$. Convert the answer back to decimal and verify that it is correct.

8. (10 points) Construct a 16×1 multiplexer with as many 4×1 multiplexers and any additional logic that you might need. Use block diagrams for the components.

9. (15 points) Design a code converter that implements the following code converter. You do not have to draw a circuit diagram.

x	y	z		A	B	C
0	0	0		1	1	1
1	0	0		1	1	0
0	1	0		1	0	1
1	1	0		1	0	0
0	0	1		0	1	1
1	0	1		0	1	0
0	1	1		0	0	1
1	1	1		0	0	0

10. (15 points) An XY flip-flop has four operations, clear to 0, no change, set to 1, and complement, when inputs are X and Y are 00, 01, 10, and 11, respectively.
- Tabulate the characteristic table.
 - Derive the characteristic equation.
 - Tabulate the excitation table.

11. (20 points) Design a 4-bit counter which counts in the sequence 0000, 0001, 0011, 0111, 1111, 1110, 1100, 1000, 000 using clocked D flip-flops. You do not have to draw the circuit diagram. Is the counter self-correcting if it comes up in an unused state?

12. (20 points) Design a Mealy sequential circuit that has one input and one output. This circuit has an output of 1 whenever its input string has the string 0101 in sequence and otherwise has an output of 0. Two sequences can overlap. Use JK flip-flops. You do not have to draw the circuit diagram.

Input: 0110101011110110111010100101

Output: 0000001010000000000000100001