CENG 244 Introduction to Digital Systems

Exam 1 Topics & Notes

Topics and potential questions that you can expect on Exam #1 include:

Chapter 1

1) Positional number systems- how to convert numbers (both integer and fractional) from one system to another (e.g., binary, octal, decimal, duodecimal, & hexadecimal).
2) Expressing binary integers in octal & hexadecimal.
3) Binary arithmetic
4) Diminished radix complement (e.g., 9s complement, 1s complement)
5) Radix complement (e.g., 10s complement, 2s complement).
6) Subtraction with complements
7) Signed binary numbers- signed-magnitude, signed 1s-complement, and signed 2s-complement representations
8) Binary addition and subtraction using signed 2s-complement representation.
9) Binary Coded Decimal (BCD) and BCD addition.

Chapter 2

1) Truth Tables for Boolean functions
2) Simplification of Boolean expressions using Boolean algebra postulates and theorems. Operator precedence for Boolean algebra.
3) Find complement of a Boolean function.
4) Derive canonical Sum-of-Minterms or Product-of-Maxterms expressions for a Boolean function from a Truth Table or by using Boolean algebra. Be able to put in shorthand forms.
5) Put Boolean functions in standard Sum-of-Products or Product-of-Sums forms using Boolean algebra.
6) Understand fundamental Boolean operations (NOT, AND, OR, NAND, NOR, XOR, and XNOR).
7) Wiring and functionality of logic circuits, e.g., draw logic circuit/wiring diagram to implement given Boolean function or get Boolean function from given logic circuit/wiring diagram/wiring (similar to work in labs 1-3). Any required IC schematics will be given.

Notes:

(1) The use of calculators and electronic devices of any kind will not be permitted on the exam.

(2) The exam is closed book and closed notes.

(3) However, you may print out and use the following page. You may put equations/notes **inside** the lower box. Rule- no worked problems or examples.

Table 2.1
Postulates and Theorems of Boolean Algebra

Postulate 2	(a)	$x + 0 = x$	(b)	$x \cdot 1 = x$
Postulate 5	(a)	$x + x' = 1$	(b)	$x \cdot x' = 0$
Theorem 1	(a)	$x + x = x$	(b)	$x \cdot x = x$
Theorem 2	(a)	$x + 1 = 1$	(b)	$x \cdot 0 = 0$
Theorem 3, involution		$(x')' = x$		
Postulate 3, commutative	(a)	$x + y = y + x$	(b)	$xy = yx$
Theorem 4, associative	(a)	$x + (y + z) = (x + y) + z$	(b)	$x(yz) = (xy)z$
Postulate 4, distributive	(a)	$x(y + z) = xy + xz$	(b)	$x + yz = (x + y)(x + z)$
Theorem 5, DeMorgan	(a)	$(x + y)' = x'y'$	(b)	$(xy)' = x' + y'$
Theorem 6, absorption	(a)	$x + xy = x$	(b)	$x(x + y) = x$

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Equations/Notes: