CSE 140: COMPONENTS and DESIGN TECHNIQUES for DIGITAL SYSTEMS

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1. INTRODUCTION

Design Representations. Levels of Abstraction. Design Process. CAD Tools.

2. DATA TYPES & REPRESENTATIONS

Number Representations. Addition, Subtraction, Multiplication, Division. Error Correction and Detection.

3. BOOLEAN ALGEBRA

Axiomatic Definition and Basic Theorems of Boolean Algebra. Boolean Functions. Canonical Forms. Standard Forms. Gate Implementations.

4 SIMPLIFICATION of BOOLEAN FUNCTIONS

Map Method. Tabulation Method. Technology Mapping for Gate Arrays. Technology Mapping for Custom Libraries.

5. COMBINATORIAL COMPONENTS

Adders/Subtractors. Logic Unit. ALUs. Decoders. Selectors. Buses. Encoders. Comparators. Shifters. ROMs. PLAs.

6. SEQUENTIAL LOGIC

Latches. Flip-Flops. FSMs. State Minimization. State Encoding. Selection of Memory Elements.

7. STORAGE COMPONENTS

Registers. Counters. RAMs. Stacks. Queues. Datapaths. Control Unit Design.