

UNIVERSITY OF BAGHDAD
COLLEGE OF SCIENCE
DEPARTMENT OF PHYSICS

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SUBJECT: DIGITAL ELECTRONICS
SECOND YEAR
SECOND SEMESTER

Chapter 1: Logic gates :

1-1 Decision making elements

NOT, OR, AND, NOR, NAND, XOR, XNOR –Gates

1-2 Combinational logic circuit

1-3 Simple logic circuits

1-4 Universality of the NAND-gate

1-5 Universality of the NOR-gate

Chapter 2 : Numbering systems

2-1 Decimal numbers

2-2 Binary numbers

2-3 Binary addition,

2-4 Binary subtraction (1's and 2's complements methods)

2-5 Binary multiplication

2-6 Binary division

2-7 Octal numbering system

2-8 Hexadecimal numbering system

2-9 Conversion between the systems

2-10 Digital codes

1- Binary coded decimal code (BCD code)

2- Excess-3 code (Xs-3 code)

3- Gray code

Chapter 3 : Boolean algebra

3-1 Laws of Boolean algebra

Commutative law

Associative law

Distributive law

3-2 Rules of Boolean algebra

3-3 De Morgan's theorems

3-4 Simplifying logic equations using Boolean algebra

Chapter 4 :Arithmetic logic circuits

4-1 Addition (half adder-full adder – binary adder)

4-2 Subtraction (half subtractor –full subtractor- binary subtractor)

1's complement subtractor logic circuit

2's complement adder subtractor logic circuit

4-3 Logic families

Resistor- transistor logic (RTL)

Diode-transistor logic (DTL)

Transistor-transistor logic (TTL)

Emitter coupled logic (ECL)

Integrated-injection logic (I²L)

Metal oxide semiconductor logic MOS

Chapter 5: Logic gates: 2-memory elements (flip-flops)

5-1 Bistable multivibrator as a memory element

5-2 RS flip-flop

5-3 D flip-flop

5-4 JK flip-flop

5-5 T flip-flop

5-6 Master-Slave flip-flop

5-7 Use of flip-flops as a simple counter

Chapter 6 : Simplifying logic equations

6-1 Fundamental products

6-2 Simplifying logic equations using Karnaugh maps

AND-OR network

OR-AND network

NAND-NAND networks

NOR-NOR networks