WEEK 2

Digital Systems or Digital Circuits are divided into two main groups depending on whether or not they have the capacity to remember past events. Circuits that do not have this capacity are called “combinational circuits”, and circuits that do have the capacity for memory are called “sequential circuits”. In weeks 2, 3 and 4 we will be studying combinational circuits.

This week we’ll be learning:

- What combinational circuits are and how they can be described (pseudocode and truth tables).
- How to build combinational circuits using ROM memories.
- How to build combinational circuits using logical ports
- How we can use Boolean Algebra to increase the efficiency of circuits by reducing the number of ports and connections required, which in turn leads to less consumption and, finally
- Other basic elements like NAND, NOR, XOR, NXOR ports and tri-state buffers, which are often used in the design of combinational circuits.

As for the example-guide, this week we’ll be looking in depth at the specifications of the processor that we are going to design both structurally and functionally.

CONTENTS

		min (aprox)
L2.1	Combinational circuits	
	1. Combinational circuits	00:39
	2. Synthesis from tables	05:38
	2.1 Synthesis from tables : ROM	
	2.2 Synthesis from tables: Logic Gates	09:51
	Summary	22:32
L2.2	Boolean Algebra	
	1. Boolean Algebra	00:23
	2. Some useful properties	09:48
	3. Boolean functions and truth tables	15:19
	Boolean functions and truth tables (minterms)	16:39
	Boolean functions and truth tables (canonical representation)	18:41
	4. Example: 4 bit adder	22:20
	Summary	25:06
L2.3	NAND, NOR, XOR, NXOR, TRI-STATE	
	1. NAND,NOR	00:25
	NAND,NOR (universal modules)	01:31
	2. XOR, NXOR	07:27

	XOR, NXOR First example: Magnitude comparator	11:21
	XOR, NXOR Second example: Parity bit	13:31
	XOR, NXOR Third example: Arithmetic application	17:24
	3. Buffer tri-state, inverter tri-state	22:06
	Buffer tri-state, inverter tri-state (main application: BUS)	23:55
	Summary of most frequently used logic gates	26:22
	Summary	26:47
P2.1	Functional Specification	
	1. Instructions types	00:35
	2. Functional Specification	04:09
	Summary	12:16
P2.2	Structural Specification	
	1. Block diagram	00:50
	Internal data	03:14
	Data transfers	04:23
	Block diagram	06:14
	Instructions	06:24
	2. Block descriptions	07:20
	2.1 Input selection	08:09
	2.1 Output selection	08:09
	Summary	10:30