Istituto d'Istruzione Superiore Tassara - Ghislandi

Progetto ERASMUS+ KA1

UNITA' DI APPRENDIMENTO CLIL

Disciplina: Tecnologia elettrica ed elettronica

Argomento	**Logic gates**
Docenti coinvolti	Prof. Laini Stefano (Tecnologia elettrica ed elettronica)
Obiettivi	• Comunicare in lingua inglese, in forma scritta e orale, in modo chiaro, semplice, corretto e appropriato riguardo a tematiche del campo di specializzazione (porte logiche) • Individuare le principali porte logiche e conoscerne il funzionamento • Usare adeguatamente i sussidi e i materiali a propria disposizione • Utilizzare in modo sufficientemente autonomo e consapevole gli strumenti digitali • Mostrare consapevolezza e autonomia nello svolgimento delle attività assegnate • Collaborare e contribuire alla realizzazione di lavori a coppie • Interpretare in modo sufficientemente critico quanto viene letto o ascoltato
Abilità	• Descrivere in modo semplice e con terminologia tecnica appropriata il funzionamento delle porte logiche • Comprendere e completare un breve testo con le parole fornite • Guardare un video e ricavare informazioni dettagliate per rispondere a domande a risposta chiusa • Identificare le porte logiche attraverso la corretta simbologia
Conoscenze	• Terminologia di settore • Denominazione, simboli e funzionamento delle principali porte logiche
Destinatari	Studenti della classe 3 IeFP elettrico
Prerequisiti	• Conoscenza della Lingua Inglese a livello A2+ del QCER • Conoscenza dei microprocessori • Conoscenza dell'algebra di Boole • Conoscenza del codice binario
Tempi	4 ore
Strumenti	• Materiale autentico fornito dal docente • LIM • YouTube • Piattaforma Office 365 (TEAMS)

Students are asked to do the following activities.

Warm-up

1. **What is there in the picture? Share your ideas with your classmates.**

Presentation

2. **Read the text below and fill in the blanks with the words provided. Then check with your classmates.**

perform– arithmetic – instructions – running – operations – processes

A Processor (Control Processing Unit - CPU) is the logic circuitry that responds to and - _____the basic _____ that drive a computer. CPU will _____most basic_____, logic and I/O _____, as well as allocate commands for other chips and components _____ in a computer.

Practice

3. **Watch the video at this link https://www.youtube.com/watch?v=fw-N9P38mi4 and listen to the explanation carefully, then answer the true/false statements. Correct the false ones.**

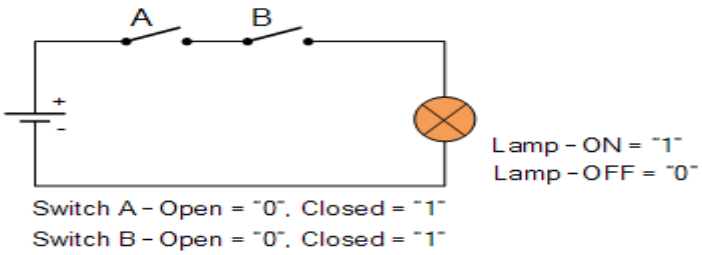
- The digit 1 means that electricity is flowing through a wire. T F
- Logic gates can modify the electric current. T F
- Logic gates can't work together. T F
- ENIAC was the first logic gate inside a computer. T F
- Valves are types of amplifiers and switches. T F
- A valve can be on but it can't be off. T F
- Valves in computers were big, slow to switch and became hot. T F
- Resistors replaced valves in computers in the 1950s. T F
- Resistors reduce the amount of the current flowing through a cable. T F
- Transistors were smaller, slower and more reliable. T F
- A NOT gate is a circuit which has an input and an output. T F
- In a NOT gate if you apply 1 at the input, you have 1 at the output. T F
- In a NOT gate you apply 0 at the input to obtain 1 at the output. T F
- A NOT gate works as an inverter. T F
- The AND gate and the OR gate have two inputs. T F
- In an AND gate you have 0 at both inputs to have 1 at the output. T F
- In an OR gate if you apply 0 and 1 at the inputs, you obtain 0 at the output. T F
- In an OR gate you apply 0-1 or 1-1 at the inputs to have 1 at the output. T F

4. **In pairs check your answers, then verify them with the classmates and the teacher.**

Production

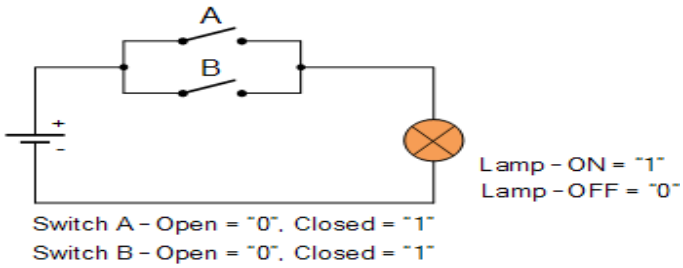
5. Work in pairs. Look at the three circuits below and describe them briefly in your own words. Use the information in the truth tables.

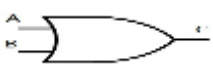
Circuit no.1



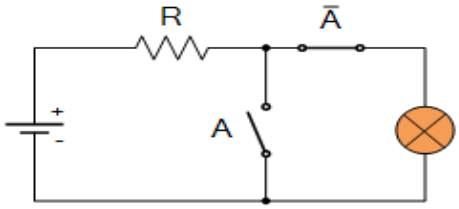
AND Truth Table			
Switch A	Switch B	Output C	Description
0	0	0	A and B are both open, lamp OFF
0	1	0	A is open and B is closed, lamp OFF
1	0	0	A is closed and B is open, lamp OFF
1	1	1	A is closed and B is closed, lamp ON
Boolean Expression (A AND B)			A. B
Symbol			

Circuit no.2



OR Truth Table			
Switch A	Switch B	Output C	Description
0	0	0	A and B are both open, lamp OFF
0	1	1	A is open and B is closed, lamp ON
1	0	1	A is closed and B is open, lamp ON
1	1	1	A is closed and B is closed, lamp ON
Boolean Expression (A OR B)			A + B
Symbol			

Circuit no.3

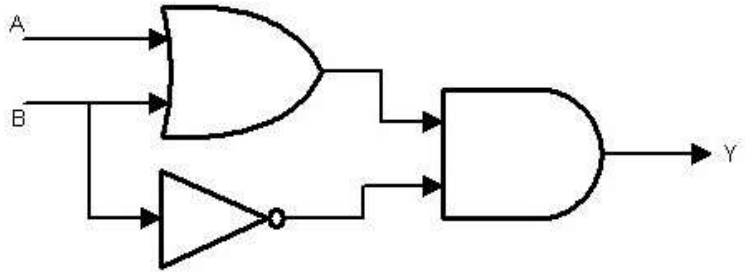


Switch A – Open = "0", Lamp – ON = "1"
Switch A – Closed = "1", Lamp – OFF = "0"

NOT Truth Table	
Switch	Output
1	0
0	1
Boolean Expression	not-A or A
Symbol	

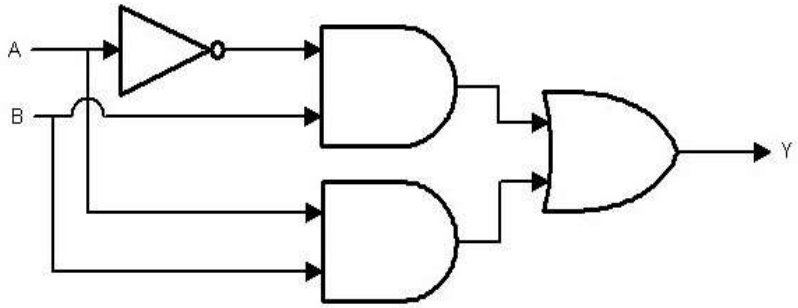
6. In pairs build truth tables for the two following logic circuits.

Circuit no.1



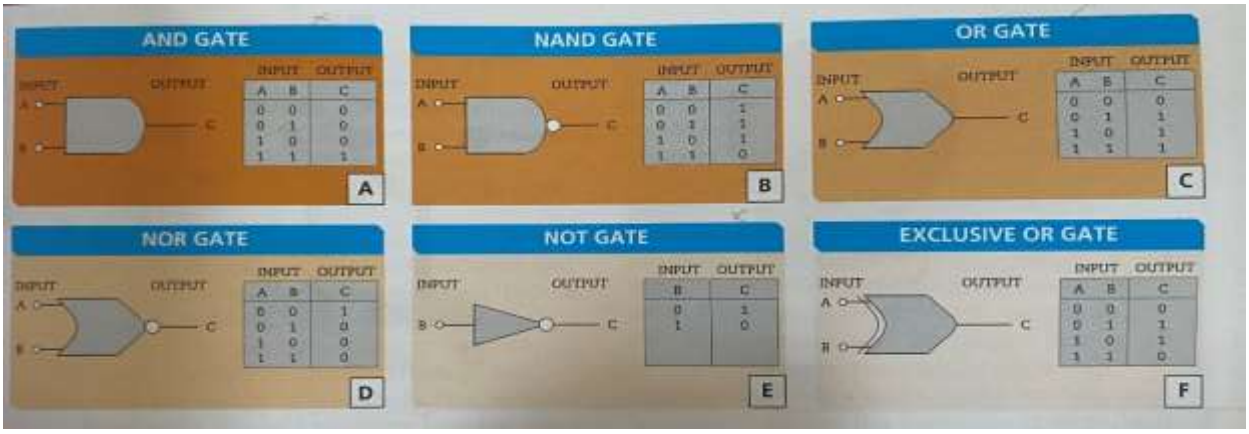
Switch A	Switch B	Output y	Description

Circuit no. 2



Switch A	Switch B	Output y	Description

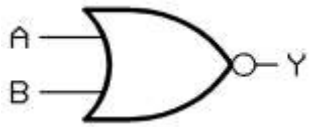
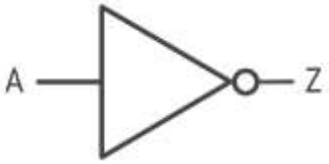
7. Match each truth table (A-F) with the correct description. Then check with your classmates.



1. □ This gate always produces an output which is on except in one case: when both the inputs are on.
2. □ This gate gives an output which is on when either of the inputs is on but not when both of them are on. If both inputs are off, the output is also off.
3. □ This is the simplest gate, with only one input. It produces an output which is on if the input is off and vice versa. For this reason it is called an inverter.
4. □ With this gate both inputs must be on to produce an output which is on. In all other cases the output is off.
5. □ The circuit is similar to NOT gate but it has two inputs. If either or both of them are on, the output is off. For the output to be on, both inputs must be off.
6. □ This gate has the opposite function to a NOR gate. The output is on when either of the inputs is on and also when both of the inputs are on.

Evaluation

8. Complete the following table with the missing information about the logic gates you have studied.

Logic gate	Symbol	Description
		
		Output is at logic 0 when one or more of its inputs are at logic 1. If all the inputs are at logic 0, the output is at logic 1.
EXCLUSIVE OR		
		
		Output is at logic 1 when one or more inputs are at logic 1. If all inputs are at logic 0, the output is at logic 0.
AND		