



Institute of Technology of Cambodia



Department Telecommunication and Networking

Report: Analog Electronic

Lab2: NPN Transistor

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I. Objective

The objective of this experiment is to study and understand the behavior and characteristics of a transistor under different operating conditions.

II. Material

This experiment requires the following components:

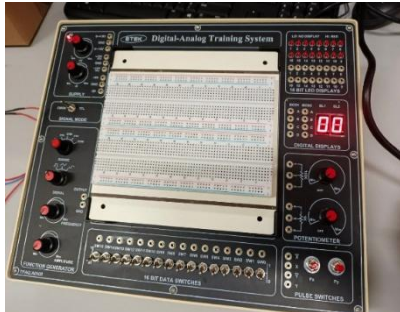


Figure 1: Analog experimental board

- **Analog experimental board** is used for prototyping electronic circuits. It allows for quick construction of temporary circuits with components and jumper wires. Breadboards enable testing and modifying designs before creating a permanent PCB version.



Figure 2: Wire connector

- **Wire connector** is used for temporary connections in a circuit. It usually has connectors at both ends and is often used in prototyping and troubleshooting.

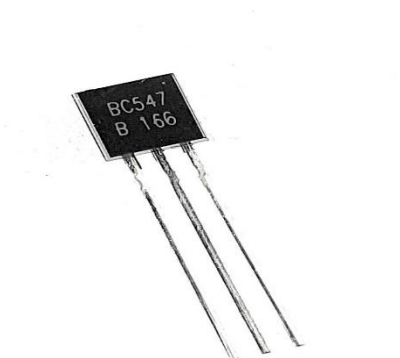


Figure 3: NPN transistor(2N2222)

- **NPN transistor (2N2222)** is used for amplification we can amplify weak electrical signals, making them stronger or as switching we can act as electronic switches, controlling the flow of current.

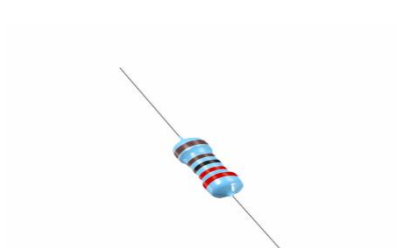


Figure 4: Transistor

- **Resistors** is important in electrical circuits for current limiting, voltage division, signal conditioning, power dissipation, biasing components, impedance matching, pull-up/down, timing circuits, and temperature sensing. In this experiment we need two resistors.



Figure 5: Oscilloscope

- **Oscilloscope** is a key electronic tool for observing and measuring changing voltage signals over time.



Figure 6: Multimeter

- **Multimeter** is a versatile electronic measuring instrument used for diagnosing electrical circuits and components.

III. Procedure

A. Transistor characteristic

We will construct a circuit as shown in Figure 7. Then, we vary the input voltage and measuring the output and current accordingly.

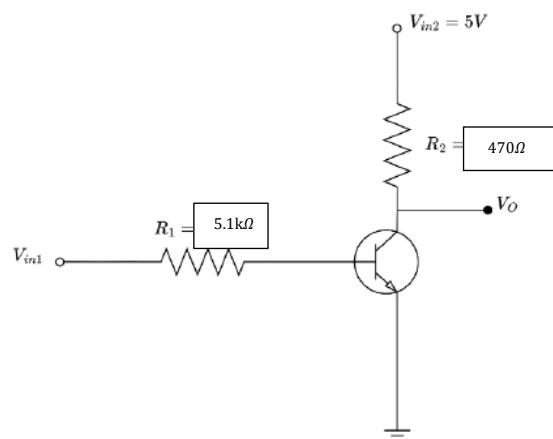


Figure 7. Emitter base configuration

- This is the process to do in this experiment:

We take all the components from teacher. Then, we test it does it work or not by using multimeter if it doesn't work, we should tell teacher and change it. After that, we start ware the circuit on the **Analog experimental** when we use transistor, we should know which one is Emitter, Base, and Collector by using **datasheet** for the P2N2222A based on the datasheet we will know. According to the Figure 7 we connect the input1 voltage that we can change value to the first resistor1 (5.1KΩ) and also connect to the Base of transistor. Then, we connect voltage input2 that it is constant (5V) to the resistor2 (470Ω) and also connect to Collector of the transistor for the Emitter of transistor we connect to ground (GND). After we already

ware in the **Analog experimental**, we use Oscilloscope for measure the input voltage and output voltage that we use two oscilloscope probes by using one for signal input and one more use for signal output and we connect to Oscilloscope in CH1 and CH2. Than, we open the both Chanel and we put it in the same voltage for CH1 and CH2. Finally, we observe to the voltage in screen of Oscilloscope.

IV. Result and Conclusion

Here is my result:

Table 1. Measurement result

Vin[V]	Vout[V]
1	3.78
2	3.36
3	2.56
4	2.01
5	1.75
6	1.04
7	0.143
8	0.11
9	0.09
10	0.06
11	0.04
12	0.012

Based on the Table 1, this transistor operates as either a current-controlled (BJT) or voltage-controlled (FET) element, which allows it to act as an amplifier or a switch, depending on its configuration and the input characteristics used.

