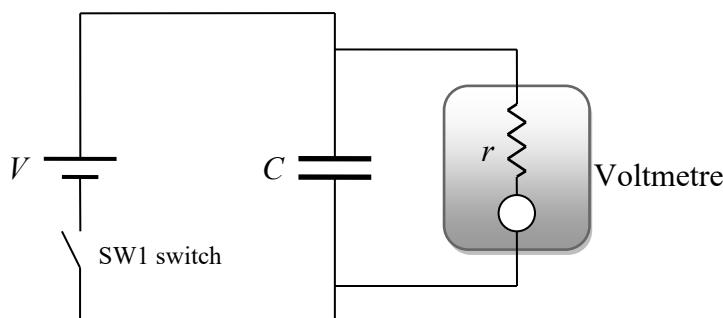


PROCEDURE

In this experiment you will construct circuits that involve a battery, a capacitor and a resistor to study the charging and the discharging of capacitors. Make sure you understand the steps involved and have all the items required. If you have any question or concern, please contact your tutor.

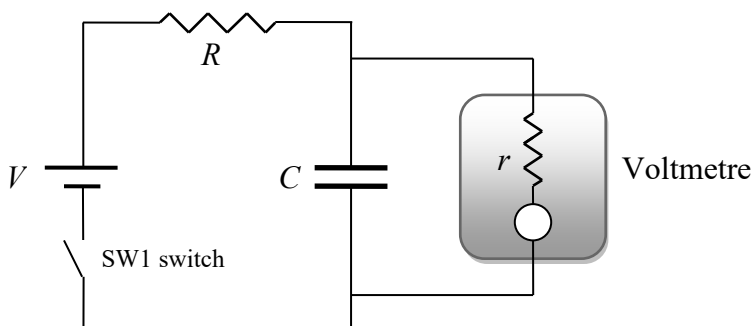
Part I: Discharging of a Capacitor



1. Construct the circuit whose schematic diagram is shown above, using the $10\ \mu\text{F}$ capacitor. Set the Multimeter to measure the voltage across the capacitor (see Pic 1). Note that the resistor r shown in the diagram is the voltmeter's internal resistance, which is expected to be very large.
2. When the SW1 switch is closed the capacitor will charge instantaneously and the voltmeter reading should be equal to that of the voltage across the battery (about 3V). Record this initial voltage reading in the first row in the Table below.
3. The discharging of the capacitor can be done through the Voltmetre's internal resistance and, therefore, no external resistance is necessary. To begin, open the SW1 switch and immediately start the stopwatch. Record the times when the voltage across the capacitor decreases to the values indicated in the table below.

Time (s)	Capacitor voltage (V)
0	
	2.5
	2.0
	1.75
	1.50
	1.25
	1.00
	0.75
	0.50
	0.25

Part II: Charging of a Capacitor



1. Construct the circuit whose schematic diagram is shown above (see Pic 2). Note that R is the large ($10\text{ M}\Omega$) resistance provided separately from the circuit board (see Pic 3). Set the Multimetre to measure the voltage across the capacitor. The reading of the Voltmetre should be near zero before you close the switch and begin the experiment. If it is not, use a wire to short-circuit the connection across the capacitor (see Pic 4) and insure that the capacitor is completely discharged.
2. To begin charging the capacitor, close the SW1 and, at the same time, start the stopwatch. Record the times when the voltage across the capacitor increases to the values indicated in the table below. Note that, in this circuit, the voltage across the capacitor will not reach that of the battery (i.e. 3 V). Actually, it will only reach about half of this value!

Time (s)	Capacitor voltage (V)
0	0
	0.50
	0.75
	1.00
	1.25
	1.35
	1.40
	1.45