CHARGING AND DISCHARGING OF SUPERCAPACITOR

AIM:

To find out the time constant of a supercapacitor from the charging and discharging characteristics of a supercapacitor.

APPARATUS:

Commercial setup with following components: Supercapacitor (100F) , Resistors 3Ω and 5.8 Ω, Regulated power supply V_s (1.5 V & 2.5V) with Ammeter and Voltmeter and stopwatch.

THEORY:

The charging of capacitor is represented by the relation

$$V = V_s(1 - e^{-t/RC}) \quad \text{..... (1)}$$

Where V is the charge on the plate at time t and V_s is the supply voltage

The discharging of capacitor is represented by the relation

$$V = V_0 e^{-t/RC} \quad \text{---------- (2)}$$

Where V is the charge on the plate at time t and V_0 is the initial maximum voltage while discharging.

OBSERVATIONS:

Sr.No.	Charging			Discharging		
	Time (sec)	Voltage (volts)	Current (Amp)	Time (sec)	Voltage (volts)	Current (Amp)
1						
2						
3						
4						
5						
6						
7						

8						
9						
10						
11						
12						

RESULT:

Theoretical value of time constant:

Graphical value of time constant

From charging characteristics (V against Time):

From discharging characteristics (V against Time):

Mean graphical value of time constant:

Percentage error: