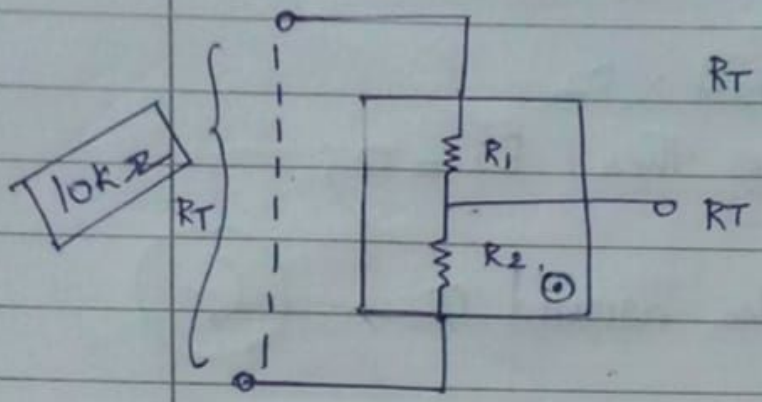
Module – 12

POTENTIOMETER



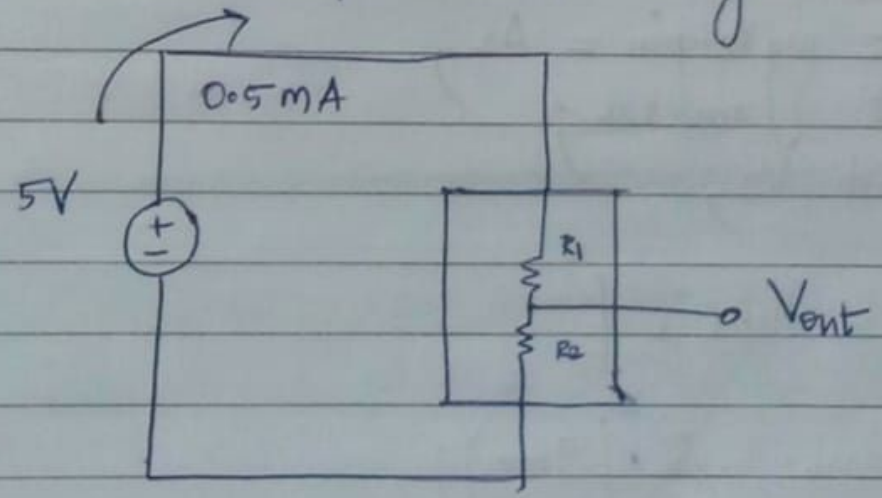
$R_T = R_1 + R_2$

(↓) When $R_2 = 0$; $R_1 = R_T = 10K\ \Omega$

(↑) When $R_2 = 5K\ \Omega$; $R_1 = 5K\ \Omega$

(↑) $R_1 = 0$; $R_2 = R_T = 10K\ \Omega$

Lets make simple Circuit Analysis :



$$I = \frac{V}{R} = \frac{5V}{10K} = 0.5\ m\ Amps$$

$$0.5 \times 10^{-3}\ A$$

$V_{out} = I \times (R_{Total} \Omega)$

$V_{out} = 5mA \times R_2$

if R_2 is low then $R_2 = 0$;

- Vout will be around 0. (5)

If R_2 is Fixed and turned to Max

- Vout will be around 5V. (7)

Therefore the Vout will be around 0 - 5V

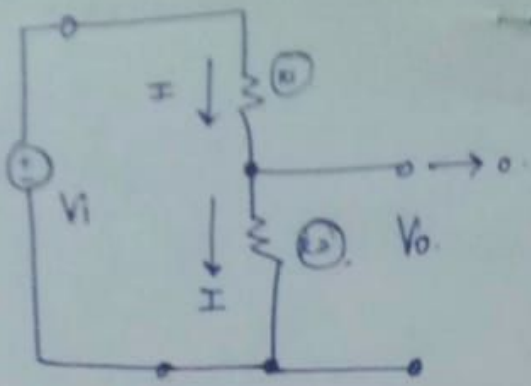
```
int myVoltpin = A2;
int readVal;
float V2;

Void setup() {

Serial.begin (9600);
}

Void loop() {
readVal = analogRead (myVoltpin);
V2 = (5.0/1023.0) * readVal; }
```

Voltage divider



Equating ① & ②

$$\frac{V_{in}}{R_1+R_2} = \frac{V_o}{R_2}$$

$$V_o = \frac{V_{in} \cdot R_2}{R_1+R_2}$$

ohms law

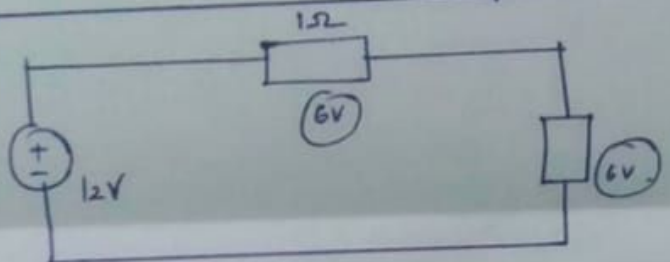
$V = IR$

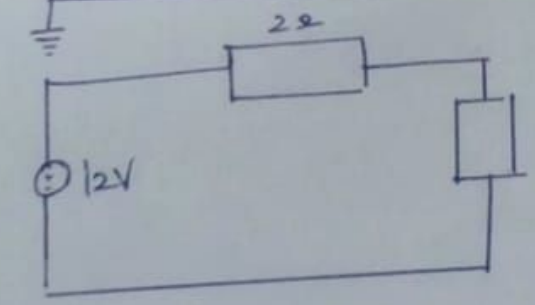
$V_i = i(R_1+R_2)$

$$i = \left(\frac{V_{in}}{R_1+R_2}\right) \quad \text{—— ①}$$

$$V_o = i R_2$$

$$i = \frac{V_o}{R_2} \quad \text{—— ②}$$





Voltage across any resistor = (Total Voltage / Total Resis) * Resistor of concern

Voltage across 2Ω

$= \frac{12}{12} * 2\Omega$

$= 2$ Volts.

$R_2 = R_1 \times$ Desired Vout / (Vin − Vout)

Voltage across 10Ω.

$= \frac{12}{12} \times 10.V$

$= 10$ Volts