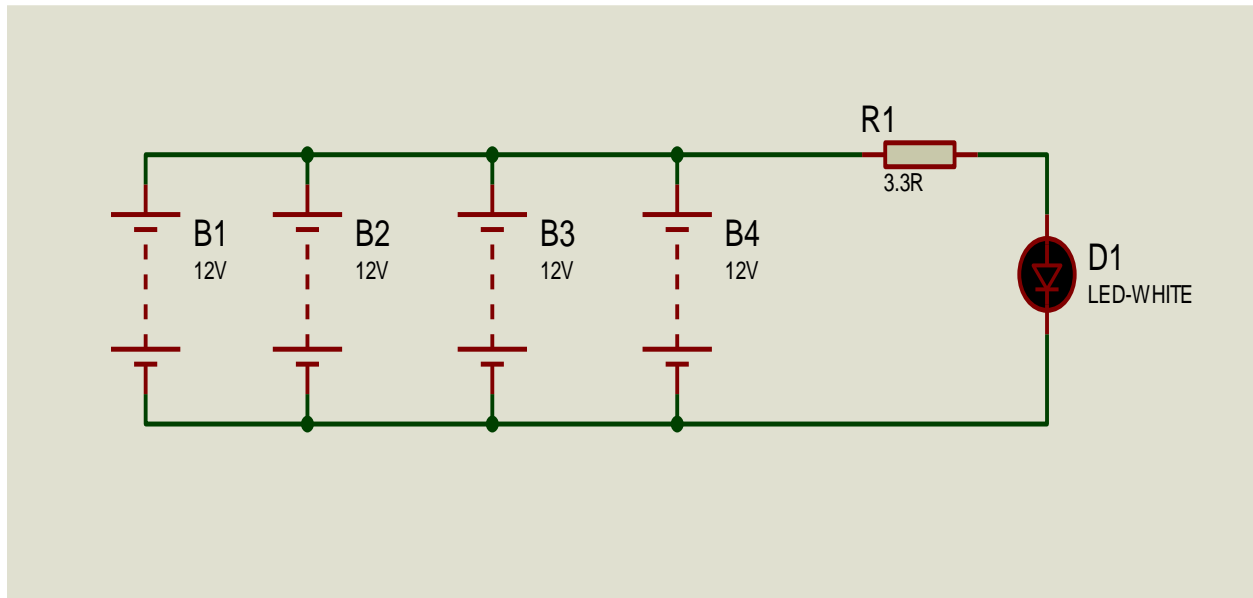


Task 2.3: Box of Shame



Given that:

$R = 3.3 \text{ ohm}$, $V = 12 \text{ volt}$, Capacity = 5200 mAh

- 1) From ohm's law, calculate the current through the LED -ideal- and resistor.

$$I = V / R = 12 / 3.3 = 3.636 \text{ A}$$

- 2) Calculate the Energy.

$$E = V I t = 12 * 3.636 * 5 = 218.18 \text{ watt.hr}$$

- 3) Calculate the actual capacity used in the process.

$$C = (5200 / 1000) * 0.8 = 4.16 \text{ Ah}$$

Note:

- To convert from mAh to Ah, we divide the value by 1000.
- The battery must recharge when it reaches 20% of its maximum value so we only use 80% of its value.

4) Derive number of batteries from the relation between Total Energy and total Capacity ($C = I t$)

$$N * C (\text{single Battery}) * V = E (\text{total energy})$$

$$N = E / (C * V) = 218.12 / (4.16 * 12) = 4.37 \text{ battery.}$$

The total number of batteries that last 5 hours is 5 batteries connected in parallel.

BMS

It is an electronic system designed to monitor and control rechargeable batteries. Its primary function is to ensure the safe and efficient operation of the battery pack by monitoring various parameters and taking appropriate actions to protect the battery cells.

There are various types of BMS:

- Passive BMS: A passive BMS uses passive components like resistors for cell balancing.
- Active BMS: An active BMS employs active components like switches or DC-DC converters for cell balancing.

