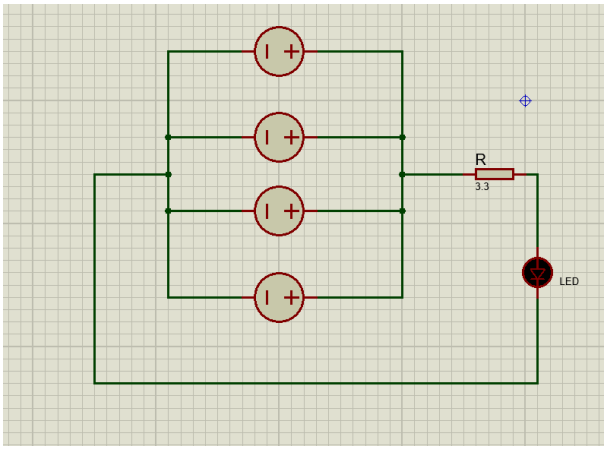

Current = V/R = 12/3.3 = 3.636 A

Energy = current x voltage x time = 3.636 * 12 * 5 = 218.18 Wh

Required battery capacity = energy / voltage = 218.18 / 11.1 = 19.656 Ah

Number of batteries = req. cap/batt. Cap = 19.656 / 5.2 = 3.78 ≈ 4 batteries

A Battery Management System (BMS) is crucial for protecting batteries, especially when connected in parallel. To solve the issue of differing voltages in parallel batteries, a BMS ensures safe operation:

- **Balancing Circuits:** Use individual balancing circuits for each battery, transferring energy to balance voltages.
- **Voltage Monitoring:** Implement continuous voltage monitoring to detect differences and trigger balancing.
- **Stable Reference:** Employ a stable voltage reference for accurate measurement.
- **Microcontroller:** Integrate a microcontroller to manage balancing and communicate with external systems.
- **Overcurrent Protection:** Include fuses or breakers to prevent excessive current.
- **Temperature Monitoring:** Monitor temperature and adjust charging/discharging accordingly.
- **Communication:** Add an interface for external monitoring and control.
- **Isolation:** Ensure separation between battery packs and circuits for safety.