

TECHNOLOGY TEST

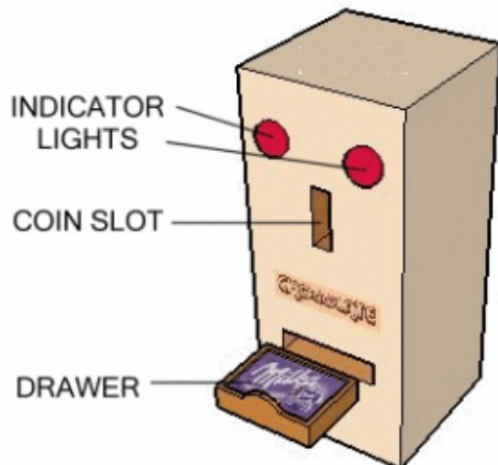
SENSORS

3RD COURSE

Name:

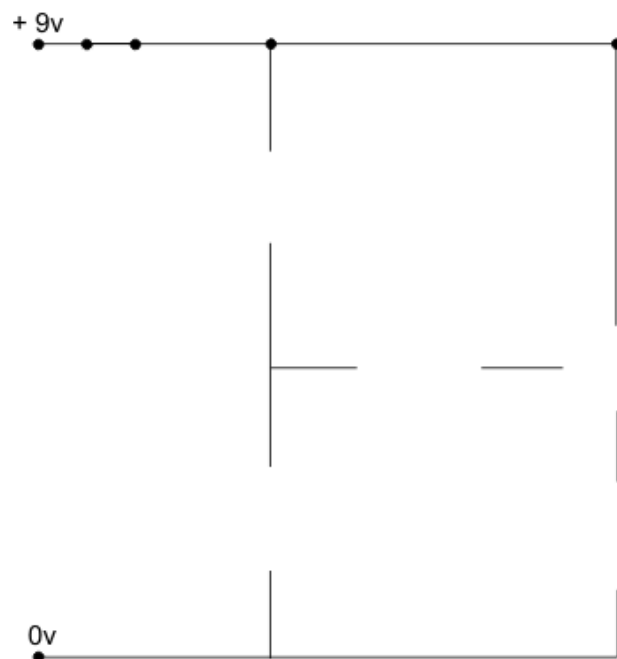
Group:

1. Below is a typical bar dispenser. It includes a light sensor that detects when the dispenser needs filling



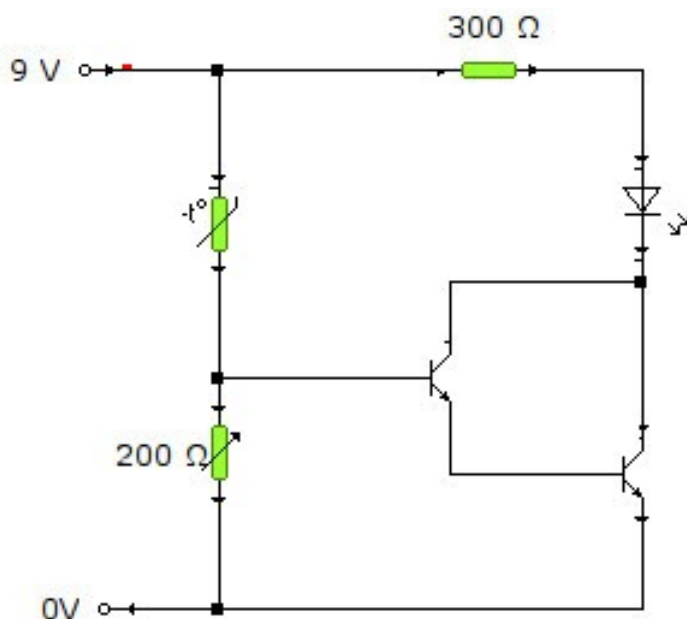
The circuit diagram below is incomplete.

- Add all the missing components. Include the following components: 1 LDR, 1 fixed resistors, 1 potentiometer, 1 npn transistor and a relay that is energized when light is sensed.
- Explain how the circuit works

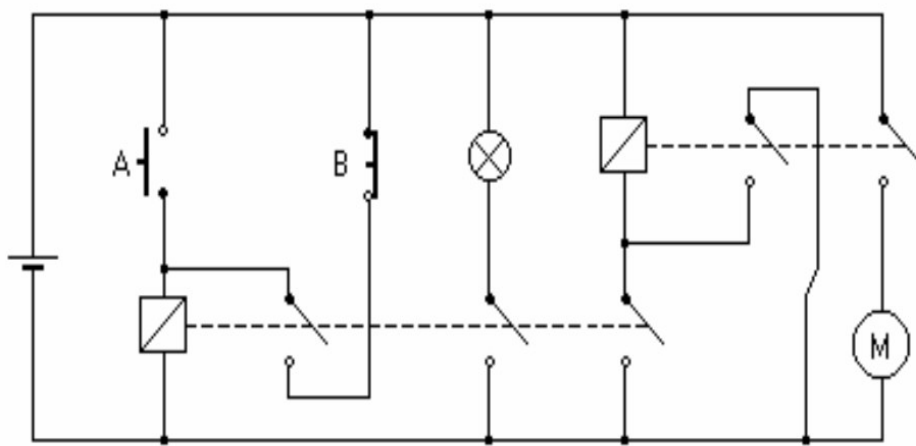


2. In the circuit below

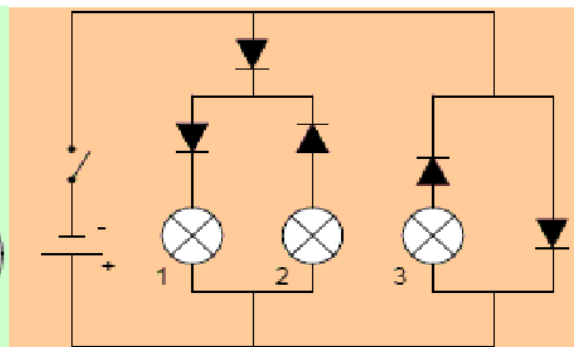
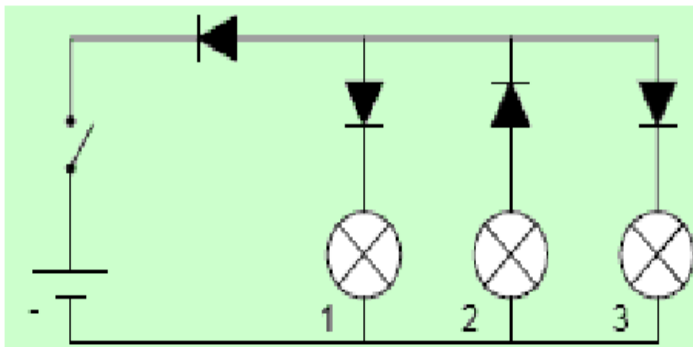
- Identify all the components
- Explain how the circuit works



LIGHT SENSOR CIRCUIT



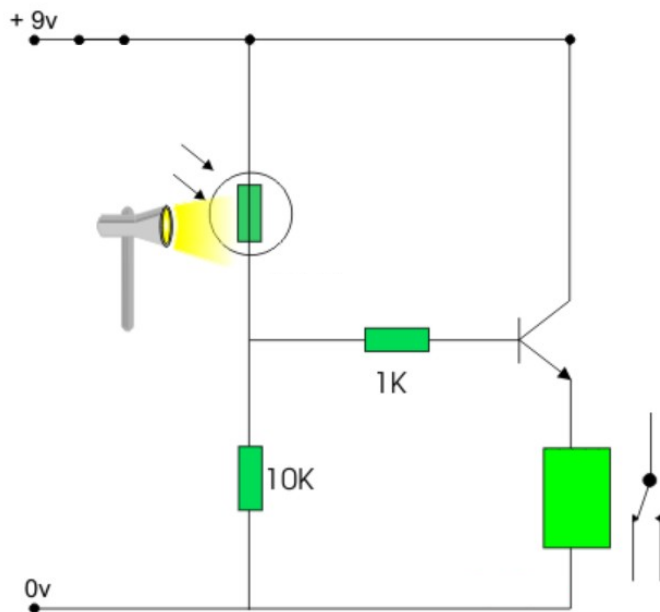
3. In the circuit above, what elements work if:
- You do not press anything
 - You press A
 - You do not press A
 - You press B
 - You do not press B
 - Is there a hooked element? Which one?
 - If there is any hooked element, indicates how unhooking in the schema
4. What bulbs are or when I press the switches?. Justify your answer



SOLUTION

1.

a.



b.

With light, the resistance of the LDR is small --> There is a base current different from zero --> Transistor is conducting current --> Relay is activated

In the darkness, the resistance of the LDR is huge (several million ohms) --> the current in the base is zero --> Transistor does not conduct (Cut-off) --> Relay is deactivated

2. a. Theory

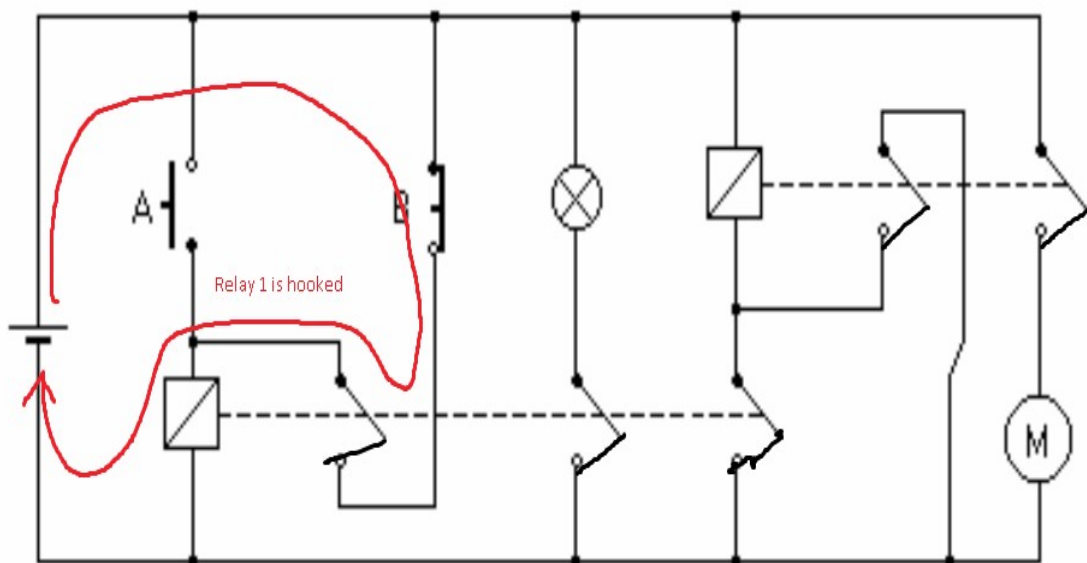
b. **Temperature high** → The NTC resistance is low → There is a base current different from zero → Transistor conducts from collector to emitter → LED is on

Temperature low → The NTC resistance is high → The base current is almost zero → Transistor does not conduct from C to E → LED is off.

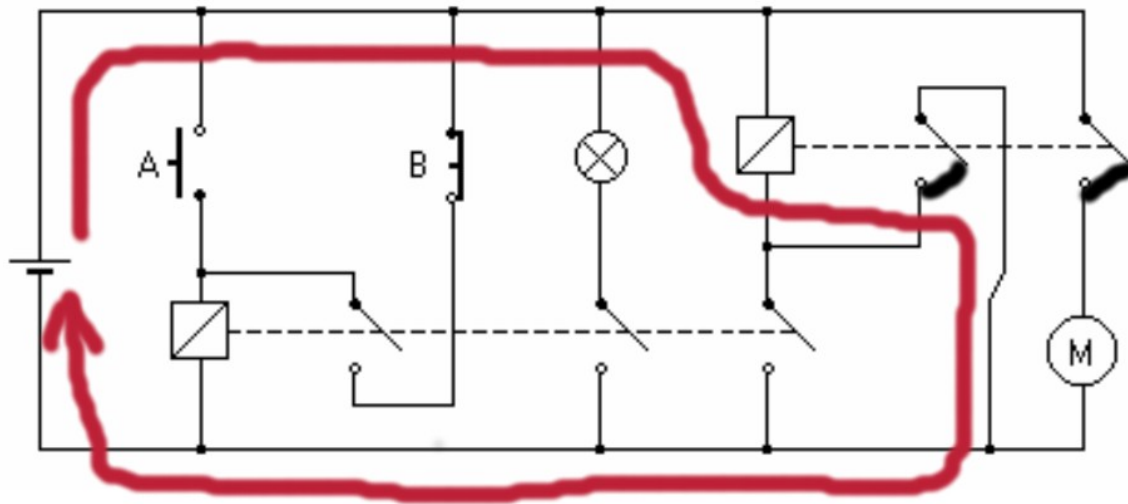
3. a. Nothing is working (all the switches are open)

b. Relays one and two activated, so all the switches are close → bulb and motor on

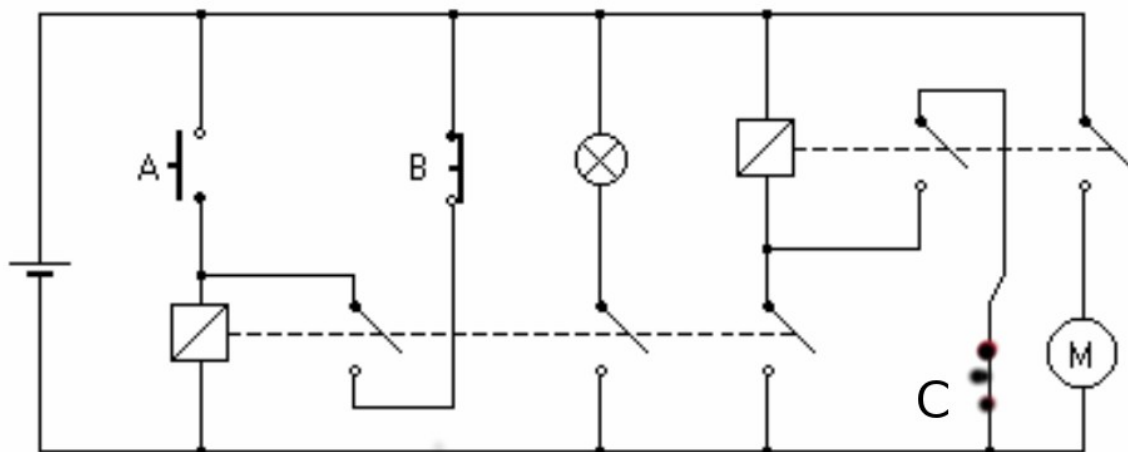
c. The first relay is hooked → Relay 2 is activated → Nothing changes



d. The first relay is unhooked but not the second one --> Motor is on



- e. The second relay goes on hooking --> Nothing changes
- f. Obvious, the second relay --> Motor keeps spinning.
- g. You need a push-to-break (C) for the second relay



4. Remember, the direction of the current is from positive terminal to negative one.
The diodes I circle don't let the flow of the current (They are the key ones). So,
- a. All the bulbs are off
 - b. Bulb number 3 is on

