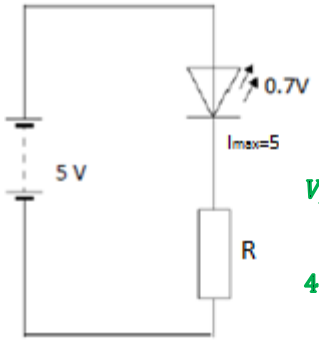
5. ELECTRONIC CIRCUITS

1. Electronic Circuit Symbols

Symbol	Component	Function	Example Application
	diode	controlling current direction	a.c. to d.c adapters
	light emitting diode (LED)	producing light	on/off indicator lights
	microphone	converting sound to electrical signals	telephone
	loudspeaker	producing sound	headphones
	photodiode	detecting light	light gate
	fuse	limiting current	standard U.K. plug
	capacitor	storing charge, smoothing, time delays	various
	thermistor	detecting temperature changes	thermostats → TURD
	light dependant resistor (LDR)	detecting light changes	street lighting → LURD
	relay	circuit connecting switch	car ignition
	NPN transistor	controllable switch	logic gates, computers
	MOSFET transistor	controllable switch	logic gates, computers
M	motor	producing rotational motion	electric car

2. LEDs and Diodes

The diode and the LED in the above list are very special. They only allow current to flow in one direction.
The resistor protects the diode ensuring that the p.d. across it, and the current through it are limited.



Calculate the resistance R.

$$V_R = V_s - V_{led}$$
$$V_R = 5 - 0.7 = 4.3V$$

$$V = IR$$
$$4.3 = 50 \times 10^{-3} \times R$$
$$R = 86\Omega$$

N5 Past Papers to complete:
2014 – SecB Q2
2016 - MC Q1 SecB Q3c
2017 – MC Q4

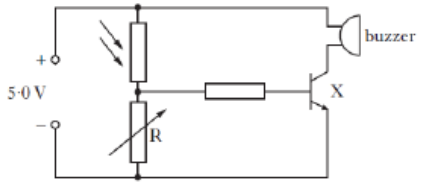
- Light level decreases
- Resistance of the LDR increases
- Voltage across the LDR increases
- The transistor switches on
- Current flows through the relay coil
- Creating a magnetic field
- Relay switch closes
- Current flows
- Motor switches on

3. Transistor Circuits

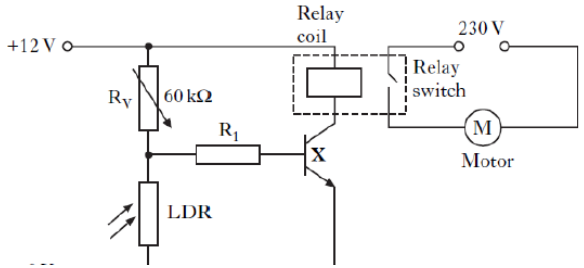
The NPN or MOSFET transistor can be used as a digital switch.

Example 1

A photographic darkroom has a buzzer that sounds when the light level in the room is too high.
The dark room door is opened and the light level increases.
Explain how the circuit operates to sound the buzzer.



- Resistance of LDR decreases
- Voltage across LDR decreases
- Voltage across variable resistor, R increases
- When the voltage across the variable resistor reaches 0.7V, the transistor switches the buzzer on.



An automatic hand dryer used in a washroom is shown in the diagram below.
Inserting hands into the dryer breaks a light beam, this is detected using a light dependent resistor (LDR). Explain how the motor to activate the hand dryer works.

ANSWER