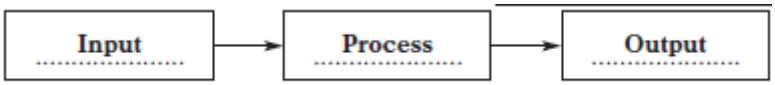
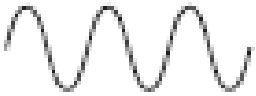
Electronics Answers – NAT 5

1) a)



b) i)

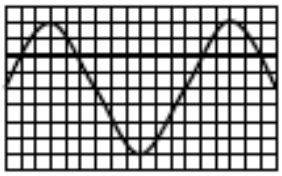


ii)

2) a) Buzzer or loudspeaker.

b) i) Screen 1.

ii) Frequency is constant but the amplitude is greater.



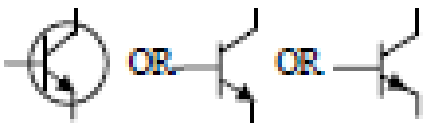
3) a) 0.015A.

b) i) An electronic switch.

ii) The lamp lights when the temperature becomes too high.

4) a) i) The voltage **increases gradually** from 0v to 5V..

ii)



iii) An electronic switch.

b) i) Reading increases.

ii) 0.005A ($5x10^{-3}$A)

5) a) i) A change in temperature.

ii) An electronic switch.

iii) The lamp will come on **or** go off.

iv) This involves any application where temperature needs to be monitored.

e.g Oven, incubator, greenhouse, freezer , heating system etc

b) Any **two** of 7 segment display, LED, relay or solenoid.

6) a) The resistor reduces the **current flowing through** the LED **or** reduces the **voltage dropped across** the LED.

b) 42.5Ω.

7) a) 21,600C.

b) 400Ω.

8) a) The resistor reduces the **current flowing through** the LED **or** reduces the **voltage dropped across** the LED, to protect the LED.

b) 500Ω.

c) 200mA = 0.2A.

9) a) i) Transistor.

ii) An electronic switch.

b) As the light level increases the resistance of the LDR decreases.

As the resistance across the LDR decreases, the voltage across the LDR decreases.

As the voltage across the LDR decreases the voltage across the variable resistor R increases.

When the voltage across the variable resistor R reaches **0.7V**, the transistor conducts and switches on.

A current will flow through the buzzer, which will then sound.

c) 80 units R_{LDR} = 2500Ω. Total Resistance = 3070Ω.

Current = 1.63mA **or** 1.63 x 10^{-3}A.

d) The variable resistor is used to set the light level at which the transistor will switch on **or** to set the level at which the buzzer will sound.

10) a) 0.75V.

b) Transistor.

c) As the light level decreases, the resistance of the LDR increases.

As the resistance of the LDR increases, the voltage across the LDR increases.

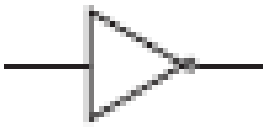
When the voltage across the LDR increases above 0.7V, the transistor will switch on.

The relay coil is now energised and will close the relay switch.

The relay circuit is now complete and a current will flow through the motor, which will now activate.

11) a) AND gate.

b) i)



ii)

Input	Output
0	1
1	0

c) i) P -> 1, Q -> 0 and R -> 1.

ii) An electric motor or a solenoid.

12) a) The voltage **gradually rises** from 0V to 6V.

b) Reduce the resistance **and** reduce the capacitance in the voltage divider.

c) i) 5.3V.

ii) 7000Ω.

13) a) MOSFET.

b) Voltage decreases.

c) i) 12 – 2.4 = **9.6V**

ii)

$$\frac{V_1}{V_2} = \frac{R_1}{R_2}$$

$$\frac{9.6}{2.4} = \frac{5600}{R_2}$$

$$R_2 = 1400\Omega$$

d) Lamp stays on

- As Temperature falls R_T rises
- As R_T rises V_T rises
- As $V_T > 2.4V$ (switching voltage)