1. Determine the current supplied by each of the three batteries shown in Figure 1. Also, determine the power dissipated in each of the two resistors.
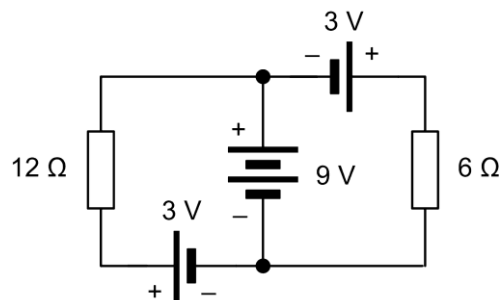

Figure 1 *See Question 1*

2. Determine the energy stored in a 680 µF capacitor when charged from a 400 V DC supply. If the capacitor is subsequently discharged through a 1 MΩ resistor, determine the time taken for the capacitor voltage to fall to less than 50 V.

3. A 22 µF capacitor is connected to a 12 V, 50 Hz AC supply. Determine the current flowing in the capacitor. Explain why the capacitor doesn't get hot.

4. Part of a repetitive pulse waveform is shown in Figure 2. What is (a) the period; (b) the pulse repetition frequency; (c) the mark-to-space ratio; and (d) the duty cycle of the waveform. Over one complete cycle what will the average voltage of the waveform be?
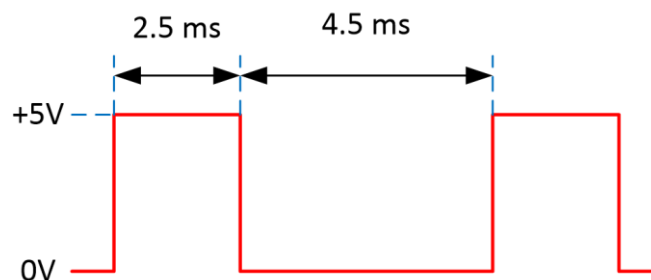

Figure 2 *See Question 4*

5. Identify the component shown in Figure 3. Sketch the circuit symbol for this component and briefly describe one typical application for it.
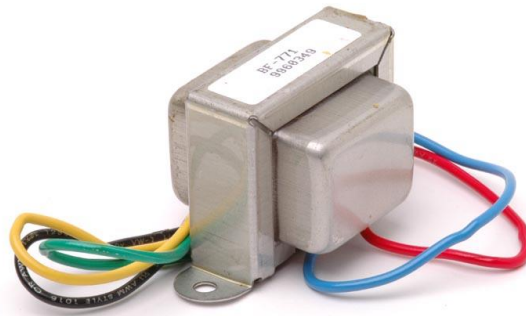

Figure 3 *See Question 5*

6. A transistor operates with a collector current of 15 mA and a base current of 75 μA. Determine common-emitter current gain and value of collector current that would flow if the base current increases to 100 μA.
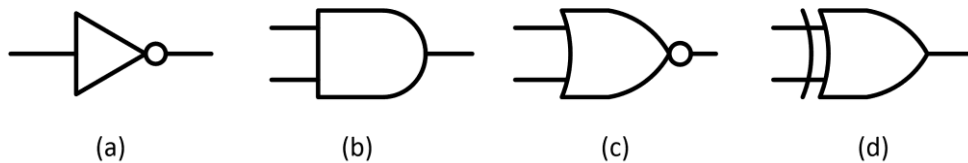
7. Identify each of the logic gates shown in Figure 4.

(a)   (b)   (c)   (d)

Figure 4 *See Question 7*

8. Sketch the circuit symbol for an operational amplifier and show how it can be used as a simple fixed-gain inverting amplifier.

9. Sketch the circuit diagram of a monostable timer based on a 555 device. Explain, briefly, how the circuit operates.

10. Convert (a) F6 hexadecimal to binary; (b) 10011010 binary to hexadecimal; (c) 7E hexadecimal to decimal; and (d) 34 decimal to binary.