



General Certificate of Secondary Education

Electronic Products 2013

Year 10 Autumn Half Term - Mock Exam

Unit 1 – Written Paper

Time allowed; 1 hour

Total; 60 Marks

Instructions

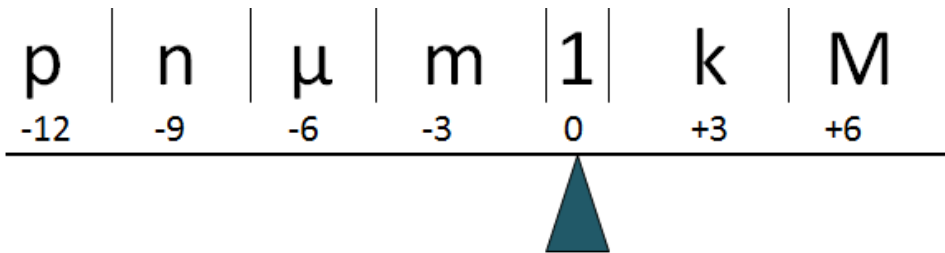
- Use black ink or black ball-point pen.
- Fill in the boxes at the bottom of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this answer book. Cross through any work you donot want to be marked.
- Complete the extension question if extra time remaining

Surname		
Other Names		
Candidate Signature		
Total Mark (0/60)		



Useful Information;

$$V_{out} = V_{in} \frac{R_2}{(R_1 + R_2)}$$



Time Constant (s); Resistance (Ω) X Capacitance (F)

Potential Difference (V) = Current (A) / Resistance (Ω)

Colour	Band 1	Band 2	Band 3 (No. of 0s)	Band 4 (Tolerance)
Black	0	0	None	
Brown	1	1	0	
Red	2	2	00	
Orange	3	3	000	
Yellow	4	4	0000	
Green	5	5	00000	
Blue	6	6	000000	
Violet	7	7	–	
Grey	8	8	–	
White	9	9	–	
				Gold = 5%
				Silver = 10%

1 (i) In a DC power supply many components ensure the correct voltage is delivered to the product.

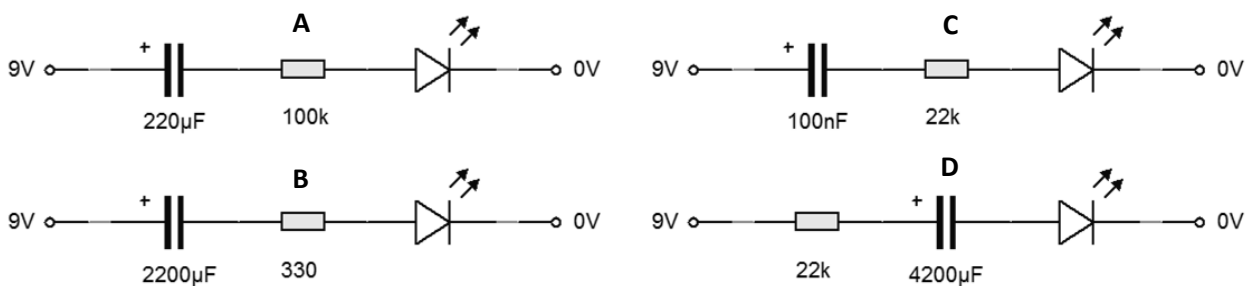
Explain the purpose and function of a Bridge Rectifier _____

(3 marks)

1 (ii) State the purpose of an electrolytic capacitor in a DC PSU _____

(1 mark)

1 (iii) A designer is looking to redesign a new Iron to improve the products safety. He wants a warning light to stay on after use to protect the user from contact with the hot Iron.



Which combination will be keep the LED on the longest _____

(2 marks)

1 (vi) Suggest two different ways the designer could make the LEDs flash on and off automatically.

An example is given below:

Use a flashing LED in series with other LEDs.

1 _____

2 _____

(2 marks)

2 Electronic component values are displayed in SI units and are shortened depending on the value.

Calculate the following equations using; $V = I / R$

(i) $I = 80\text{mA}$ $R = 22\text{K}$ $V = \underline{\hspace{2cm}}$ (1 mark)

(ii) $I = 2\text{A}$ $R = 20\text{M}$ $V = \underline{\hspace{2cm}}$ (1 mark)

Present the following in whole numbers; (4 marks)

(iii) 2200uF _____ (v) 100nF _____

(vi) 50mA _____ (vii) 120Mk _____

3(i) Name a component which can be used as an input device to switch the LEDs on automatically when it gets dark.

(1 mark)

3(ii) Explain how your chosen device reacts to changes in light levels.

(2 marks)

4 Name an electronic component which best fits each of the descriptions given below:

(i) It emits light when a current flows from the anode to the cathode.

(1 mark)

(ii) Its resistance decreases as the temperature increases.

(1 mark)

(iii) It has two connections and stops a current flowing when it is pressed.







(1 mark)

(iv) It has three connections called Anode, Cathode and Gate.

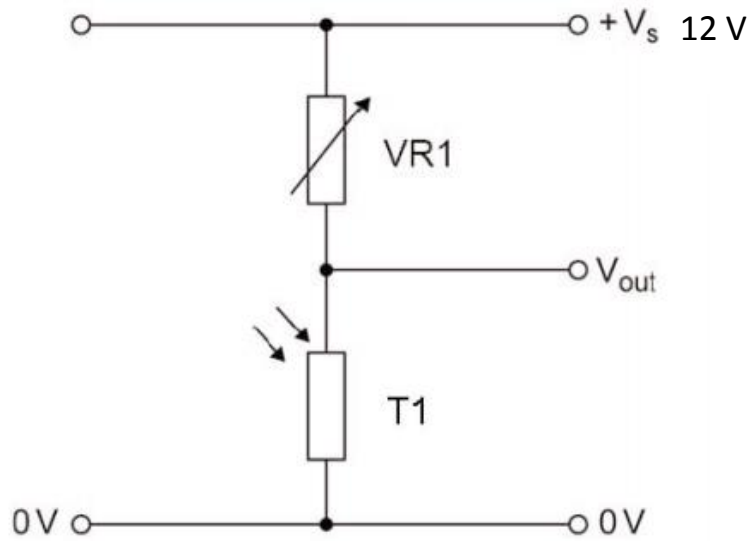
(1 mark)

5 Draw the Schematic Symbols for the following components;

(6 marks)

<p><i>i</i></p> 	<p><i>i</i></p>	<p><i>ii</i></p> 	<p><i>ii</i></p>	<p><i>iii</i></p> 	<p><i>iii</i></p>
<p><i>iv</i></p> 	<p><i>iv</i></p>	<p><i>v</i></p>  <p>PTM</p>	<p><i>v</i></p>	<p><i>vi</i></p> 	<p><i>vi</i></p>

6 This question explores the use of Potential Dividers



6(i) Describe the function of VR1 in the diagram shown above.

(2 marks)

6 (ii) The resistance of the variable resistor is set to 5K and the LDR has a resistance of 800Ω. Calculate the value at V_{out} for the Potential Divide. Show working.

(2 marks)

7 Describe two advantages and one disadvantage of using LEDs rather than filament lamps.

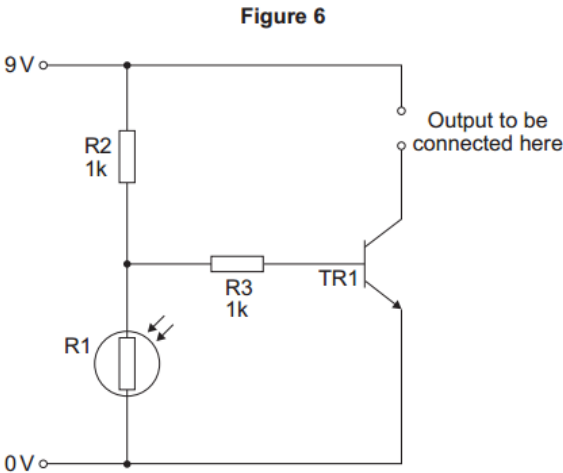
Advantage 1 _____

Advantage 2 _____

Disadvantage _____

(5 marks)

8 This question is about designing and using transistors.



8 Identify a suitable product application for the circuit in Figure 6 and the purpose of R3 and TR1 in operating the circuit below.

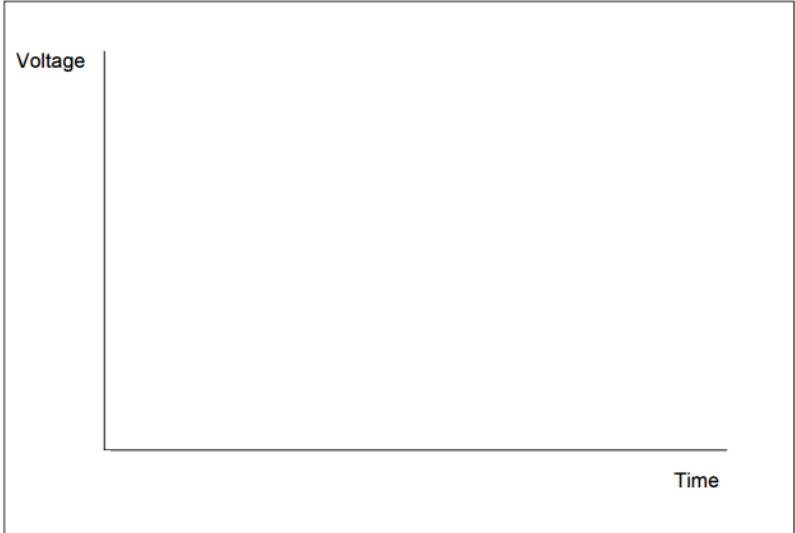
Product application _____

Describe the purpose of R3 _____

Describe the purpose of TR1 _____

(5 marks)

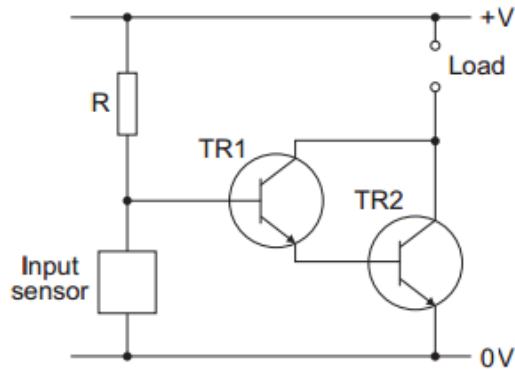
9 Using the axes provided, draw and label a diagram that highlights the differences between analogue and digital signals.



(2 marks)

10 Name the arrangement of TR1 and TR2 used in the circuit Figure 8 below. Explain the function of TR1 and TR2.

Figure 8



Arrangement _____

Function of TR1 and TR2 _____

(3 marks)

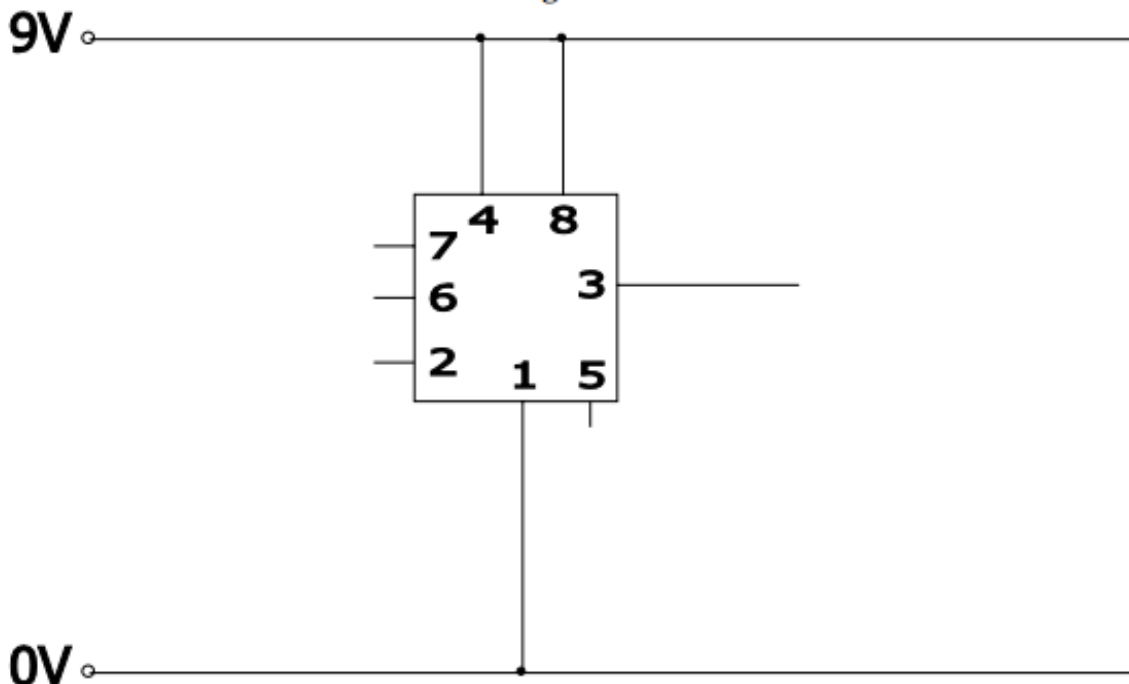
11 Figure 4 shows an incomplete circuit diagram for the Monostable circuit. Complete Figure 4 to work as a Monostable by connecting:

(i) a timing potential divider (3 marks)

(ii) a trigger input showing the appropriate value of components (4 marks)

(iii) a suitable transducer driver, a lamp and any other necessary components to the output, pin 3, so that it will light when pin 3 goes high. (3 marks)

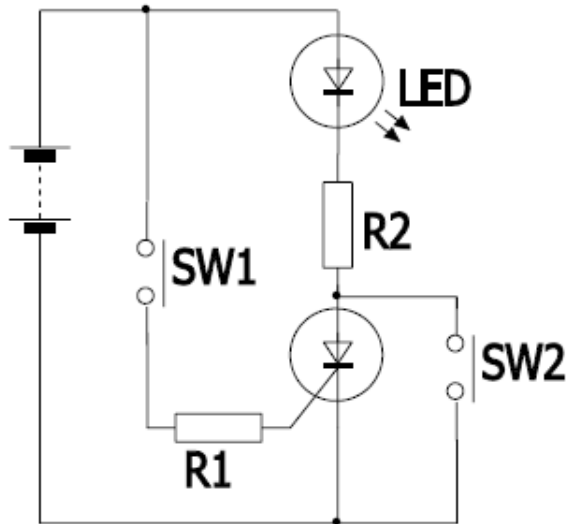
Figure 4



12 An advertising company has asked you to design a small electronic torch as a promotional gift.

(a) One possible solution is a circuit using a Thyristor and an LED as shown in **Figure 1**.

Figure 1



Explain what happens when the following actions are carried out in the order shown in the above the circuit.

12(a) (i) SW1 is pressed and then released _____

(2 marks)

12(a) (ii) SW2 is pressed and then released _____

(2 marks)

Extension Question; *(complete if time remaining)*

Using notes and sketches produce an initial idea for the design of a future mobile phone concept. Your design should be based 10 years in the future and incorporate the latest electronic technology.

