



**L-Università
ta' Malta**

MATRICULATION AND SECONDARY EDUCATION CERTIFICATE
EXAMINATIONS BOARD

**SECONDARY EDUCATION CERTIFICATE LEVEL
2018 MAIN SESSION**

SUBJECT:	Engineering Technology
PAPER NUMBER:	Controlled – Unit 3
DATE:	10 th April 2018
TIME:	10:00 a.m. to 11:35 a.m.

**THIS PAPER SHOULD BE RETURNED TO THE INVIGILATOR
AFTER THE EXAMINATION.**

Name of candidate _____

I.D. number _____

School _____

Class _____

Answer **ALL** questions in the space provided. The use of non-programmable electronic calculators is allowed.

Scenario




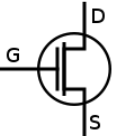
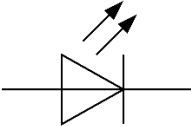
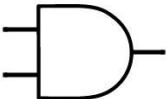
Manufacturing of Integrated Circuits is becoming more popular as demand for electronic equipment such as that used for mobile phones, televisions and cars increases. You are applying to work as a technician with an international company manufacturing Integrated Circuits. Answer the questions to demonstrate that you are knowledgeable in the area of electronics.

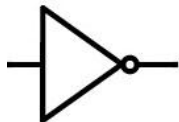

Question 1

K1 (4 marks)

In Table 1, identify the component or logic gate corresponding to the schematic or real life representation provided from (a) to (h) in the first column.

Table 1 - Schematic and real life representations of electronic components.

	Schematic and real life representations	Component name
(a)		
(b)		
(c)		
(d)		
(e)		
(f)		

(g)		
Schematic and real life representations		Component name
(h)		

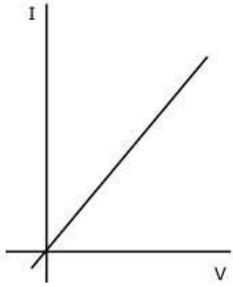
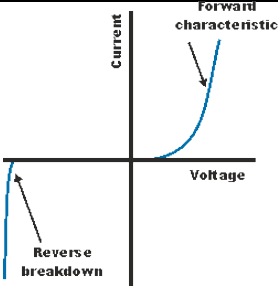
(4)

Question 2

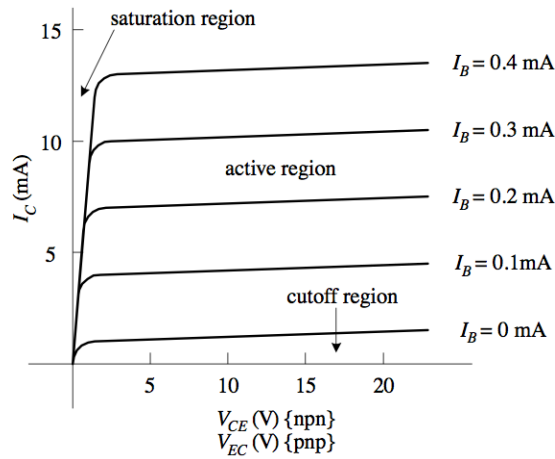
C2 (6 marks)

Individual electronic components exhibit different Current/Voltage characteristics. This property makes them useful for different applications.

Table 2 – Characteristic curves of various electronic components.

Characteristic Curves (Current I/Voltage V)	
(a)	 <p style="text-align: right;">(Source https://iwantarobotpet.files.wordpress.com)</p>
(b)	 <p style="text-align: right;">(Source http://www.radio-electronics.com)</p>

(c)



(Source <https://upload.wikimedia.org>)

This question continues on next page.

Refer to the characteristic curves shown in Table 2 and answer the questions below.

- (a) Is the figure marked as "a" representing the IV characteristic curve of a diode, transistor or resistor?

(1/2)

- (b) Which device's characteristics are represented by the IV characteristic curve represented by "b"?

(1/2)

(c) Refer to the characteristic curve "b" and answer the questions below.

- (i) Explain how the current changes as the voltage increases from 0 volts upwards.

(1)

- (ii) Explain what happens when the current goes into the negative direction.

(1)

(d) Refer to the characteristic curve marked "c" and answer the questions below.

- (i) Interpret the characteristic curve and state if this is the characteristic curve for a resistor, diode or transistor.

(1/2)

- (ii) State the meaning of the terms I_c and I_b and explain how the current I_c changes as I_b increases.

(2 1/2)

Please turn the page.

Question 3

K4 (4 marks)

As part of their engineering training a group of technicians are setting up different circuit combinations in the lab. They are measuring various parameters such as current and voltage.

(a) Circuit 1.

The first circuit designed and built is the one shown in Figure 1. This circuit uses a 20 V cell with three resistors. R1 is 30 Ω , R2 is 50 Ω , R3 is 10 Ω .

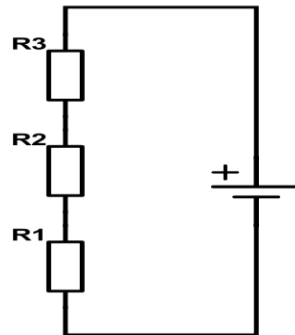


Figure 1 – Circuit 1

Calculate the voltage across the 50 Ω resistor.

(2)

(b) Circuit 2.

The circuit shown in Figure 2 is built. The cell voltage is 10 V and resistors R1, R2 and R3 each have a resistance of 10 Ω .

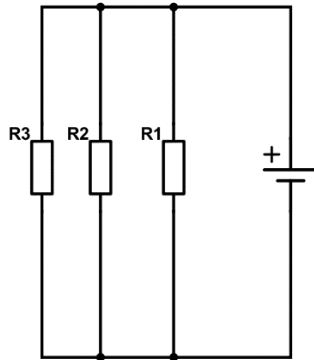


Figure 2 – Circuit 2

What is the power developed across **ONE** of the 10 Ω resistors?

(2)

Please turn the page.




Question 4

K5 (4 marks)

Several tools and equipment are used when constructing electronic circuits. In Table 3, below, fill in the name of the tool corresponding to the picture provided.

Table 3 – Tools used to manufacture electronic circuits.

	Tool picture	Tool name
(a)	 <p>(Source: https://www.circuitspecialists.com)</p>	
(b)	 <p>(Source: https://images-na.ssl-images-amazon.com)</p>	
(c)	 <p>(Source: https://images-na.ssl-images-amazon.com)</p>	
(d)	 <p>(Source: https:// rackcdn.com)</p>	
(e)	 <p>(Source: https://cdn.shopify.com)</p>	

	Tool picture	Tool name
(f)	 <p>(Source: https://upload.wikimedia.org)</p>	
(g)	 <p>(Source: https://images-na.ssl-images-amazon.com)</p>	
(h)	 <p>(Source: https://images-na.ssl-images-amazon.com)</p>	

Question 5

C4 (6 marks)

Test bench equipment is essential equipment in the electronics laboratory. There are various equipment types, each of which is used for different purposes in the electronics laboratory.

(a) What is a multi-meter used for? Name **TWO** values that can be read using a multi-meter.

(3)

This question continues on the next page.

(b) Justify the use of an oscilloscope in an electronics workshop by listing **THREE** properties which can be analysed and measured by the oscilloscope.

(3)

Question 6

K7 (4 marks)

The circuit shown in Figure 3 was set up where two lamps shown as Lamp 1 and Lamp 2 were connected. To check that all is working well various tasks need to be undertaken.

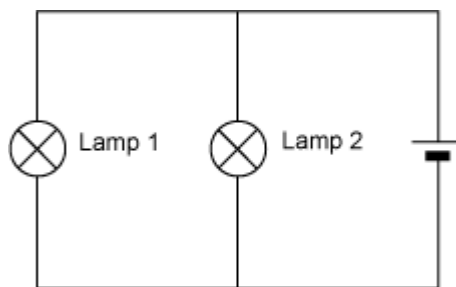


Figure 3 – Circuit 3.

(a) The first task would be to measure the voltage across each of the two lamps.

(i) Describe how to measure the voltage across Lamp 1.

(1)

(ii) Sketch the setup used in the space below.

(1)

(b) The second task would be to measure the current flowing through Lamp 2.

(i) Describe how to measure the current flowing through Lamp 2.

(1)

(ii) Sketch the setup used in the space below.

(1)

Please turn the page.

Question 7

C5 (6 marks)

The electronic circuit board is the component which brings all the electronic components together and keeps them electrically connected with each other. There are various electronic boards in use.

(a) A breadboard is an important component in the electronics lab.

(i) Describe what a breadboard is.

(2)

(ii) Identify **TWO** advantages of using breadboards.

(1)

(b) A strip board is another frequently used component.

(i) Describe what a strip board is.

(2)

(ii) Identify **TWO** advantages of using a strip board.

(1)

Please turn the page.

Question 8

K10 (4 marks)

Soldering is the process in which components are electrically connected together to enable the separate components to work as a circuit.

(a) Describe the soldering process when building a prototype circuit.

(2)

(b) Describe **TWO** advantages of robotic assembly when manufacturing mass produced circuits.

(2)

Blank Page

Blank Page