

EXERCISE 1

1 Using materials, components and equipment provided, perform the following tasks.

- (i) Connect the circuit shown in **figure 1**. (3 marks)
Let the examiner check your work.

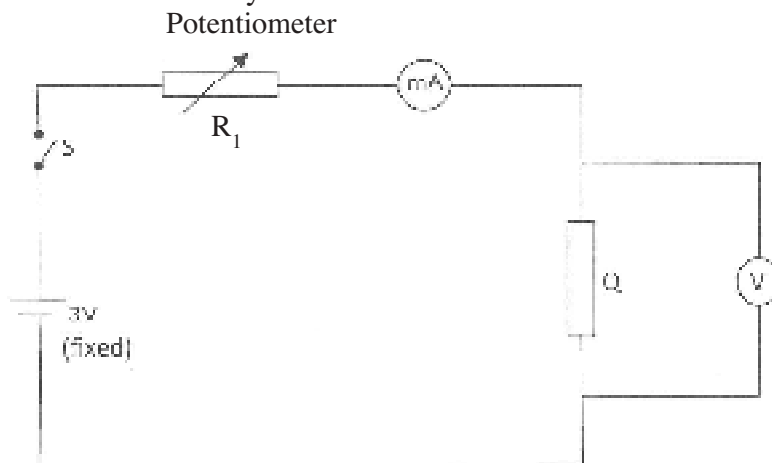


Figure 1

- (ii) Close switch S.
- (iii) Adjust the potentiometer for the ammeter to obtain current values in table 1 and in each case record the corresponding voltage values. (7½ marks)

Table 1

Current I _(mA)	40	100	200	240	260
Voltage (V)					
$\frac{V}{I}$					

- (iv) Calculate the values of $\frac{V}{I}$ and record them in the spaces provided in the table.
- (v) Use the values in the table to draw a graph of voltage against current. (5½ marks)
- (vi) Determine the slope of the graph. (2 marks)
- (vii) From the graph, determine the voltage, V when the current I = 160 mA.
V = (1 mark)
- (viii) State the purpose of the experiment. (1 mark)

EXERCISE 2

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- 2 Use the tools, equipment and materials provided to make the bracket shown in **figure 2**. (20 marks)

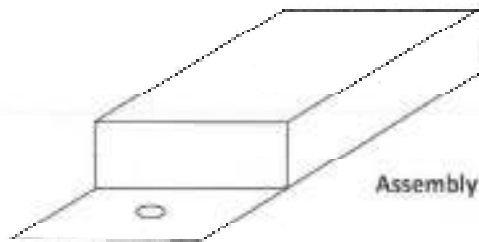
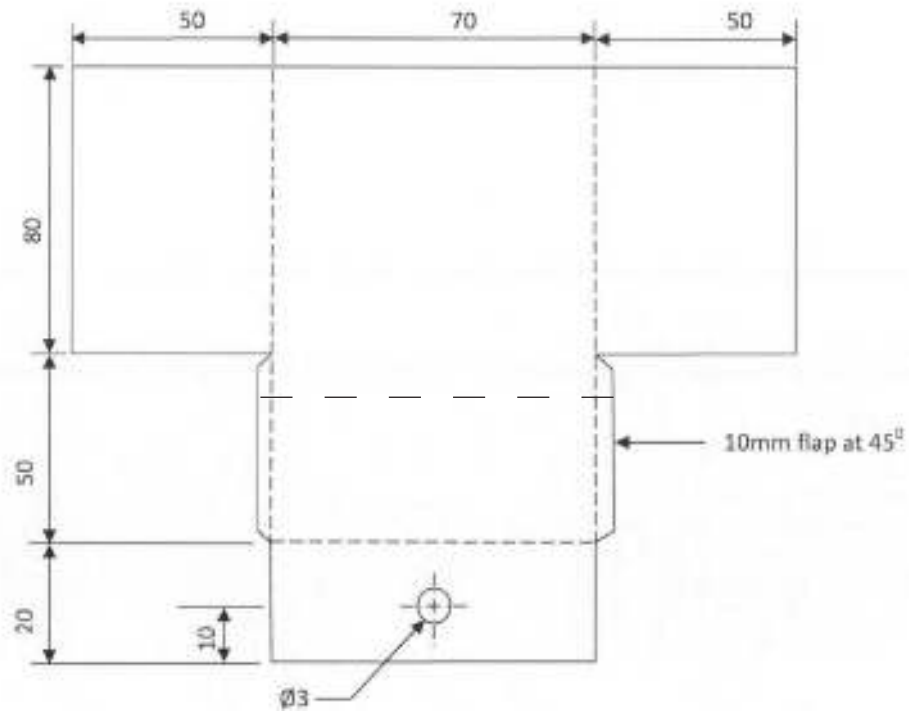


Figure 2

EXERCISE 3

- 3 **Figure 3** shows a block diagram of the electronic circuit provided.

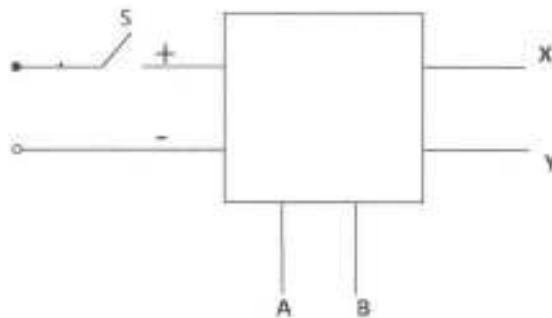


Figure 3

Perform the following tasks:

- (a) With the switch S open, connect the circuit to the DC power source. Let the examiner check your work. (1 mark)
- (b) Set the potentiometer to 0Ω as measured with ohmmeter. Select a value of resistor shown in table 2 and in each case, do the following:
- (i) connect each resistor between terminals A and B; (2½ marks)
- (ii) close the switch, measure the voltage and record in table 2. (5 marks)

Table 2

Resistor (Ω)	V_R	$P = \frac{V_R^2}{R}$
56		
220		
390		
680		
1000		

- (iii) Calculate the power dissipated by each resistor and complete table 2. (5 marks)
- (iv) Draw a graph of power against resistance. (5½ marks)
- (v) From the graph, determine the value of R for which there is maximum power transfer. (1 mark)

EXERCISE 4

- 4 Use the components and equipment to connect the circuit illustrated in **figure 4**. Let the examiner see your work. (2½ marks)

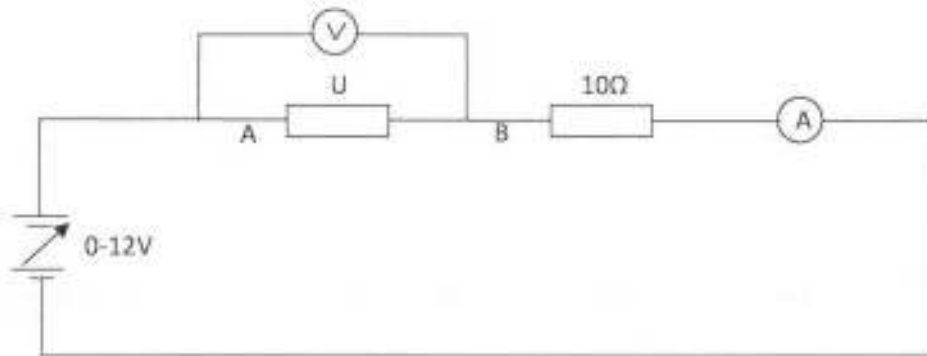


Figure 4

Perform the following tasks:

- a) Switch on the power supply.
- b) Adjust the power supply to obtain each of the voltage values across U as shown in **table 3** and in each case, record the corresponding current: (5 marks)

Table 3

V	0.4	0.5	0.6	0.7	0.8
I					

- c) Switch off the power supply and reverse its connections.
- d) Adjust the power supply to obtain each of the voltage values across U as shown in **table 4** and in each case, record the corresponding current. (5 marks)

Table 4

V	-0.5	-1	-3	-4	-5
I					

- e) Use the values of I and V from tables 3 and 4 to draw the graph of current (I) against voltage (V) on the same axes. (7 marks)
- f) From the shape of the graph, identify component U. ($\frac{1}{2}$ marks)

EXERCISE 5

- 5 **Figure 5** shows the layout of a lighting installation. Using PVC sheathed cables, install the circuit such that the lamps are controlled at one point. (20 marks)

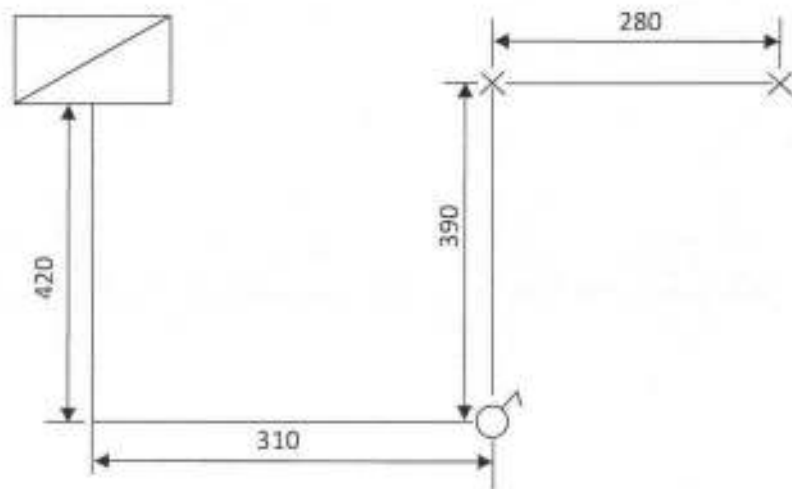


Figure 5