3.20.2 Electricity Paper 2 (448/2)

EXERCISE 1

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

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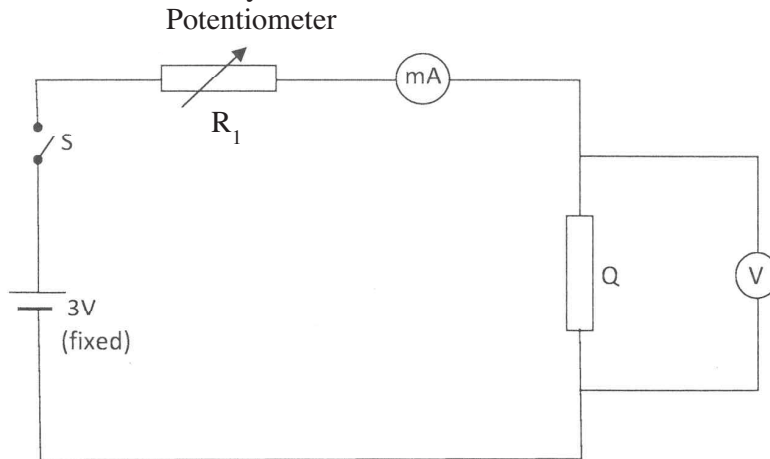Let the examiner check your work.

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. $(7\frac{1}{2}$ marks)

Table 1

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

(iv)   Calculate the values of $\dfrac{V}{I}$ 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. $(5\frac{1}{2}$ 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)

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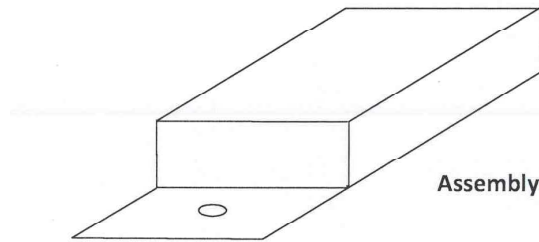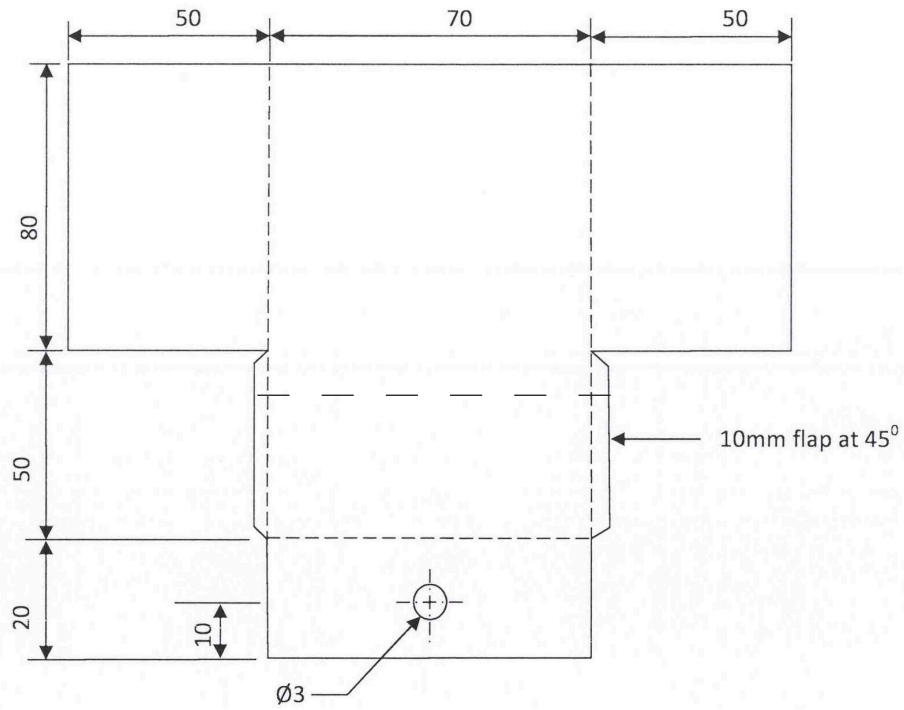
(20 marks)

50   70   50

80

50

10mm flap at 45^0

20

10

Ø3

Assembly

Figure 2

EXERCISE 3

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

S

+   X

−   Y

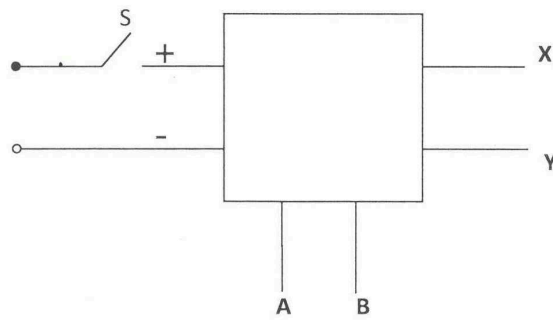A   B

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 0 Ω as measured with ohmeter. 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; $(2\frac{1}{2}$ marks)

        (ii)   close the switch, measure the voltage and record in table 2.   (5 marks)

Table 2

Resistor (Ω)	V_R	$P = \dfrac{V_R^{\,2}}{R}$
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. $(5\frac{1}{2}$ 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
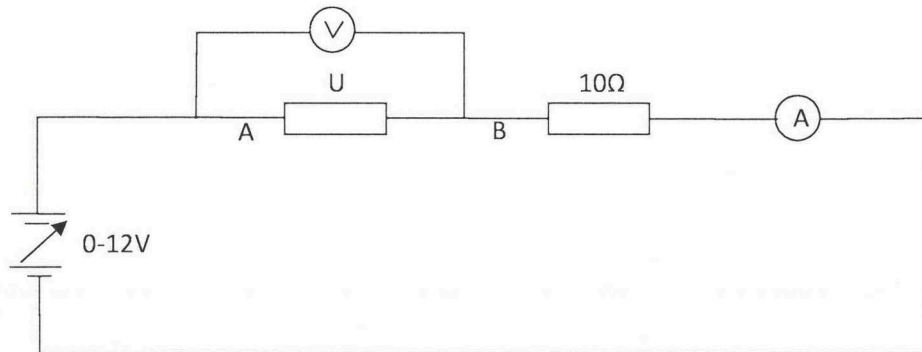   examiner see your work. $(2\frac{1}{2}$ marks)

Figure 4

187

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.
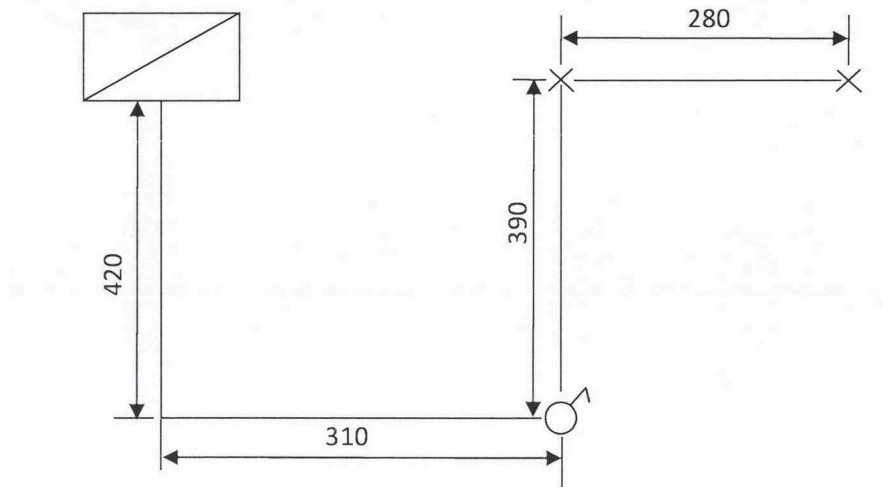
(20 marks)

Figure 5