

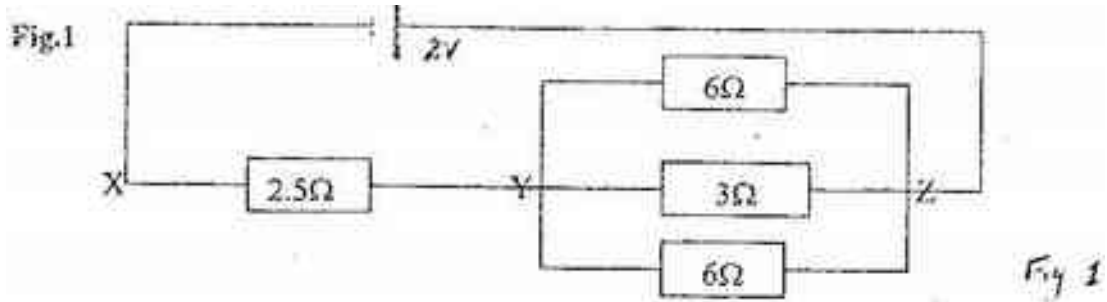
NAME
SCHOOL

INDEX NUMBER
DATE

CURRENT ELECTRICITY II

1. 1995 Q2 P2

Study the circuit diagram in figure 1 and answer the following questions



(a) Calculate the effective resistance between Y and Z (3 marks)

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(b) Determine the current through the 3 Ω resistors (6 marks)

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- (c) One of the 6Ω resistor has a length of 1.0m and cross-section area of $5.0 \times 10^{-6} \text{m}^2$
 (3 marks)

Calculate the resistivity of the material

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2. 1996 Q12 P1

Thermistor, TH, is connected in parallel with a bulb as shown in figure 3. The bulb is lit. When the thermistor is steadily heated the brightness of the bulb reduces. Explain this observation (3 marks)

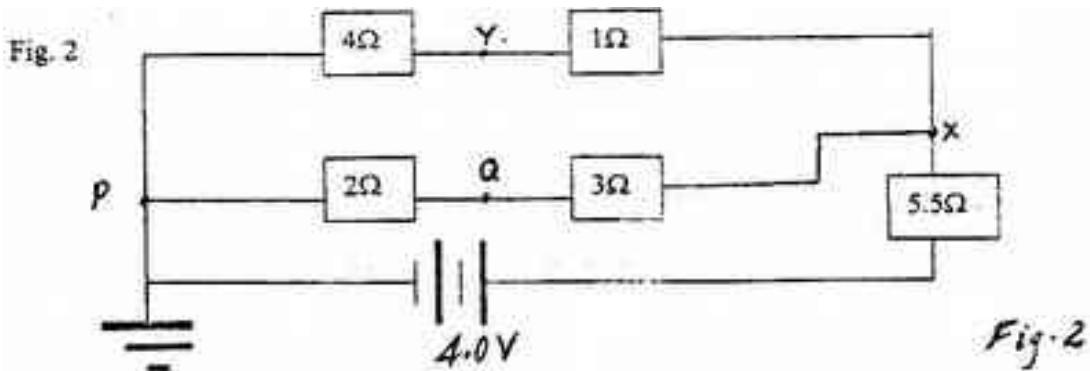
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3. 1996 Q3 P2

The diagram in fig 2 represent an electric circuit in which five resistors are connected to be a battery of e.m.f 4.0V and of negligible internal resistance



Determine:

- (i) The total resistance of the circuit (3 marks)

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(ii) The potential difference between Y and Q (2 marks)

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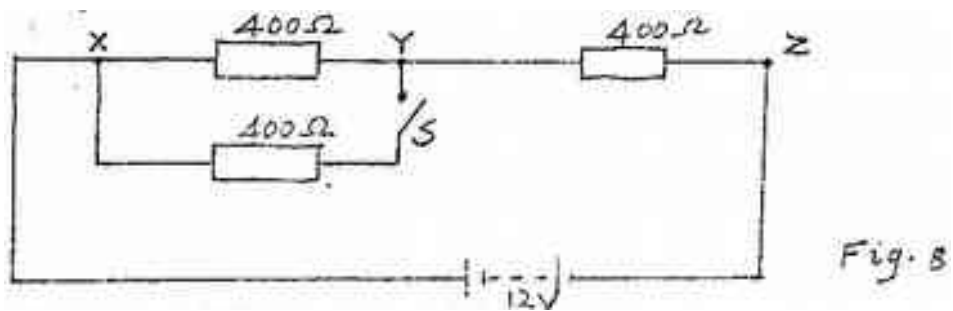
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4. 1997 Q22 P1

Using the information in figure 8 answer questions 4 and 5.



What is the p.d across YZ when the switch S is open?

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5. 1997 Q23 P1

Determine the p.d across YZ when the switch S is closed

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6. 1997 Q24 P1

How many 1000W electric irons could be safely connected to a 240V main circuit fitted with 13A fuse?

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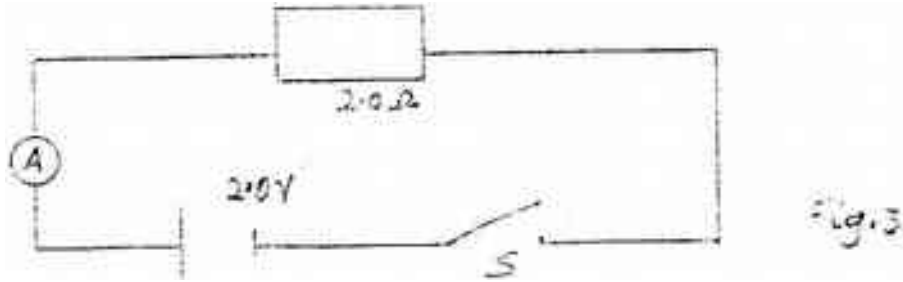
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7. 1998 Q11 P1

The internal resistance of the cell, E in figure 3 is 0.5 ohms.
Determine the ammeter reading when the switch S is closed.



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8. 1998 Q17 P1

Calculate the length of a wire required to make a resistor of 0.5 ohms, if the resistivity of the material is $4.9 \times 10^{-7} \Omega \text{ m}$ and the cross sectional area is $2.0 \times 10^{-6} \text{ m}^2$

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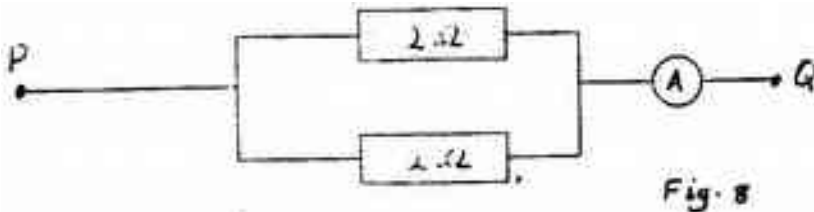
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9. 1999 Q10 P1

Determine the ammeter reading when a p.d of 3.0 volts is applied across PQ in figure 8.



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10. 1999 Q21 P1

A galvanometer of internal resistance 50Ω gives a full-scale deflection when a current of 10mA passes through it. Determine the value of the resistance required to convert the galvanometer to a voltmeter with full-scale deflection of 5 volts.

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11. 1999 Q26 P1

The figure 14 is a resistor-capacitor circuit. At time $t=0$, the switch is closed at A for sometime, and then opened. The switch is then closed at B for sometime.

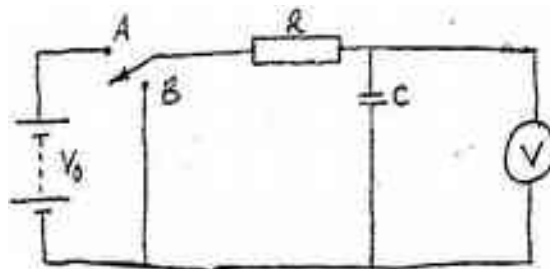
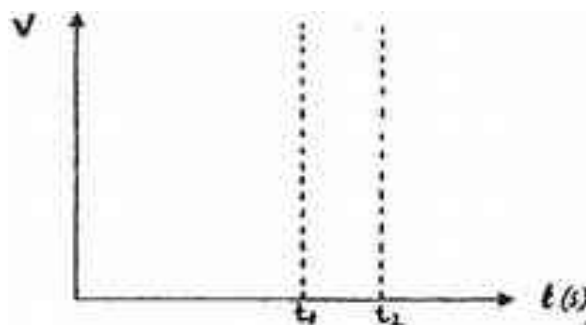


Fig. 14

On the axis provided, sketch the graph of voltage V across the capacitor against time t (t_1 and t_2 represents times for opening at A and closing at B respectively).



12. 2001 Q17 P1

The ammeter in the circuit in Fig. 11 has negligible resistance. When the switch S is closed, the ammeter reads 0.01A . Determine the internal resistance of the battery.

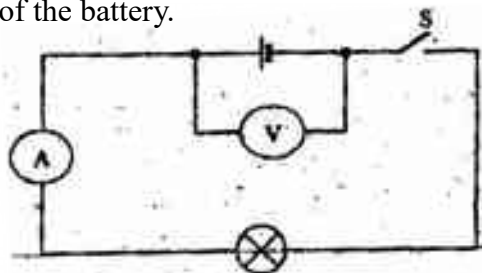


Figure 11

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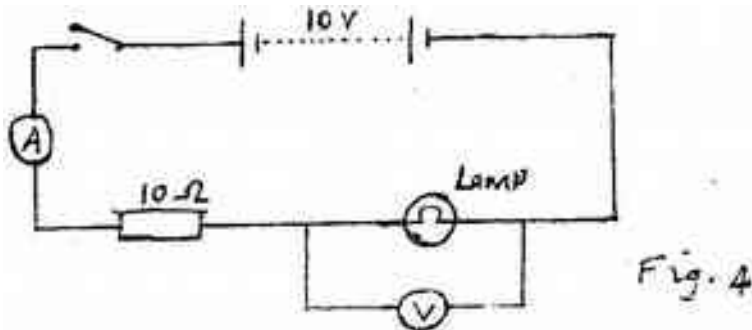
13. 2002 Q4 P1

A current of 0.70 A flows through a wire when a p.d of 0.35 V is applied at the ends of the wire. If the wire is 0.5m long and has a cross section area of $8.0 \times 10^{-3} \text{ m}^2$, determine its resistivity.

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14. 2002 Q9 P1

Fig. 4 shows electrical circuit. When the switch is closed the ammeter reading is 0.3 A.



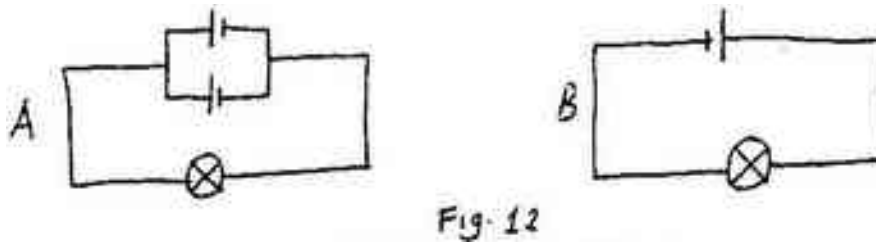
Determine the voltmeter reading.

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15. 2003 Q23 P1

In the circuit diagram shown in fig. 12, the lamps are Identical and the cells are also identical.

Figure 12.



State with reason, in which circuit the lamp will be lit for longer period.

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16. 2003 Q5 P2

a) State what is meant by electromotive force (em.f) of battery.

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b) The graph in figure 5 shows the terminal voltage, V , of a certain battery varies with the current, I , being drawn from the battery.

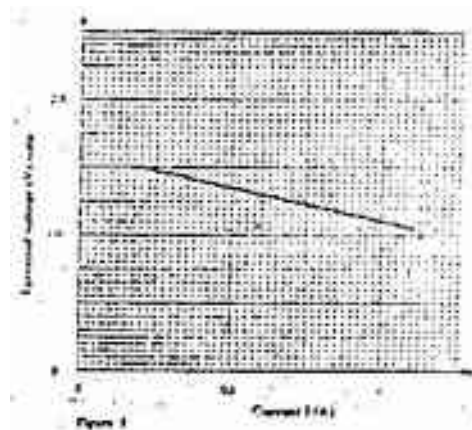


Fig 5

(i) Write an expression relating the e.m.f. E , terminal voltage, V , current, I and the internal resistance, r , of the battery for the circuit drawn in (i) above.

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- (ii) From the graph determine the; I internal resistance, r , of the battery.

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- (c) A galvanometer of resistance 10Ω gives a full-scale deflection when a current of 0.03A flows through it. Determine the resistance of the resistor, which would be required to convert the galvanometer to an ammeter reading up to 3.0A .

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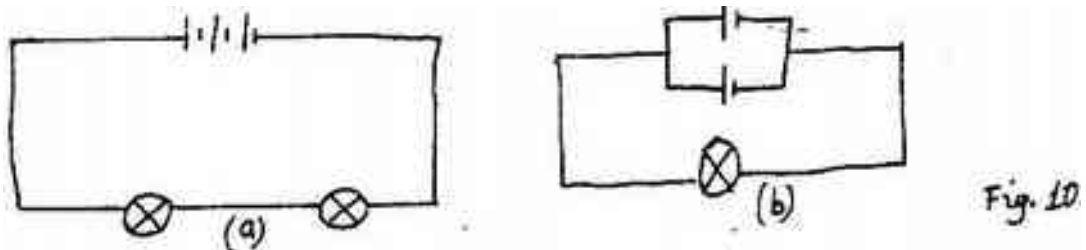
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17. 2004 Q15 P1

Figure 10 show two circuits in which identical dry cells and identical bulbs are used. Use the information in the figure to answer questions 15 and 16.



Explain why the bulb in Figure 10(b) will be brighter than each of the bulbs in Figure 10 (a)

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18. 2004 Q16 P1

Give the reason why the cells in figure 10(b) can be used for a longer period than the cells in Figure 10 (a)

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19. 2005 Q18 P1

A student wishes to investigate the relationship between current and voltage for certain device X. In the space provided, draw a circuit diagram including two cells, rheostat, ammeter, voltmeter and the device X that would be suitable in obtaining the desired results. (1 mark)

20. 2006 Q9 P2

State one condition under which Ohm's law is obeyed in a metal conductor (1 mark)

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21. 2007 Q8 P2

In the circuit diagram shown in figure 7, the ammeter has negligible resistance. When the switch S, is closed, the ammeter reads 0.13 A.

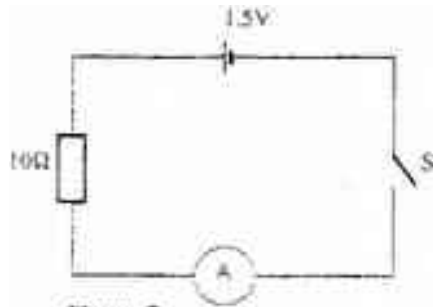


Figure 7

Determine the internal resistance of the cell (3 marks)

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22. 2007 Q15 P2

(a) State Ohm's Law

(1 mark)

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(b) The graph in figure 9 shows the current – voltage characteristics of a certain device, X

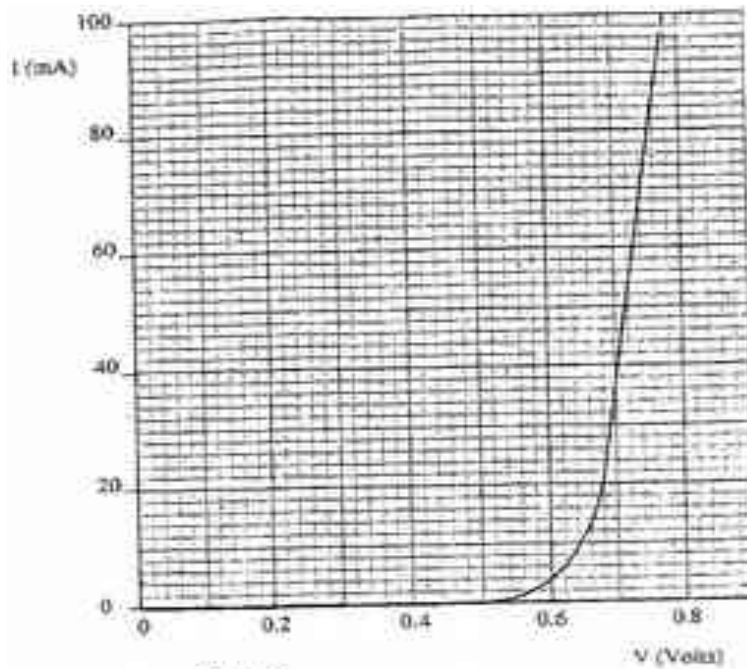


Figure 9

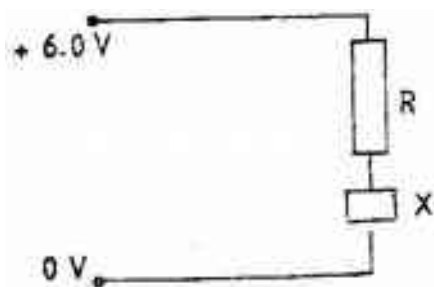
(i) State with a reason whether the device obeys Ohm's law (2 marks)

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(ii) Determine the resistance of the device, X, when the current through it is 60 mA.

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- (iii) When the device, X is connected in the circuit below, the voltage across it is 0.70 V.



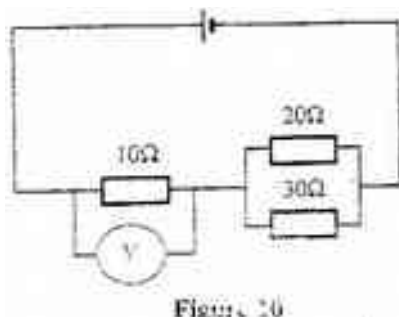
Calculate the value of the resistance R. (3 marks)

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- (c) The cell in figure 10 has an e.m.f of 2.1 V and negligible internal resistance.



Determine the

- (i) Total resistance in the circuit (2 marks)

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- (ii) Current in the circuit (1 mark)

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- (iii) Reading of the voltmeter (2 marks)

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23. 2008 Q3 P2

You are provided with the following;

A cell and holder, a switch, a rheostat, an ammeter, a voltmeter and connecting wires.

Draw a diagram for a circuit that could be used to investigate the variation of the potential difference across the cell with the current drawn from the cell.

(1 mark)

24. 2008 Q9 P2

Figure 6 shows a circuit in which a battery of negligible internal resistance, two resistors, a capacitor, a voltmeter and a switch are connected.

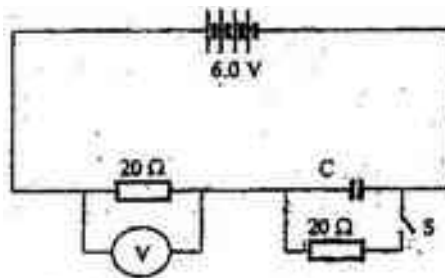


Figure 6

Giving a reason for your answer in each case, state the reading of the voltmeter, V , when the switch is (2 marks)

(i) Open

$V =$

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Reason

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(ii) Closed

$V =$

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Reason

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25. 2008 Q17 P1

(a) Three resistors of resistance 2.0Ω , 4.0Ω and 6.0Ω are connected together in a circuit.

Draw a circuit diagram to show the arrangement of the resistor which gives

(i) Effective resistance of 3.0Ω (1 mark)

(ii) Minimum resistance (1 mark)

(b) In figure 11 the voltmeter reads 2.1 V when the switch is open. When the switch is closed, the voltmeter reads 1.8 V and the ammeter reads 0.1 A .

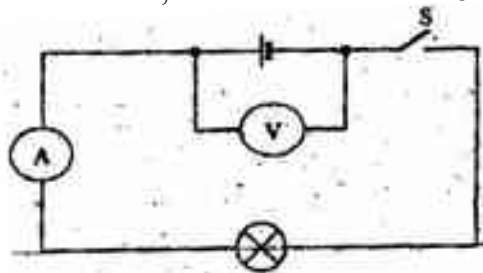


Figure 11

Determine:

(i) The e.m.f of the cell (1 mark)

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(ii) The internal resistance of the cell (3 marks)

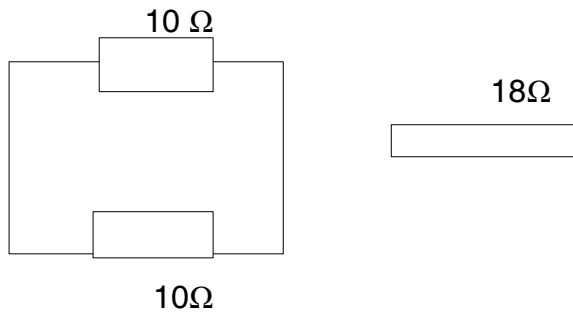
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(iii) The resistance of the lamp (2 marks)

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26. 2009 Q8 P2

Figure 3 shows part of an electrical circuit .The current through the 18 resistor is observed to be 2A



State the value of the current through each of the $10\ \Omega$ resistors.

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27. 2009 Q15 P2

Figure 9 shows the graph of the relationship between current I and potential difference V for the tungsten filament lamps X and Y. The normal working voltages for the lamp X and lamp Y are 2.5 V and 3.0V respectively.

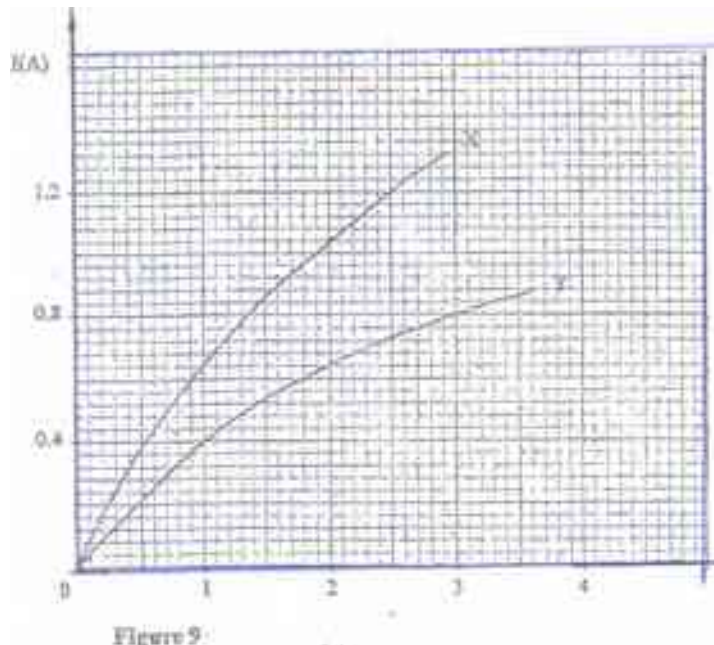


Figure 9

(a) Explain the change in the shape of the curves as the current increases. (2 marks)

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(b) Determine the resistance of lamp X at the normal working voltage. (3 marks)

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(c) The lamps are now connected in a series circuit in which a current of 0.4 A find the potential difference across lamp y.

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(d) Determine the power at which lamp Y operates under normal working voltage. (2 marks)

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28. 2010 Q10 P2

A current I flowing through a wire of resistance R was increased seven times. Determine the factor by which the rate of heat production was increased.

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29. 2010 Q15 P2

(a) **Figure 8**, shows a circuit that may be used to charge a capacitor.

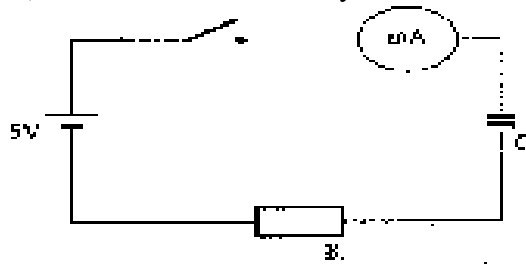


Figure 8

(i) State the observation on the milliammeter when the circuit is switched on:

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(ii) Explain the observation in (i) above.

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(b) The circuit in **figure 8** is left on for some time. State the value of p.d. across:

(i) The resistor R;

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(ii) The capacitor C;

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(c) Sketch the graph of potential difference (V) across R against time.

30. 2011 Q11 P2

A 4Ω resistor is connected in series to a battery of e.m.f $6V$ and negligible Internal resistance. Determine the power dissipated by the resistor.

(2 marks)

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31. 2012 Q15 P2

Figure 14, Shows a circuit in which a battery, a switch, a bulb, a resistor P, a variable resistor Q, a voltmeter V and two ammeters A_1 and A_2 of negligible resistance are connected.

P has a resistance of 10Ω . When the switch is closed A_1 reads $0.10 A$ and the voltmeter reads $1.5V$.

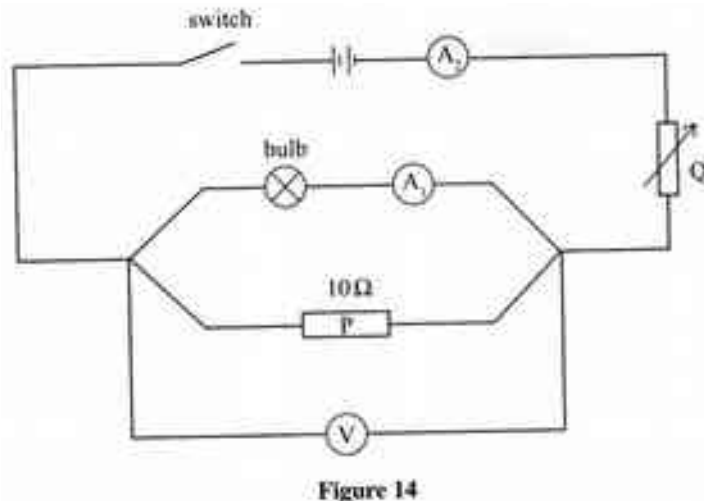


Figure 14

a) Determine

i. The current passing through P;

(3 marks)

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ii. The resistance of the bulb

(2 marks)

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- b) The variable resistor Q is now adjusted so that a large current flows through A_2 .
i. State how this will affect the resistance of the bulb. (1 mark)

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- ii. Explain your answer in (b) (i) (2 marks)

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- c) A house has one 100 W bulb, two 60 W bulbs and one 30W bulb. Determine the cost of having all the bulbs switched on for 70 hours, given that the cost of electricity is 40 cents per kilowatt hour. (3 marks)

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