



FOUNDATION PHASE TEST RESIT SPECIFICATION

Programme:	Foundation				
Unit:	Engineering Science : Electronics				
Phase Test No:	1A	Lecturer:	Tim Tudor	Internal Verifier:	Abi Summerfield

Time and Date:	Sept 2012 Resit	Duration:	1 Hour	Contribution to Overall Unit Assessment (%):	15%
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Outcomes being Assessed (from Unit Syllabus):	
Number	Description
1	Identify and apply appropriate physical principles and relationships in order to solve engineering problems.
2	Manipulate equations to produce numerical values in engineering units.

Instructions to candidates:

Write your name in the candidate name box below.

All working should be completed in this test booklet.

Answer ALL questions

Show all workings for calculations.

Formulae:

$$P = IV$$

$$E = \frac{CV^2}{2}$$

$$R = \frac{\rho L}{A}$$

$$V = IR$$

$$I = \frac{Q}{t}$$

$$\Delta R = \alpha R_0 \Delta T$$

Candidate Name

Question 1

- a) Draw and label an arrow to show the direction of conventional current flow on the circuit diagram below.

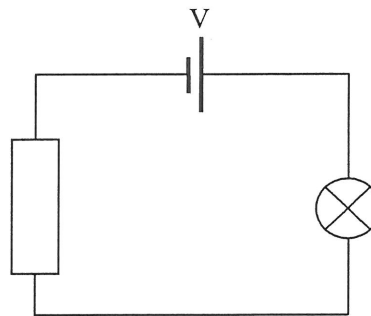
[1 mark]

- b) Draw and label an arrow to show the direction of electron flow on the circuit diagram below.

[1 mark]

- c) Label the positive and negative terminals of the battery.

[1 mark]



- d) Give fluid and mechanical properties which are analogous to the following electrical terms :

Voltage : _____

Current : _____

Resistance : _____

[3 marks]

- e) State :

Kirchoff's Current Law:

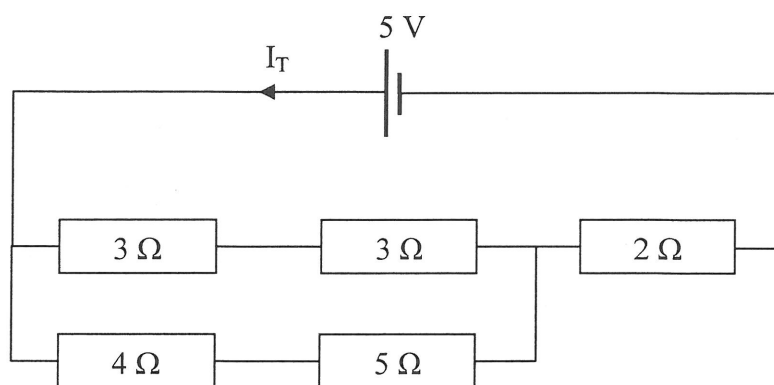
[2 marks]

f) State :

Kirchoff's Voltage Law:

[2 marks]

Question 2



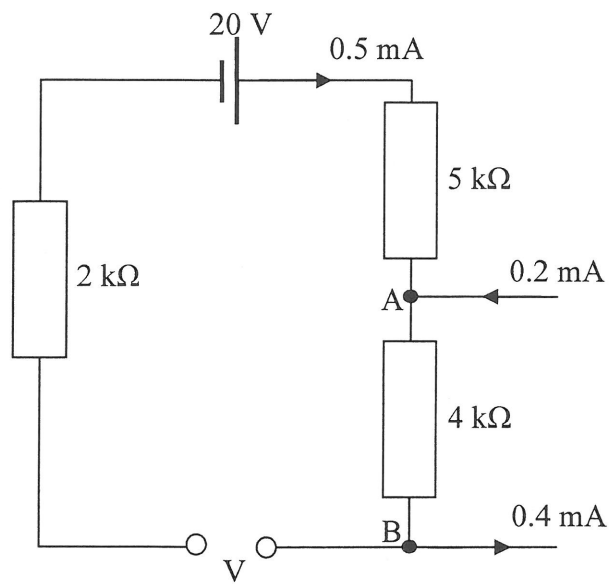
- a) Calculate the total resistance for the circuit above

[5 marks]

- b) Calculate the unknown current, I_T

[2 marks]

Question 3



- a) Label and calculate the unknown currents in the circuit above.

[4 marks]

- b) Calculate the unknown voltage, V .

[4 marks]

- c) Indicate the sense of this voltage on the circuit diagram by symbolising the unknown voltage as a battery

[1 marks]

Question 4

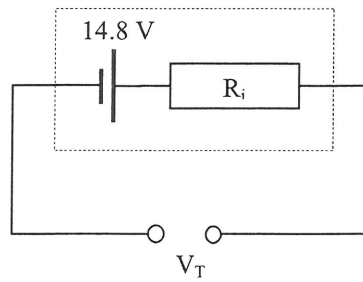
- a) A long thin aluminium wire has a resistance of $0.2\ \Omega$ at a temperature of 0 degrees Celsius. Calculate the resistance of the wire if it is heated to a temperature of 200 degrees Celsius, given that the temperature co-efficient of the material is $4 \times 10^{-3}\ \text{K}^{-1}$

[5 marks]

- b) A certain wire is made from a material with a resistivity of $2.65 \times 10^{-8}\ \Omega\text{-m}$. Calculate the length of a wire if it has a diameter of 0.13mm and a resistance of $50\ \Omega$.

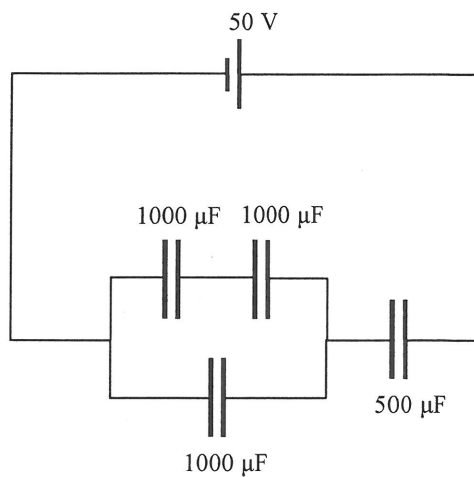
[5 marks]

Question 5



- a) A certain battery has an EMF of 14.8V. Calculate the terminal voltage V_T when a current of 8A is drawn, if the battery has an internal resistance of 0.5Ω .

[3 marks]



- b) Calculate the total capacitance of the circuit shown above.

[4 marks]

- c) A capacitor stores 0.1 J of energy when a voltage of 12 V is supplied. Calculate the capacitance.

[2 marks]

Question 6

- a) What are the advantages of electromagnets over permanent magnets?

[3 marks]

- b) State Lenz's Law of electromagnetic induction.

[2 marks]

- c) Describe what relays are used for and how they work.

[2 marks]

- d) Describe how an AC transformer may be used to 'step-up or step-down voltage.

[3 marks]

END OF TEST

