2007 Assessment Report

VICTORIAN CURRICULUM AND ASSESSMENT AUTHORITY

2007 VCE VET Electrotechnology GA 2: Written examination

GENERAL COMMENTS

The VCE VET Electrotechnology written examination is based on the following units of competence:

- UTENES050A Identify and select components/materials/accessories for electrotechnology work activities
- UTENES056A Apply technologies and concepts to electrotechnology work activities.

The examination was divided into two sections. Section A contained 20 multiple-choice questions. Section B contained short answer questions that required students to read graphical data, do short calculations, describe component names and functions, complete circuit diagrams, provide explanations, do number conversions and read tabular information.

Questions that required students to read graphs, interpret flowcharts and/or complete a circuit diagram were generally well answered. The quality of answers to questions requiring written explanations ranged widely. Questions requiring two or three steps, such as formula transposition, substitution, calculation and expressing the answer with a correct unit/multiplier, were generally answered only partially correctly. Few students were able to complete calculation-style questions completely. Questions where students had to draw battery connections were very poorly answered.

When preparing for the examination, teachers should encourage students to refer to past examination papers and assessment reports.

SPECIFIC INFORMATION

Section A – Multiple-choice questions

The table below indicates the percentage of students who chose each option. The correct answer is indicated by shading.

Question	% A	% B	% C	% D	% No Answer	Comments
1	5	38	54	3	0	
2	32	24	25	18	0	
3	6	3	12	78	0	
4	52	1	43	3	1	
5	21	12	35	32	0	
6	46	32	17	4	0	
7	5	1	15	80	0	
8	20	61	11	8	0	
9	4	15	69	12	0	
10	15	17	25	42	2	
11	28	18	49	5	0	
12	27	5	45	24	0	
13	13	24	40	21	2	
14	79	10	3	9	0	
15	7	52	22	19	0	
16	8	73	15	3	1	
17	43	10	19	27	1	It is possible that students did not answer Questions 17–20 with reference to Figure 3a, or they do not have basic knowledge about power supplies.
18	7	17	55	20	1	
19	22	16	55	6	0	
20	12	20	38	30	0	

Areas of weakness encountered in the multiple-choice section included:

- the correct voltage of a lead acid battery cell
- symbols for commonly used electronic components
- knowledge about batteries
- commonly used computer terminologies.

Section B

Question 1a.

Marks	0	1	2	3	4	Average
%	33	21	7	8	31	**1.8**

$R_T = R1 + R2$, $R_T = 680 + 1200K = 1880\ \Omega$

$$I_{R2} = \frac{V}{R_T} = \frac{6}{1880} = 3.19mA$$

Marks were awarded as follows:

- one mark for calculating the total series resistance (there was no penalty for leaving the units out)
- one mark for getting the formula for I correct (transposed correctly from formula sheet)
- one mark for correctly substituting the values of V and R
- one mark for getting the correct answer, with the unit.

Question 1b.

Marks	0	1	2	Average
%	59	10	32	**0.8**

$V_{R1} = I \times R1 = 3.9mA \times 680\ \Omega = 2.17V$

One mark was awarded for correctly substituting into the formula, and one mark for obtaining the correct answer with units. Full marks were awarded even if the wrong value for I was carried over from Questions 1a.

Question 1c.

Marks	0	1	Average
%	63	37	**0.4**

$I_{R1} = 0$

Students need to know the effect of a short circuit across a component in the circuit.

Question 1d.

Marks	0	1	2	Average
%	56	7	37	**0.8**

$$I_{R2} = \frac{6}{1200} = 5mA$$

One mark was awarded for correctly substituting into the formula, and one mark for getting the correct answer with units.

Students need to know the effect of a short circuit on other components in the circuit.

Questions 2a–c.

Marks	0	1	2	3	Average
%	5	6	40	49	**2.3**

2a.
350 Ω

2b.
22–23 newtons

2c.
Any of:

- 0–30
- 0–40
- 0–10

- 10–20
- 20–30.

Responses to this question were good in general, showing that students were able to read graphs.

Question 3a.

Marks	0	1	2	Average
%	44	9	47	**1.1**

$$7 \text{ divisions} \times \frac{2 \text{ volts}}{\text{div}} = 14\text{V peak to peak}$$

Answers within the range 13–15V were accepted. Only one mark was awarded for responses that stated Vp = 7V.

Question 3b.

Marks	0	1	2	3	Average
%	59	9	15	18	**0.9**

T = 5 divisions × 100µs = 500µs

$$f = \frac{1}{T} = \frac{1}{500\mu s} = 2\text{KHz}$$

Two marks were awarded for reading the value from graph. One mark was given for applying the formula. Many students could not interpret the graph and read the value of the time period, T, or did not know the relation between T and the frequency because the formula was given in the formula sheet.

Question 3c.

Marks	0	1	Average
%	54	46	**0.5**

$$\frac{14\text{V}}{10} = 1.4\text{V peak to peak}$$

Students were awarded the mark for dividing the voltage value from Question 3a. by 10.

Question 3d.

Marks	0	1	Average
%	81	19	**0.2**

2KHz

Students were awarded this mark if they gave the same response as for Question 3b. Most students divided the frequency in Question 3b. by 10, resulting in the same response as for Question 3c.

Question 4a.

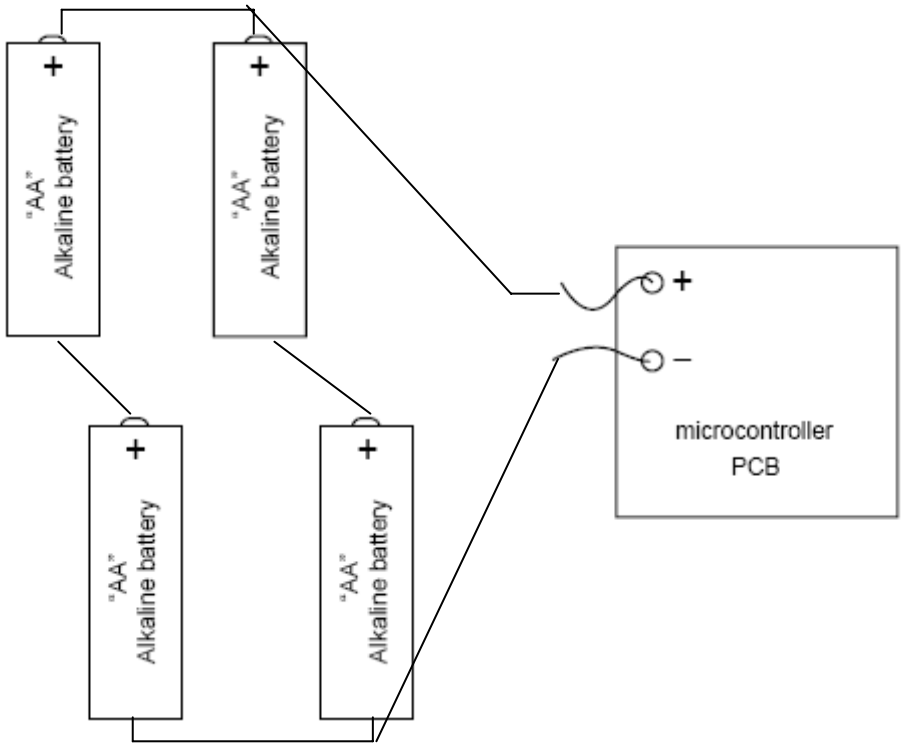
Marks	0	1	2	3	4	5	6	Average
%	6	3	8	8	27	12	37	**4.3**

Danger	Explanation of the effect on personnel
Exposure to heat	Explosion damage to skin and/or eyes
Chemical leakage	Damage to skin and/or eyes
Fumes	Damage to respiratory systems
Short circuit	Sparks, damage to eyes, burns to skin
Dropping heavy battery	Damage to foot – cuts, abrasions, etc.

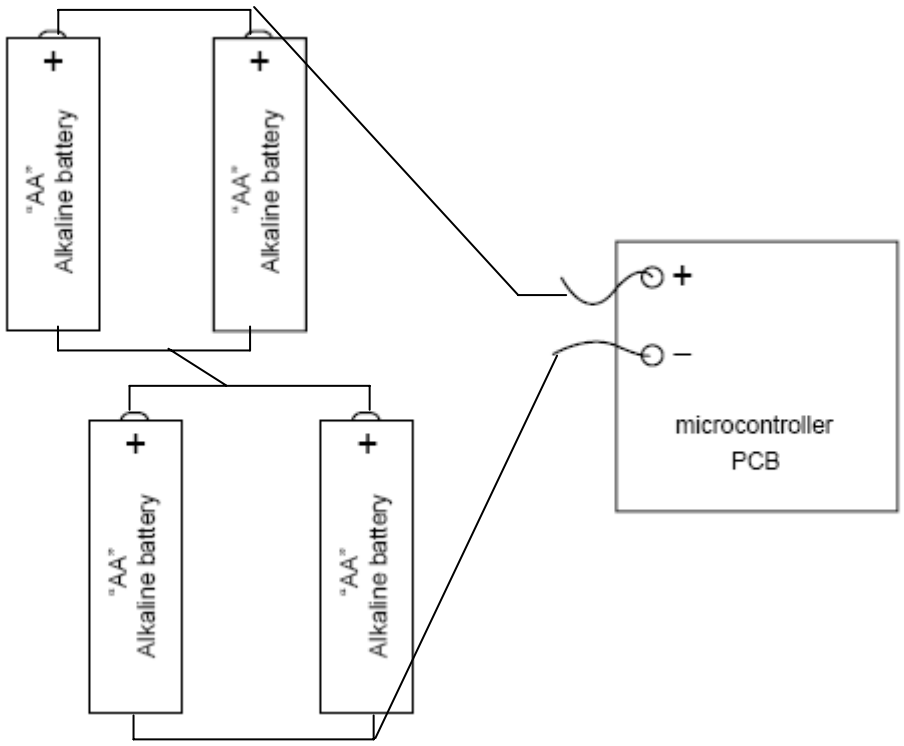
Most students were able to respond to this question and scored well.

Question 4b.

Marks	0	1	2	Average
%	56	11	34	**0.8**

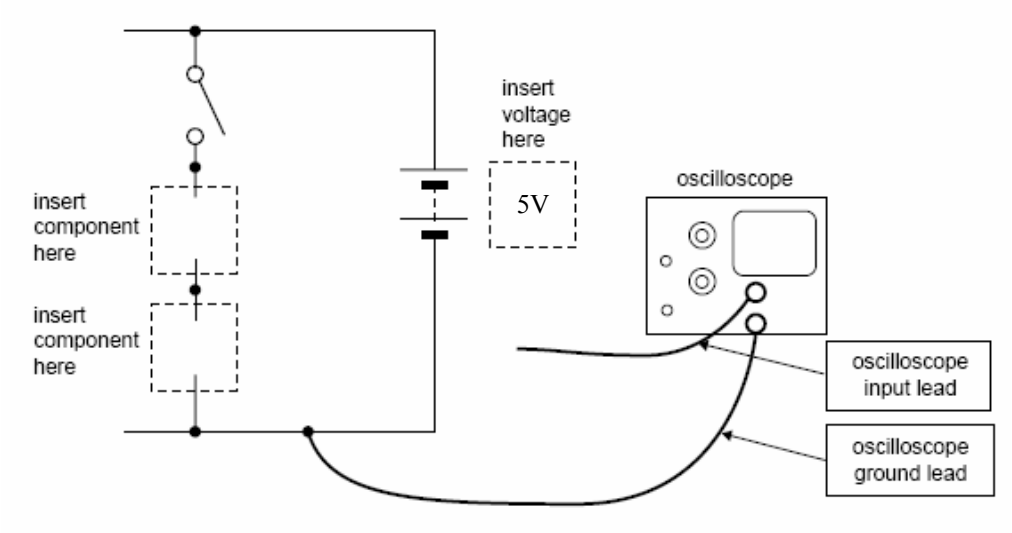


or



Question 5a.

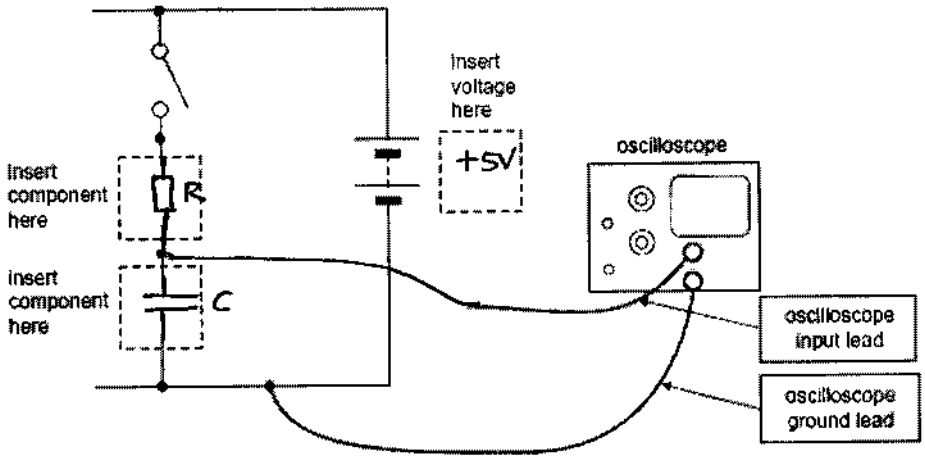
Marks	0	1	2	3	Average
%	15	27	41	17	**1.6**



Most students could identify R and 5V, thus were awarded two marks. There were few correct responses that also identified C. It appears that students need more help with R-C circuits and their responses.

Question 5b.

Marks	0	1	Average
%	80	21	**0.2**



One mark was awarded for connecting the CRO to the connection point between R and C.

The poor response to this question shows a lack of understanding or coverage of this area.

Question 5c.

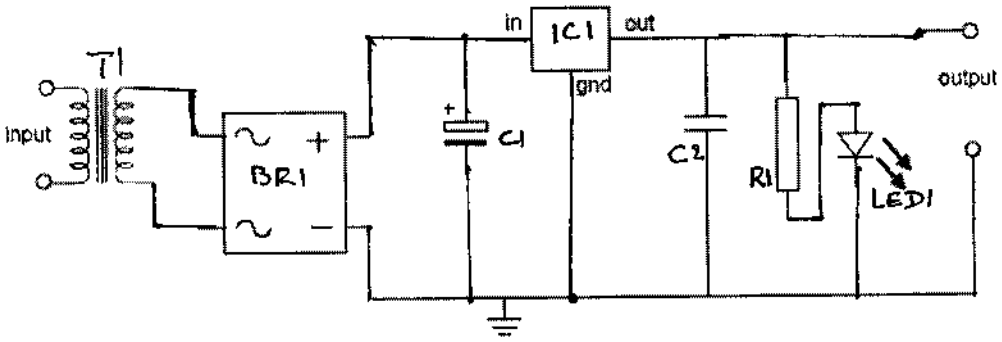
Marks	0	1	2	Average
%	87	1	11	**0.3**

5 × ϯ = 15; ϯ = 3 minutes or 180 seconds

The poor response to this question suggests that this topic may not have been covered in detail in class, despite the fact that the topic and related questions were in the 2006 examination and sample paper.

Question 6a.

Marks	0	1	2	3	4	5	Average
%	11	11	13	28	5	32	**3.0**



The marks were divided as follows

- one mark for the connection from the transformer
- one mark for GND connections
- one mark for rectifier o/p to regulator input connection
- two marks for correct output connections.

Question 6b.

Marks	0	1	2	Average
%	56	7	37	**0.8**

It is a rectifier – converts AC input to DC output.

Variations of answers that showed Rectifier, AC input and DC output were awarded marks.

Question 6c.

Marks	0	1	Average
%	69	31	**0.3**

Voltage regulator

Other variations were accepted, including IC and integrated circuit.

Question 6d.

Marks	0	1	2	Average
%	73	9	19	**0.5**

It regulates the output voltage for variations in input voltage and output load.

Correct answers included words such as ‘stabilise’ and ‘set the output voltage’.

Question 6e.

Marks	0	1	2	Average
%	31	25	44	**1.2**

Any two strategies from the following were accepted:

- heat sink
- fan ventilation
- substitute a more heat tolerant IC
- drop the voltage to the regulator
- check for faulty load.

Question 7a.

Marks	0	1	2	3	Average
%	9	7	20	64	**2.4**

- The bar code is read.
- The bar code is valid.
- The motor is turned on.

This question tested whether students were able to read flowcharts and follow the sequence of actions when certain conditions are met. Responses indicated that a majority of students were able to do this.

Question 7b.

Marks	0	1	2	Average
%	21	17	62	**1.4**

- The motor keeps running.
- The boom gate stays up.

Question 7c.

Marks	0	1	2	Average
%	28	11	62	**1.4**

- Additional hardware: an extra loop
- Location: inside the car park

Other options that were considered correct included a manually operated system or a bar code reader inside the car park.

Question 8a.

Marks	0	1	2	3	4	Average
%	8	3	4	10	75	**3.4**

Temperature Logic 0 = below 6°C Logic 1 = equal to or above 6°C	**Time of day** Logic 0 = night-time Logic 1 = daytime	**Heater** Logic 0 = heater off Logic 1 = heater on
0	0	*1*
0	1	*0*
1	0	*0*
1	1	*0*

This question was answered well.

Question 8b.

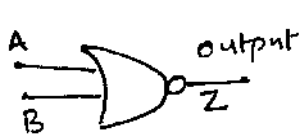
Marks	0	1	Average
%	73	27	**0.3**

NOR gate

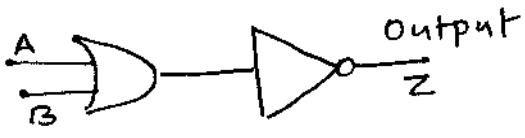
The poor response rate shows that many students did not know the symbols commonly used for logic gates.

Question 8c.

Marks	0	1	Average
%	53	47	**0.5**



or



Students who drew the standard symbol for a NOR gate received one mark. Alternatively, students could draw an OR followed by a NOT also received full mark.

A lack of uniformity in responses to Questions 8a–c. shows that students need to develop a better understanding of basic gates, symbols and truth tables. This is the basic knowledge needed for digital circuits.

Questions 9a–b.

Marks	0	1	2	3	4	Average
%	29	20	25	15	10	**1.6**

9a.
Any two of:

- CD player
- MP3 player
- digital music player
- digital video player
- modem
- digital television adapter.

9b.
Any two of:

- digital voltmeter
- digital CRO
- digital thermometer
- CD writer
- DVD writer
- modem.

Questions 9c–d.

Marks	0	1	2	Average
%	16	46	38	**1.2**

9c.
256

0–255 and 255 were also awarded full marks.

9d.
USB

Even though this question related to devices or systems that are commonly used, most students did not recognise what is contained in them. These systems could be used as examples when the relevant topics are discussed.

Questions 10a–b.

Marks	0	1	2	Average
%	65	13	22	**0.6**

10a.
H

10b.
m

Question 10c.

Marks	0	1	2	3	Average
%	69	1	1	30	**0.9**

Byte 7 = $(01000101)_2$ = 64 + 4 + 1 = 69

Each step in the question was worth one mark.

Question 10d.

Marks	0	1	2	3	Average
%	77	1	2	20	**0.7**

$(927)_{10} = (1001\ 0010\ 0111)_{BCD}$

One mark was awarded for converting each digit to correct binary form.

Most students did not know what a BCD system of number is, even though this is commonly used in digital systems for displaying numbers.

Question 11a.

Marks	0	1	Average
%	44	56	**0.6**

Any of:

- network printer
- another PC
- router
- switch.

Question 11b.

Marks	0	1	2	Average
%	47	23	30	**0.9**

A NIC adapter converts the binary data to a suitable packet format and appropriate voltage levels.

Most students could identify what device could be connected to a NIC adapter, but they did not understand what the purpose of such an adapter was. 'Interfaces external network devices to a PC' was also accepted.

Question 11c.

Marks	0	1	Average
%	43	57	**0.6**

Input/Output

Question 11d.

Marks	0	1	2	Average
%	46	35	19	**0.8**

A device conflict occurs when devices sharing the same Input/Output address in a PC try to access the CPU simultaneously.

This question was challenging for students, and marks were awarded for using some of the key terms such as 'devices accessin

Question 11e.

Marks	0	1	2	Average
%	81	7	12	**0.3**

256 (or 00–FF)