2006 Assessment Report

VICTORIAN CURRICULUM AND ASSESSMENT AUTHORITY

2006 VCE VET Electrotechnology GA 2: Written examination

GENERAL COMMENTS

This was the first examination for the VCE VET Electrotechnology program based on 21583VIC Certificate II in Electrotechnology (Shared Technology). It replaced the VCE VET Electronics program.

The written examination is based on the 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 involving component identification and those where students had to 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 only partially answered correctly. Few students were able to complete calculation style questions completely.

SPECIFIC INFORMATION

Section A

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

Question	% A	% B	% C	% D	Comments
1	14	17	44	25	
2	57	28	6	9	
3	19	17	16	48	
4	63	1	34	2	
5	0	22	59	19	
6	54	30	7	10	
7	36	12	9	43	The safety standard for wrist straps, leg straps and bench mats is that the resistance to earth must exceed 8×10^5 Ω. This may be achieved by incorporating a 1MΩ resistor in the attaching lead (alternative B). It is also possible for the wrist strap system to be made of selected high resistivity materials, therefore alternative D is also possible. Both answers were therefore awarded the mark.
8	16	11	46	27	
9	7	45	44	4	Many students seemed to misunderstand the main purpose of a circuit breaker.
10	4	2	2	92	
11	37	47	7	10	The popularity of alternative B indicates a limited knowledge of basic computer architecture amongst some students.
12	16	13	31	39	
13	5	20	74	1	
14	4	47	29	20	
15	2	25	7	66	
16	87	7	3	2	
17	4	61	8	27	
18	22	61	15	2	
19	6	6	66	22	
20	26	9	12	52	

Section B

Students were awarded full marks for questions requiring a calculation if the correct answer was given with the correct unit. The vast majority of students showed working and were able to gain partial marks even if they did not arrive at the correct answer.

Questions 1a–b.

Marks	0	1	2	Average
%	1	13	86	**1.9**

1a.
Answers within the range of 2k–2.2kΩ were accepted.

1b.
Answers within the range of 7–8°C degrees were accepted.

Questions 1c–d.

Marks	0	1	2	Average
%	6	27	67	**1.6**

1c.
decrease

1d.
Acceptable responses included:

- temperature control
- air conditioning
- electronic thermometer.

Question 2a.

Marks	0	1	2	3	Average
%	23	28	28	22	**1.5**

$$I = \frac{V}{R} = \frac{6 - 1.8}{220} = 19.1 \text{ mA}$$

One mark was awarded for dividing a voltage by a current, one mark for using the correct voltage across R (4.2 V), and the final mark for calculating the answer with the correct unit.

Question 2b.

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

To limit the current to the LED.

A common error was that the resistor set the LED voltage.

Question 2c.

Marks	0	1	2	3	Average
%	30	19	14	37	**1.6**

$$R = \frac{V}{I} = \frac{12 - 0.1}{2.1} = 5.67\Omega$$

One mark was awarded for dividing a voltage by a current, one mark for using 11.9 V and one mark for giving the correct answer with the correct unit. Partial marks were awarded if 12 V was used instead of 11.9 V.

Question 2d.

Marks	0	1	2	Average
%	59	16	24	**0.7**

To prevent the back EMF of the motor damaging Q1 and/or the microcontroller.

One mark was awarded for a correct reference to EMF in the answer, and one mark for referring to damage to Q1/microcontroller.

Question 3a.

Marks	0	1	Average
%	45	55	**0.6**

+5 V or 5 V

Question 3b.

Marks	0	1	2	Average
%	59	19	22	**0.7**

$\tau = \text{R1C1} = 82\ \text{k} \times 0.01\mu\text{F} = 820\mu\text{s}$

One mark was awarded for correct R and C multiplication, and one mark for multiplying an R value by a C value with a correct unit (such as seconds, milli-seconds or micro-seconds).

Many students did not select the correct R and C values.

Question 3c.

Marks	0	1	2	3	4	Average
%	71	7	7	6	8	**0.7**

$\tau = \text{R2C1} = 100\Omega \times 0.01\mu\text{F} = 1\mu\text{s}$

Two marks were awarded for correct R and C selection and multiplication, one mark for multiplying an R value by a C value and correctly supplying a unit (such as seconds, milli-seconds or micro-seconds), and one mark for multiplying by 5 to get the total discharge time. Partial marks were given for calculating a time constant, and for multiplying by 5 and expressing an answer with correct decimal place/units.

Few students were able to identify the discharge path through R2 alone. Very few students demonstrated knowledge of five time constants to fully discharge the capacitor.

Question 4a.

Marks	0	1	Average
%	61	39	**0.4**

Acceptable answers included:

- wristwatch battery
- motor vehicle remote entry key
- clock back-up on computer motherboard.

Many students confused the lithium (3V primary cell) with the lithium-ion rechargeable cell.

Question 4b.

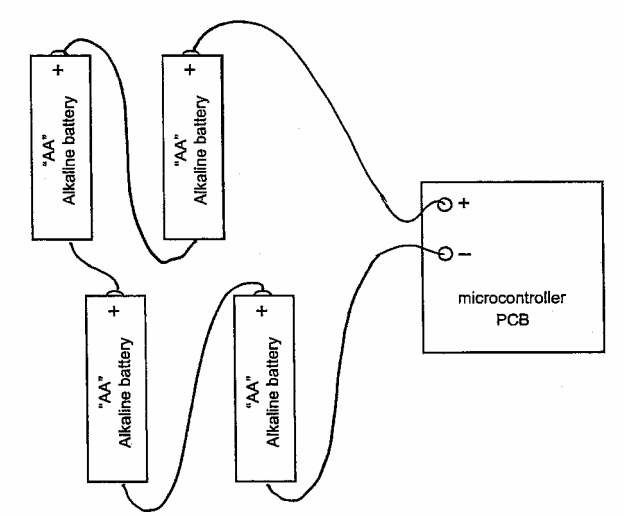
Marks	0	1	2	Average
%	17	55	27	**1.1**

Acceptable answers included:

- long life
- flat/compact profile
- useful in higher than 1.5V applications
- environmentally friendly as they are not replaced very often.

Question 4c.

Marks	0	1	2	3	4	Average
%	9	4	7	4	76	**3.4**



Numerous topologies of cells with correct series inter-connection of cells and correct cell to microcontroller polarity termination were awarded full marks.

Partial marks awarded for series/parallel combination that had correct inter-cell polarity connections and correct cell to microcontroller polarity termination.

This question was well answered.

Question 4d.

Marks	0	1	Average
%	28	72	**0.7**

Possible reasons included:

- high load current
- short circuit
- under rapid charge or overcharged
- cell within pack
- connection to circuit is reversed.

This question was generally well answered.

Question 5a.

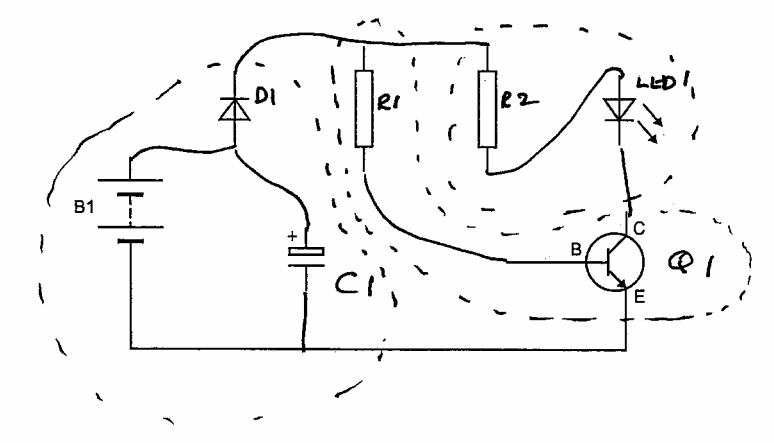
Marks	0	1	2	3	4	5	Average
%	0	1	0	7	13	79	**4.7**

Component	Device name
B1	Battery
C1	Capacitor
D1	Diode
LED1	Light emitting diode
R1/R2	Resistor
Q1	Transistor

This question was very well answered. Q1 was the device most often incorrectly identified.

Question 5b.

Marks	0	1	2	3	4	5	Average
%	9	11	2	4	27	46	**3.7**



The most common mistake was C1/D1 loops drawn incorrectly and R1 and R2 incorrectly drawn in series. Some students did not label each component as requested, which resulted in the loss of one mark.

Question 5c.

Marks	0	1	Average
%	2	98	**1.0**

Acceptable answers included:

- protective eye wear
- goggles
- fume extractor
- gloves.

Question 6a.

Marks	0	1	2	Average
%	7	12	81	**1.8**

The pump is on (turns on) and the tank fills with water.

Question 6b.

Marks	0	1	2	3	Average
%	10	9	28	53	**2.3**

The pump turns off (pump is off), the tank empties until the low water sensor is active (on), then the pump switches on and the tank refills with water.

This question was well answered; however, quite a few students had incomplete or partially incorrect descriptions.

Question 6c.

Marks	0	1	2	Average
%	30	11	59	**1.3**

The pump would rapidly cycle on and off.

Answers that stated ‘the tank would fill and overflow’ or ‘the tank would empty’ without referring to the system function/malfunction were awarded one mark.

Question 7a.

Marks	0	1	2	3	Average
%	21	13	17	50	**2.0**

Gate 1	Inverter/not gate
Gate 2	AND gate
Gate 3	OR gate

The most incorrectly identified gate was the Inverter/not gate.

Question 7b.

Marks	0	1	2	3	4	5	Average
%	5	5	7	20	18	45	**3.7**

A	B	X1	X2	X3	X4	Z
0	0	***1***	1	0	***0***	0
0	1	1	0	1	***0***	1
1	0	0	***1***	0	1	***1***
1	1	0	0	0	0	0

Questions 8a–b.

Marks	0	1	2	3	Average
%	3	2	39	57	**2.5**

8a.
Any of:

- CPU socket
- ZIF socket
- processor socket.

8b.
keyboard and mouse

Question 8c–d.

Marks	0	1	2	Average
%	2	19	79	**1.8**

8c.
Connector G

8d.
A USB device (or a specific USB device, such as memory stick, USB printer, etc.)

Question 8e–f.

Marks	0	1	2	Average
%	15	37	48	**1.4**

8e.
Connector H

8f.
Power connector **or** extra-low voltage power plug

Question 9a.

Marks	0	1	2	3	4	5	Average
%	12	4	4	13	9	58	**3.8**

Characters	SOH	G	5	d	EOT
ASCII (in Hex)	01	47	35	64	04

Partial marks were awarded if the order of the digits was swapped.

Question 9b.

Marks	0	1	Average
%	12	88	**0.9**

Any of:

- UPS
- backup generator
- backup batteries.

Question 9c.

Marks	0	1	Average
%	51	49	**0.5**

Either of:

- analogue to digital
- digital to analogue.

Answers such as music to computer conversion were not accepted. Some students did not attempt this question.

Question 10a.

Marks	0	1	2	Average
%	49	8	44	**1.0**

The multiple data paths of the parallel port provide faster data throughput than a serial port.

This question was not well answered. Many students did not address the question. Incorrect answers included bi-directional data and fewer device conflicts.

Question 10b.

Marks	0	1	2	Average
%	73	10	17	**0.5**

The parallel port has more conductors, wires and PCB tracks, takes up more physical space and is more expensive to manufacture than a serial port.

This question was not well answered. A number of students incorrectly referred to the required amount of memory or conflicting devices.

Questions 10a. and 10b. tested students' understanding of the general advantages/disadvantages of parallel ports compared with serial ports. Some incorrect or partially correct answers referred to the specific USB serial port technology but did not fully address the general nature of the question.

Question 10c.

Marks	0	1	2	Average
%	67	9	23	**0.6**

Eight locations

Partial marks were awarded for the difference between 0378h and 037Fh (seven locations).

This question was not well answered. The most common mistake was for students to attempt to convert one of the port addresses to decimal.

Question 10d.

Marks	0	1	2	Average
%	71	4	25	**0.5**

0000 0011 0111 1000

Answers with leading zeroes suppressed were also accepted.

This question was not well answered. Mistakes were common in the working of students who attempted to convert to decimal and then convert to binary.

Question 10e.

Marks	0	1	2	Average
%	78	0	21	**0.4**

$(8\times1)+(7\times16)+(3\times256)=888$

Few students attempted this question.

Question 10f.

Marks	0	1	2	Average
%	43	22	35	**0.9**

Accepted answers included:

- USB
- parallel
- serial
- network
- infrared
- Bluetooth.