VICTORIAN CURRICULUM AND ASSESSMENT AUTHORITY

2008 VCE VET Laboratory Skills GA 2: Written examination

GENERAL COMMENTS

VCE VET Laboratory Skills is one of the smaller VCE VET studies offered. Due to the small sample size, it was difficult to establish any trends.

Most students read the questions carefully and their answers demonstrated a clear understanding of the topic. However, a very small number of students completed all three electives, causing themselves unnecessary stress. Some students did not complete questions on the short answer section of the paper.

As in previous years, questions involving calculations presented problems for some students. It is essential that students at this level are able to determine the molarities and concentration of chemical solutions, perform dilutions and balance chemical equations.

SPECIFIC INFORMATION

For each question, an outline answer (or answers) is provided. In some cases the answer given is not the only answer that could have been awarded marks.

Section A – Core units – 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	Comments
1	0	17	8	75	
2	8	0	92	0	
3	17	50	33	0	
4	8	25	25	42	
5	0	17	0	83	
6	100	0	0	0	
7	83	0	8	8	
8	0	17	0	83	
9	0	83	8	8	
10	0	0	42	58	It is important to incubate a representative sample of the medium as contaminants may be present in very small numbers, which may be missed by the other methods listed.
11	0	0	42	58	Bottles containing bacteria must be autoclaved to make them safe before any other processing occurs.
12	0	17	17	67	
13	25	67	0	8	
14	50	42	0	8	Option B was the correct interpretation of the term ‘formula weight’. This is one of the basic chemical concepts taught in this study.
15	0	0	8	92	Question 15 caused students a great deal of difficulty, with most students responding that a titration is performed to determine the concentration of the standard being used in the titration, which is in fact the known factor.
16	0	8	92	0	
17	100	0	0	0	
18	0	0	92	8	
19	17	0	83	0	
20	0	83	8	8	

In general, the multiple-choice questions were answered well. The questions that caused difficulties for students were 10, 11, 14 and 15.

Section B – Short answer questions

Core units

Question 1

Marks	0	1	2	3	Average
%	26	17	57	0	**1.3**

Three of:

- fit for purpose
- conforms to requirements
- meets the client's needs
- dependable
- predictable
- uniform.

As in previous years, students had difficulty defining what is meant by a quality product, which is fundamental to understanding of this unit.

Question 2

Marks	0	1	2	3	4	Average
%	0	0	39	0	61	**3.3**

Term	Definition
Reliable	data collected in the approved way and error free
Relevant	data about the things that most affect what needs to changed or improved
Readable	data that people making the decisions can interpret
Representative	data without bias that might distort the results and lead to poor conclusions

Question 3a–b.

Marks	0	1	2	Average
%	4	74	22	**1.2**

Question 3a.

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Question 3b.

Upper and lower control limits

Question 4ai–iii.

Marks	0	1	2	3	Average
%	0	0	26	74	**2.8**

4ai.

Autoclave: autoclave to sterilise the agar and buffered peptone water

4aii.

Sterile 1 ml pipettes: sterile pipettes to measure the milk samples for the serial dilutions

4aiii.

Bunsen burner: Bunsen burner to flame bottles and provide a sterile umbrella for the testing

Question 4b.

Marks	0	1	2	3	4	5	6	Average
%	0	0	4	43	30	4	17	**3.9**

Any six of (in a logical sequence):

- clean and disinfect the work area
- open and flame the mouth of the milk container

- add 1 ml of milk to 9 ml of buffered peptone water and mix well (1/10)
- open the mouth of the diluted milk and flame the mouth of the container
- add 1 ml of this dilution to 9 ml of buffered peptone water (1/100)
- open the mouth of the milk mixture and flame the mouth of the container
- add 1 ml of this dilution to 9 ml of buffered peptone water (1/1000).

Question 4c.

Marks	0	1	2	Average
%	61	26	13	**0.5**

Two agar deeps are required for each dilution.
Undiluted milk, 1/10, 1/100, 1/1000 8 deeps
Plus 1 negative control = 9 deeps in total

Question 4d.

Marks	0	1	2	Average
%	0	13	87	**1.9**

Two essential items of labelling which would be required on each Petri dish include:

- date
- dilution
- sample number
- type of agar.

Question 4e.

Marks	0	1	Average
%	48	52	**0.5**

To ensure that the peptone water and agar deeps were sterile (did not contain any bacteria)

Although some students answered this question very well, the concept of serial dilutions continues to cause problems for a number of students. Questions 4c. and 4e. caused difficulties for many students. More attention needs to be paid to the function of a negative control.

Question 5a.

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

A solution containing a known concentration of a substance

A number of students had difficulty with the definition of a stock solution. Once again, this concept is fundamental to this core unit.

Question 5b.

Marks	0	1	2	Average
%	0	61	39	**1.4**

Possible answers could have been:

- pipette
- volumetric flask
- funnel
- stirrer.

Question 5c.

Marks	0	1	2	Average
%	0	0	100	**2**

- laboratory coat
- safety glasses or goggles

Question 5d.

Marks	0	1	2	Average
%	22	4	74	**1.6**

C1V1=C2V2

5xX=1.5x250

X=75ml or 0.075L

Question 6a–b.

Marks	0	1	2	Average
%	0	9	91	**1.9**

- gas produced
- NO_2 produced

Question 6b.
MSDS

Question 6c.

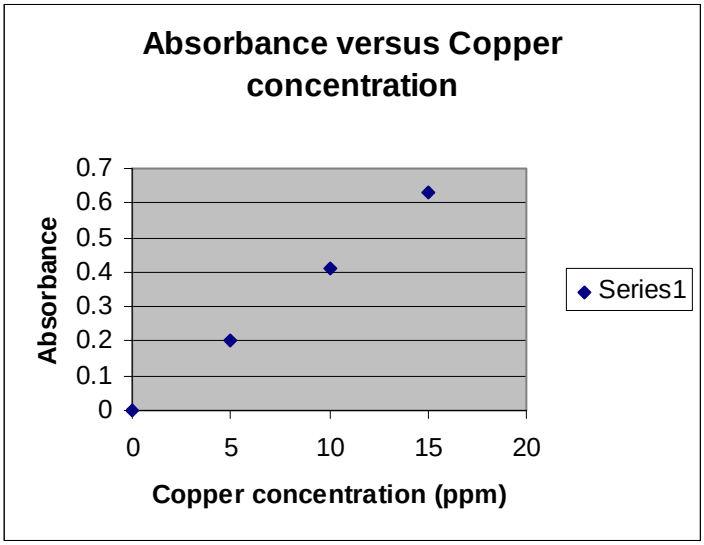
Marks	0	1	2	Average
%	35	13	52	**1.2**

- 50 mg/L
- 0.05 g/L

Question 6di–ii.

Marks	0	1	2	3	4	Average
%	0	0	22	43	35	**3.2**

6di.



- x, y labelled
- heading
- accurate numbering

6dii.
5.5 ppm

Question 6e–f.

Marks	0	1	2	Average
%	0	30	70	**1.7**

6e.
No (not safe)

Question 6f.
Logbook

Section C – Electives

Elective 1 – PMLTEST308A Perform microscopic examinations

The students who chose this elective appeared to have a good understanding of the units covered. The only question which caused a number of students difficulty was Question 1a., where a number of students did not appear to understand what was expected of them.

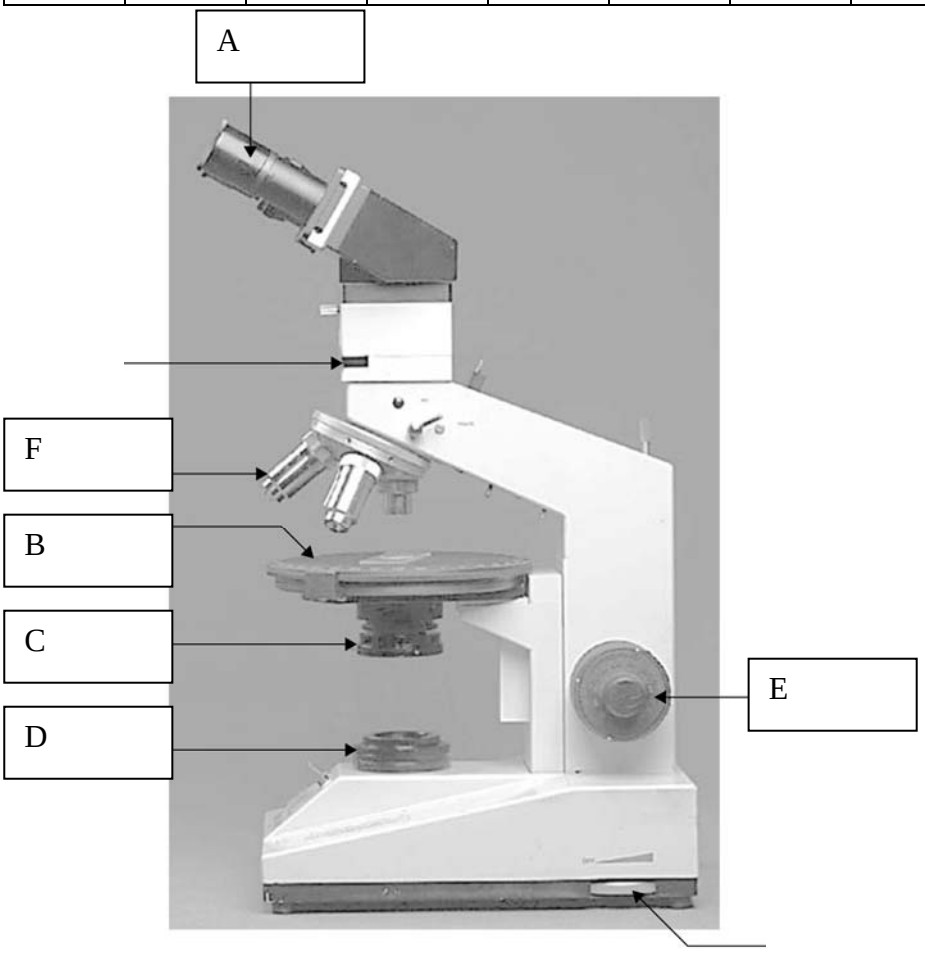
Question 1a.

Marks	0	1	2	Average
%	48	26	26	**0.8**

- binocular
- trinocular
- monocular
- stereo
- inverted

Question 1b.

Marks	0	1	2	3	4	5	6	Average
%	0	0	0	0	13	30	57	**5.5**



Question 1c.

Marks	0	1	2	Average
%	0	0	100	**2**

- clean lenses
- move to the lowest power
- cover the microscope
- remove slides and coverslips
- unplug from the power
- lower stage and objectives

Question 2ai–iii.

Marks	0	1	2	3	4	5	6	7	Average
%	0	0	0	13	26	22	35	4	**4.9**

2ai.
5 x 10 = 50

2aii.
Ocular x 10
Objective (lens) x 40

2aiii.
- improve resolution
- bend the light rays
- refract light

Question 2bi–ii.

Marks	0	1	2	Average
%	9	57	35	**1.3**

2bi.
Gram stain

2bii.
Blue/purple

2c.

Marks	0	1	Average
%	22	78	**0.8**

Neuerbauer counting chamber

Elective 2 – PMLTEST409A Capture and manage scientific images

The students who attempted this elective showed a good understanding of the topics covered.

Question 1a–b.

Marks	0	1	2	3	Average
%	0	6	33	61	**2.6**

1a.
Make digital copies of the slides

1b.
- convert to digital images
- organise files into folders
- put images onto a shared drive to make them accessible to others

Question 1c.

Marks	0	1	2	Average
%	11	11	78	**1.7**

- increase the health and safety of workers in the laboratory
- make the laboratory more environmentally sustainable

Question 2a.

Marks	0	1	2	3	Average
%	0	17	44	39	**2.2**

Possible answers could have included:

- ultraviolet
- infrared
- visible
- poly.

Question 2b.

Marks	0	1	2	Average
%	11	56	33	**1.2**

Possible answers could have included:

- labelling locations
- labelling specimens
- preventing contamination of the scene
- correlation of image to specimen
- chain of custody.

Question 2c.

Marks	0	1	2	Average
%	0	33	67	**1.7**

Possible answers could have included:

- gloves
- protective clothing
- goggles
- personal hygiene.

Question 3a.

Marks	0	1	2	3	Average
%	11	6	28	56	**2.3**

Possible answers could have included:

- typical sites
- testing equipment
- reports and results
- company logos
- images of people doing the testing.

Question 3b.

Marks	0	1	2	Average
%	11	6	83	**1.7**

Possible answers could have included:

- efficiency
- accessibility
- ease of use
- cost
- reducing waste.

Question 3c–d.

Marks	0	1	2	3	Average
%	11	28	22	39	**1.9**

Question 3c.

Possible answers could have included:

- date/time
- grid reference
- client
- job number
- operator.

Question 3d.

- F – Stop

Elective 3 – PMLTEST304B Prepare culture media

Many students had difficulty with this elective, in particular with listing the sequential steps required to prepare a batch of culture medium.

All culture medium come with instructions for preparing 1 litre of medium, however, it is often necessary to prepare batches that are much smaller or larger than this.

Serum used in the preparation of some culture medium is heat labile and is usually purchased as a sterile solution. It is easy to contaminate and sterility can be assured by using an appropriate sterile filtration system.

Question 1a.

Marks	0	1	2	3	4	5	6	Average
%	40	0	0	40	20	0	0	**2.4**

Possible answers could have included:

- weigh 20 grams of nutrient agar into a heat-proof container
- accurately measure 500 ml of distilled water and add to the container
- heat to dissolve (100°C)
- dispense in 10 ml volumes
- cap bottles
- sterilise the agar bottles in the autoclave according to the standard operating instructions

- allow to cool
- label bottles.

Question 1b–c.

Marks	0	1	2	Average
%	0	0	100	**2**

Question 1b.
25 ml

Question 1c.
Any one of:

- manufacturer's information
- bottle of base
- standard operating instructions.

Question 2a–b.

Marks	0	1	2	Average
%	20	80	0	**0.9**

2a.

- 100 ml
- 90 ml

Question 2b.
10 ml

Question 2c.

Marks	0	1	2	3	4	5	6	Average
%	0	20	40	40	0	0	0	**2**

- prepare the agar base according to manufacturer's instructions or SOPs
- melt the agar
- allow to cool
- add a sterile serum
- mix well without causing bubbles
- dispense in 25 ml volumes into Petri dishes
- allow to set
- label

Question 2d–e.

Marks	0	1	2	3	4	Average
%	0	0	20	80	0	**2.9**

2d.
Filter it with a suitable sterile filter

2e.

- type
- date
- batch
- preparer