VICTORIAN CURRICULUM AND ASSESSMENT AUTHORITY

Victorian Certificate of Education 2006

SUPERVISOR TO ATTACH PROCESSING LABEL HERE

STUDENT NUMBER

Figures									Letter
Words									

VCE VET LABORATORY SKILLS

Written examination

Friday 17 November 2006

Reading time: 3.00 pm to 3.15 pm (15 minutes)
Writing time: 3.15 pm to 4.45 pm (1 hour 30 minutes)

QUESTION AND ANSWER BOOK

Structure of book

Section	*Number of questions*	*Number of questions to be answered*	*Number of marks*
1 – Core	14	14	30
	Number of electives	*Number of electives to be answered*	
2 – Electives	3	2	60
			Total 90

- Students are permitted to bring into the examination room: pens, pencils, highlighters, erasers, sharpeners, rulers and one scientific calculator.
- Students are NOT permitted to bring into the examination room: blank sheets of paper and/or white out liquid/tape.

Materials supplied
- Question and answer book of 23 pages.

Instructions
- Write your **student number** in the space provided above on this page.
- All written responses must be in English.

Students are NOT permitted to bring mobile phones and/or any other unauthorised electronic devices into the examination room.

SECTION 1 – Core units

Instructions for Section 1

Answer **all** questions in the spaces provided.

For Questions 1 to 10, write the letter of the correct alternative in the box provided.

Question 1

Laboratory technicians calibrate equipment

A. only when absolutely necessary to avoid delays in obtaining results.

B. when specified by manufacturers, operating procedures or audit certification requirements.

C. when poor results indicate it is necessary.

D. at various times depending on the workload of the laboratory.

1 mark

Question 2

Which one of the following is **not** an example of sustainable laboratory practice?

A. adopting international standards for laboratory procedures

B. switching off equipment not immediately required at the power point

C. repairing, not disposing, of equipment that is still capable of performing tests efficiently

D. ensuring that testing procedures avoid or reduce the levels of harmful wastes

1 mark

Question 3

2 mL of a reagent diluted with 18 mL of diluent is

A. a 2:18 dilution.

B. a 2:10 dilution.

C. a 1:15 dilution.

D. a 1:10 dilution.

1 mark

Question 4

If a leadership style is autocratic, which of the following behaviours will most likely be demonstrated?

A. allow technicians to set their own timeframes
B. allow technicians to perform tasks in their own way
C. encourage technicians to contribute to the team's achievements
D. make decisions without consulting the team

1 mark

Question 5

Which of the following behaviours is **not** helpful in forming a successful work team?

A. respecting other team members' ideas
B. thinking about other team members' feelings
C. keeping information to oneself
D. never listening to gossip

1 mark

Question 6

Water does not always boil at 100°C.

One factor that does **not** affect the temperature at which water boils is

A. air pressure.
B. purity of water.
C. room temperature.
D. type of container.

1 mark

Question 7

A pH meter can be made inaccurate by

A. contamination of the buffer solution used in calibrating the instrument.
B. repeating an experiment continuously.
C. the time of the day an experiment is conducted.
D. moving the pH meter before calibration.

1 mark

Question 8

While checking glassware in the laboratory, all thermometers need to be checked for

A. bubbles trapped in the bulb.

B. pressure in the bulb.

C. age.

D. substances previously tested.

1 mark

Question 9

Laboratory occupational health and safety procedures are especially important because

A. there are specific hazards in laboratories.

B. the consequences of unsafe procedures are not likely to be very serious.

C. the laws are much stricter for laboratories.

D. the Occupational Health and Safety Act does not apply to laboratories.

1 mark

Question 10

Water taps in laboratories should be routinely turned on for short periods to

A. ensure that they still work properly and reliably, and the water is corrosion free.

B. ensure that the sinks beneath them do not leak, so ensuring legal wastes are safely flushed.

C. ensure there is a small pool of water in the pipe elbow, to limit any vapours passing up from sinks into the laboratory.

D. All of the above.

1 mark

Question 11

Instrument logs or log books contain important information on how the instrument is performing.

a. List **two** important features that should be detailed in the log book.

1. _____

2. _____

2 marks

b. Calibration checks depend on many factors. Give **two** reasons why the frequency of calibration of laboratory equipment should be increased.

_____

_____

_____

_____

2 marks

c. Explain **three** methods you would use to determine if a laboratory balance was out of calibration.

_____

_____

_____

_____

_____

_____

3 marks

Question 12

Describe **two** important differences between a work group and a work team.

Work group	Work team
_____	_____
_____	_____
_____	_____
_____	_____

4 marks

Question 13

The quality control laboratory of a dairy factory has five technicians divided into two work teams; microbiological testing and chemical testing. Mandy belongs to both teams. When the laboratory is busy Mandy finds it difficult to meet deadlines due to the competing priorities of the two groups. What can Mandy do to resolve her problem and ensure her work is completed on time?

3 marks

Question 14

Fluoride concentrations can be measured simply and rapidly in a wide range of natural water using an ion selective electrode. A technician is required to determine the concentration of fluoride (F^-) in drinking water.

The following results were obtained.

Fluoride standards	Potential (Mv)	Test sample	Potential (Mv)
5 ppm	50	tap water	75
10 ppm	102		
15 ppm	155		

a. Plot a calibration curve (observed potential versus F^- ppm).

3 marks

b. Determine the concentration of fluoride (F^-) in the tap water.

1 mark

c. List **two** factors which may have caused inaccurate results in this experiment.

2 marks

Total 30 marks

END OF SECTION 1
TURN OVER

SECTION 2 – Electives

Instructions for Section 2

Complete **two** electives **only**. Answer **all** questions within the **two** chosen electives in the spaces provided.

Elective 1 – PMLTEST 300A Perform basic tests

For Questions 1–10, write the letter of the correct alternative in the box provided.

Question 1

Gravimetric analysis involves determining the _____ of a substance.

A. volume

B. components

C. weight

1 mark

Question 2

Volumetric analysis involves determining the _____ of a substance.

A. weight

B. volume

C. pH

1 mark

Question 3

Refractive index refers to

A. the behaviour of light as it passes between materials of different densities.

B. the thickness of materials.

C. the concentration of substances.

1 mark

Question 4

The melting point of a substance is the temperature at which

A. all of the solid begins turning into a liquid.

B. all of the solid has turned into a liquid.

C. all of the solid begins giving off a gas.

1 mark

Question 5

A Ford Cup is used to measure

A. temperature.

B. viscosity.

C. mass.

1 mark

Question 6

The end point of a titration is

A. the point when the titrant and the analyte have fully reacted.

B. the point when all of the titrant has been dispensed.

C. the point when the indicator is added to the analyte.

1 mark

Question 7

In a laboratory, organic flammable waste materials should be disposed of in

A. the sink, flushing with plenty of water.

B. an organic residue container.

C. the sink, following treatment with a neutralising agent.

1 mark

Question 8

Chemical testing is performed in a laboratory for several reasons.

Chemical testing does **not** include

A. providing information to consumers about the components of a food or pharmaceutical product.

B. checking the concentration of a chemical in a mixture.

C. determining the density of a product.

1 mark

Question 9

Laboratory Personal Protective Equipment (PPE) does **not** include

A. instruction manuals.

B. safety glasses.

C. comfortable enclosed shoes.

1 mark

Question 10

When unsure of how to clean and store equipment in the laboratory, you should consult

A. the instrument log.

B. the instrument manual.

C. the Material Safety Data Sheet (MSDS).

1 mark

Question 11

a. Define the term viscosity.

1 mark

b. Give an example of a product with each of the following properties.

High viscosity

Low viscosity

2 marks

c. Give **two** examples of products where viscosity properties are important and explain why.

4 marks

d. List **three** factors that can affect your results when measuring the viscosity of a substance.

3 marks

Question 12

At the end of an experiment Jane finds that she has beakers of the following solutions left over.

300 ml of 1 M sodium hydroxide
500 ml of 70% alcohol

a. Which storage area is suitable for each of the solutions?

Flammable liquid cabinet	**Corrosive store**	**Oxidiser store**

2 marks

b. Which of the following disposal methods is recommended for each of the solutions?

Dilute with plenty of water and wash down the sink	**Neutralise the solution and flush down the sink**	**Organic waste container**

2 marks

c. List **three** facts that must be included on the container label if the chemicals above are to be stored.

3 marks

d. Should the chemicals be stored or disposed of at the end of the experiment? Give **three** reasons for your answer.

3 marks

Total 30 marks

END OF ELECTIVE 1
SECTION 2 – continued

Elective 2 – PMLTEST 301A Perform laboratory biological procedures

For Questions 1–10, write the letter of the correct alternative in the box provided.

Question 1

Which one of the following components are **not** seen in animal cells?

A. cell membrane

B. cell wall

C. cell nucleus

☐

1 mark

Question 2

When making a blood smear the angle of the spreader slide should be

A. 30°

B. 50°

C. 70°

☐

1 mark

Question 3

Which one of the following components is found in viruses?

A. cell wall

B. cell membrane

C. genetic information

☐

1 mark

Question 4

Buffered saline can be used to dilute blood because it is

A. hypotonic.

B. hypertonic.

C. isotonic.

☐

1 mark

Question 5

Which one of the following is incorrect?

A. Most dyes come from natural sources and are safe to use.

B. Dyes are chemicals and can be hazardous.

C. Some dyes are carcinogenic, mutagenic or harmful in some ways.

☐

1 mark

Question 6

The best way to control a biological hazard is to

A. eliminate the hazard.

B. use safe operating procedures.

C. use Personal Protective Equipment (PPE).

☐

1 mark

Question 7

Alcohol is used in histological tissue processing for

A. dehydration.

B. clearing.

C. infiltration.

☐

1 mark

Question 8

Autoclaves are used to

A. sterilise instruments.

B. disinfect instruments.

C. sanitise instruments.

☐

1 mark

Question 9

A microtome is used for

A. cutting wax sections.

B. cutting frozen sections.

C. embedding tissue.

☐

1 mark

Question 10

Moulds like *Aspergillus* sp. (species) are

A. unicellular fungi.

B. multicellular fungi.

C. bacteria.

1 mark

Question 11

Microscopes are fragile instruments and can easily be damaged.

What are **four** main points to observe when using a microscope?

4 marks

Question 12

Personal Protective Equipment (PPE) is designed to protect your health and safety.

a. List **three** items of PPE used in a **microbiology laboratory**.

1. _____

2. _____

3. _____

3 marks

b. Describe **three** factors that have to be considered if PPE is to be effective.

3 marks

Question 13

Bacterial cells may have a number of structures. Draw a bacterial cell with each of the following structures.

i. capsule

ii. flagella

iii. spore

3 marks

Question 14

Histology technicians need to cut wax sections. Describe **four** main steps required to attach these sections to a glass slide.

4 marks

Question 15

a. Mature erythrocytes in the blood are different from all the other circulating cells. How are they different?

1 mark

b. What is the main function of erythrocytes?

1 mark

c. Draw a cross section of an erythrocyte.

1 mark

Total 30 marks

END OF ELECTIVE 2
SECTION 2 – continued
TURN OVER

Elective 3 – PMLTEST 303 Prepare working solutions

For Questions 1–10, write the letter of the correct alternative in the box provided.

Question 1

When preparing solutions it is best to

A. only wear protective equipment when necessary to save time.

B. always wear protective equipment.

C. only wear protective equipment when using hazardous substances or equipment.

☐

1 mark

Question 2

Solutions in laboratories are

A. always prepared using water as the solvent.

B. normally prepared with organic solvents.

C. prepared using water and/or organic solvents.

☐

1 mark

Question 3

When dissolving solutes we should always

A. use the total solvent volume to speed up dissolving the solute.

B. use slightly less than the total solvent volume to allow for rinsing, adjusting the pH, or increases due to the solute added.

C. boil the solution to speed dissolution.

☐

1 mark

Question 4

A 15% w/v solution contains

A. 15 g per litre of solution.

B. 150 g per litre of final solution.

C. 15 g per 100 mL of added solvent.

☐

1 mark

Question 5

When adjusting the pH of solutions it is important to

A. ensure that all solutes are fully dissolved, then adjust the pH.

B. adjust the pH first, and then add solutes.

C. Neither of the above.

1 mark

Question 6

Solutions that contain a known concentration of a particular substance, which are used for the estimation of certain other substances, are called

A. negative controls.

B. positive controls.

C. standard solutions.

1 mark

Question 7

Aqueous sodium hydroxide solutions are standardised using

A. potassium hydrogen carbonate.

B. potassium hydrogen pthalate.

C. mercuric chloride.

1 mark

Question 8

A primary standard solution is

A. a standard solution which can be used directly after preparation.

B. the standard solution used first in a reaction.

C. the most important standard used in a reaction.

1 mark

Question 9

When preparing solutions it is important to know the chemical formula and the formula weight of the chemical actually used because

A. regulations say we must do so.

B. laboratory supervisors can insist on which chemicals must be used.

C. some chemicals have various forms which look similar but differ in amount.

1 mark

Question 10

When a concentrated standard solution is diluted to prepare working solutions, the diluent used should ideally be

A. the least harmful solvent possible.

B. immiscible with the solvent used in the standard solution.

C. the same solvent as that used in the standard solution.

☐

1 mark

Question 11

Anika is a laboratory assistant. She is following an operating procedure to prepare a 0.500 M copper sulfate solution. The procedure instructs her to dissolve a mass of $CuSO_4.5H_2O$ (hydrated copper sulfate) in water and make up to 500 mL total volume. When Anika collects the required equipment, the bottle of copper sulfate is labelled, 'anhydrous copper sulfate', with formula $CuSO_4$. She is uncertain what to do.

a. Describe **two** tasks Anika is required to do to complete her procedure.

2 marks

b. What number of mole of $CuSO_4$ would be present in 500 ml of a 0.500 M solution?

3 marks

c. If the formula weight of $CuSO_4$ is 159.61, calculate the mass of $CuSO_4$ required to provide the number of mole calculated in **part b.** above.

3 marks

d. List **three** other important items of information that should be on the manufacturer's label of the copper sulfate.

3 marks

Question 12

Farid is working as a technical assistant in an industry laboratory. He has to prepare a working solution of 0.5 M Na_3PO_4 by diluting a 5 M stock solution of Na_3PO_4.

a. If Farid is required to prepare 250 mL of the working solution, show the calculation for the necessary volume of stock solution.

2 marks

b. Name **three** items of common laboratory equipment Farid could use to complete his dilution task.

1.

2.

3.

3 marks

c. Before making the final volume, Farid is also required to adjust the pH of the alkaline 0.5 M solution to pH 7.5 by adding H_3PO_4 (phosphoric acid), using a pH meter and stirrer to mix the solution properly. Describe **two** important factors he should consider to ensure his pH adjustment is correct.

2 marks

d. If Farid is uncertain if his final solution is hazardous or not, which important workplace document could he refer to for information?

1 mark

e. If the information available to Farid has Risk & Safety Phrases, where should Farid also record that information for his solution?

1 mark

Total 30 marks

END OF QUESTION AND ANSWER BOOK