BOARD OF STUDIES
NEW SOUTH WALES

2012 HSC Electrotechnology
'Sample Answers'

When examination committees develop questions for the examination, they may write 'sample answers' or, in the case of some questions, 'answers could include'. The committees do this to ensure that the questions will effectively assess students' knowledge and skills.

This material is also provided to the Supervisor of Marking, to give some guidance about the nature and scope of the responses the committee expected students would produce. How sample answers are used at marking centres varies. Sample answers may be used extensively and even modified at the marking centre OR they may be considered only briefly at the beginning of marking. In a few cases, the sample answers may not be used at all at marking.

The Board publishes this information to assist in understanding how the marking guidelines were implemented.

The 'sample answers' or similar advice contained in this document are not intended to be exemplary or even complete answers or responses. As they are part of the examination committee's 'working document', they may contain typographical errors, omissions, or only some of the possible correct answers.

Section II

Question 16 (a)

Answers could include:

Dust mask
Face mask
Hard hat
Safety goggles
Gloves
Ear protection (muffs or plugs)
Steelcap boots

Question 16 (b)

Sample answer:

A portable power tool should be regularly checked and tagged to ensure electrical safety. Various faults can occur to this equipment such as:

1. A frayed lead can allow insulation to be cut or damaged that could give an electric shock to the operator
2. A damaged plug can allow live terminals to be exposed which can give the operator an electric shock
3. Excessive build-up of dust or paint on the equipment can provide a path for electric current that can give the operator an electric shock
4. Blocked ventilation openings can cause tools to overheat, causing fire
5. Low insulation resistance can cause safety switches to trip

Answers could include:

Frayed or broken lead insulation
Damaged plug
Broken cases
Missing/split cord
Dust/paint excessive for safe operation
Blocked vents
Low insulation resistance
High earthing resistance
Chuck in non-working order
Jamming trigger switch
Bare wire
No tag

Question 17

Sample answer:

The first consideration and priority would be for the worker to look for danger to himself/ herself, other people in the area and the casualty so as not to put anyone at risk. The electrical supply to the area would need to be isolated, as would any water flow. Other assistance may include trained or untrained first aid personnel performing initial assistance to the casualty – check for response, clear airway, check breathing and commence CPR (Cardio-Pulmonary Resuscitation) if not breathing.

Assistance would be required. Someone should be instructed to call emergency help via 000.

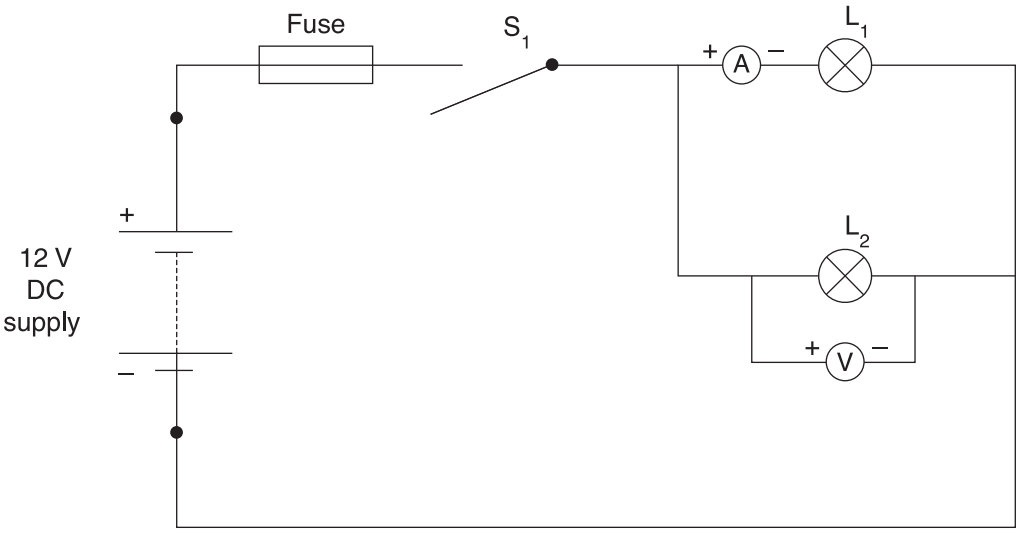
The worker or someone should stay with the casualty until help arrives. The ambulance dispatcher ('000') should be informed of the casualty's condition.

Answers could include:

Dial 000
Call other workers for assistance
Assess the scene for danger
Non-conductive objects to drag person away from shock area
Isolate supply
Extinguish flames, if any
Assess condition of casualty
Perform all CPR steps if required
Remain with casualty
Reference to DRSABC/DRABCS and SRABCS

Question 18

Sample answer:



Question 19 (a) (i)

Sample answer:

	S1	S2	S3
Open		×	
Closed	×		×

Question 19 (a) (ii)

Sample answers:

	S1	S2	S3
Open		×	×
Closed	×		

OR

	S1	S2	S3
Open	×		
Closed		×	×

Question 19 (a) (iii)

Sample answer:

	S1	S2	S3
Open	×		×
Closed		×	

Question 19 (b)

Sample answer:

$$R \text{ Total} = R_1 + R_2 + R \text{ Heating element}$$
$$= 10\Omega + 10\Omega + 5\Omega$$
$$R \text{ Total} = 25\Omega$$

$$I \text{ Total} = \frac{V \text{ supply}}{R \text{ Total}}$$
$$I \text{ Total} = \frac{32V}{25\Omega}$$
$$I \text{ Total} = 1.28 \text{ Amps}$$

Question 19 (c)

Sample answer:

$$\text{R equivalent} = R_2 + \text{R Heating element}$$
$$= 10\Omega + 5\Omega$$
$$= 15\Omega$$

$$\text{I total} = \frac{V \text{ suppy}}{R \text{ Total}}$$
$$= \frac{32v}{15\Omega}$$
$$= 2.133 \text{ Amps}$$

$$\text{P dissipation Heating element} = I^2 \times \text{R Heating element}$$
$$= 2.133^2 \times 5\Omega$$
$$= 22.75 \text{ Watts}$$

Question 20 (a)

Sample answer:

$$R_{4+5} = \frac{1}{\frac{1}{R_4} + \frac{1}{R_5}}$$

$$R_{4+5} = \frac{1}{\frac{1}{120\Omega} + \frac{1}{120\Omega}}$$

$$R_{4+5} = 60\Omega$$

Question 20 (b)

Sample answer:

$$R_1 + R_2$$

$$130 + 70 = 200\Omega$$

$$\frac{1}{\frac{1}{R_{1+2}} + \frac{1}{R_3}}$$

$$= \frac{1}{\frac{1}{200} + \frac{1}{200}}$$

$$= 100\Omega$$

Question 20 (c)

Sample answer:

$$V_{R5} = \frac{I\ Total}{2} \times R_5$$

$$V_{R5} = \frac{125 \times 10^{-3}}{2} \times 120\Omega$$

$$V_{R5} = 7.5 \text{ Volts}$$

Question 20 (d) (i)

Sample answer:

The circuit resistance INCREASES

Question 20 (d) (ii)

Sample answer:

The circuit resistance DECREASES

Section III

Question 21

Answers could include:

TOOLS/EQUIPMENT	SAFETY	PROCESSES
• Risk assessment • Get sheet metal • Guillotine, nibbler, angle grinder, snips • Drill, punch, hammer • Pan brake bender, magna bend, fold bars • Drill, rivet gun • Scribe, rule, square, jenny calipers, spring dividers, textas, marking blue, engineers blue, drilling machine	• Risk assessment • Two people • Gloves • Glasses, hair net, foot protection • Clamping to drill • SOPs for tool use and safety	• Mark off • Cut sheets • Mark out #2 • Drilling/deburring • Folding sequence • Drill and rivet • Sign on

Section IV

Question 22 (a)

Answers could include:

- Inappropriate text messages and emails
- "Harden up"
- Cut corners
- Insufficient time

- Confront team leader and tell them it's not appropriate
- Contact supervising teacher/school contact
- Talk to employer, outlining situation
- Contact anti-discrimination board

Question 22 (b)

Answers could include:

- Provide and maintain systems of work and safe work environment that is without risk to health
- Provide information, instruction, training and supervision necessary to ensure the health and safety of employees
- Must consult with employees about WHS matters to enable them to contribute to decisions affecting their health, safety and welfare

Question 22 (c)

Answers could include:

- Being asked to work on jobs without time to complete
- Unsafe ladder (aluminium)
- No direction/supervision or help from other colleagues
  - Harness
  - Anchor points
  - Public thoroughfare barriers
  - Isolation equipment