2014 Examination Report

2014 VCE VET Engineering Studies GA 2: Examination

GENERAL COMMENTS

The 2014 VCE VET Engineering Studies examination was the first examination for the new program. Previously the exam paper was set out in sections and the questions in each section were directly related to one of the units. In 2014, the exam was set out in two sections only (Section A and Section B), with questions from each of the units incorporated into both sections.

In Section A, which comprised multiple-choice questions, students performed well. Question 2, about an idler gear, proved difficult for students; idler gears have no effect on ratio. Students could have related the questions to a general workshop environment.

In Section B, which comprised written responses, the following general approaches were followed in allocating marks.

- To gain marks, responses needed to be consistent with the level of knowledge expected of a trainee in the engineering industry at a Certificate II standard.
- If a question required one response and the student gave more than one response, the first answer was accepted. (In general, it should be pointed out to students that they are more likely to be awarded marks for short, concise answers appropriate to the question, rather than a 'range' of responses.)
- If a response did not address the subject of a question it was not awarded any marks.

SPECIFIC INFORMATION

This report provides sample answers or an indication of what the answers may have included. Unless otherwise stated, these are not intended to be exemplary or complete responses.

The statistics in this report may be subject to rounding resulting in a total more or less than 100 per cent.

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	6	24	13	56	1	
2	21	22	32	25	1	Most students did not understand the role of the idler gear.
3	15	67	6	11	1	
4	11	2	81	6	1	
5	83	0	6	10	1	
6	70	3	27	1	0	
7	1	5	92	3	0	
8	15	27	1	57	1	
9	3	26	45	25	1	Students did not understand the purpose of a 10 mm fold on sheet metal.
10	1	92	4	2	1	
11	5	75	14	6	0	
12	5	3	85	7	0	
13	0	77	1	22	0	
14	11	3	83	3	1	
15	12	81	0	6	0	
16	97	1	0	1	0	

Question	% A	% B	% C	% D	% No Answer	Comments
17	71	18	2	8	0	
18	1	36	62	1	0	
19	7	88	1	4	0	
20	11	27	47	15	1	

Section B

Question 1

Marks	0	1	Average
%	25	75	**0.8**

A suitable answer was a vernier caliper.

Question 2

Marks	0	1	2	3	4	Average
%	8	19	28	0	44	**2.5**

5S step	Description of 5S step
Sustain	*Good work practices are maintained as a habit.*
Standardise	*You can immediately see what you have or what is missing.*
Set in order	*All necessary items are arranged so they can be easily picked for use.*
Shine	*Cleaning time is used to inspect the machinery and undertake maintenance.*
Sort	*All unnecessary items are removed and placed elsewhere for disposal.*

Most students had a good grasp of the 5S procedure.

Question 3

Most students were not familiar with the terms JSA and SWMS and, as a result, they struggled with all parts of the question.

Question 3a.

Marks	0	1	Average
%	86	14	**0.2**

Job Safety Analysis (JSA) or Safe Work Method Statement (SWMS)

Question 3b.

Marks	0	1	Average
%	72	28	**0.3**

The person doing the job

Question 3c.

Marks	0	1	Average
%	77	23	**0.3**

A list of possible risks and hazards associated with the job

Question 4

Marks	0	1	2	3	Average
%	0	3	19	78	**2.8**

Any three of:

- no safety glasses
- no hearing protection
- bare arms
- work piece not secured
- no mask
- holding grinder with only one hand.

Students performed well on this question, displaying a good knowledge of safety principles.

Question 5

Marks	0	1	2	3	Average
%	53	1	9	37	**1.3**

Letter: A
Name of device: three-jaw chuck
Reason: Option 'A' is the only mounting device that can hold the piece of hexagon bar, or six-cornered shape, as it is a multiple of three.

Students struggled with identifying and naming the three-jaw chuck as the most suitable mounting device for the piece of hexagon (six-sided) bar.

Question 6

Marks	0	1	2	3	Average
%	1	7	32	60	**2.5**

Any three of:

- no welding screen
- poor ergonomics
- poor working position and posture
- cluttered workspace
- drum too close
- poor ventilation.

Students again showed a good knowledge of safety principles and performed well in this question.

Question 7

Marks	0	1	2	3	4	5	6	Average
%	23	13	15	18	14	8	8	**2.4**

5S steps (not required in order)	Example of application in welding production workshop
Sort	1. Remove the drum and other extra unwanted items. 2. Have only one or a small number of individual pieces in the area at the time. Sort out and clear off the benches so they can be used.
Set in order	1. Position the welding unit for convenient operation. 2. Set up the bench so it can be used for the required welding job. Set up the tools that might be required in the welding process, so they are on hand if required.
Standardise	1. Mark out the welding area with coloured lines on the floor. 2. Place welding screens for safety and to define the welding area. Have a shadow board with the specific welding tools colour-coded so you can easily see if any are missing.

Students should have detailed two specific measures that could be implemented for the welding production area. They should have used sentence-form answers to explain what was to be implemented.

Many students had difficulty with this question.

Question 8a.

Marks	0	1	2	3	Average
%	1	3	16	80	**2.8**

Suitable answers included (any three of) the following or similar.

- musculoskeletal injuries – back, hands, arms, shoulders, legs, spinal
- cuts
- crush injuries
- hernia

Question 8b.

Marks	0	1	Average
%	41	60	**0.6**

A suitable answer included (either of) the following or similar.

- use a mechanical lifting device, crane or forklift
- a team lift with at least four people with appropriate PPE and using correct manual-handling methods

Students performed well in this question, displaying a good knowledge of the ways to handle engineering materials.

Question 9a.

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

four-jaw chuck

Question 9b.

Marks	0	1	Average
%	87	13	**0.2**

ream or boring bar

Question 9c.

Marks	0	1	Average
%	71	29	**0.3**

typical

In this case, it referred to ‘typical’ 15 mm radius.

Question 9d.

Marks	0	1	Average
%	25	75	**0.8**

The pitch of the M12 threads 1.75 mm

Question 9e.

Marks	0	1	2	Average
%	70	11	19	**0.5**

Drill vice for drilling hole and either of:

- bench vice for tapping
- clamping to the table.

Question 10a.

Marks	0	1	2	Average
%	21	61	18	**1**

A suitable answer included two of the following sustainability benefits in an engineering workplace.

Sustainability benefit 1: (either of)

- The production stage of the job would be updated in real time as the job cards are scanned at every stage of production.
- Loss of the job card or bar code can be traced directly to the last logged point of production.

Sustainability benefit 2: (either of)

- The actual time taken at each stage of production could be automatically recorded, allowing accurate billing and labour costs to be known.
- The amount of materials used would be known for the job, providing better use of materials and resources.

Question 10b.

Marks	0	1	2	Average
%	19	48	33	**1.2**

A suitable answer included two of the following difficulties in introducing the new paperless job card system to this engineering workplace.

- a malfunction of the computer system could have massive implications for production
- training new employees to use the new technology
- employees' acceptance of the new technology
- the new system does not allow for a quick check of the paperwork in the middle of the production sequence
- the workers don't like change and feel the bosses and computer system are keeping close tabs on them

Most students could identify one benefit and one difficulty.

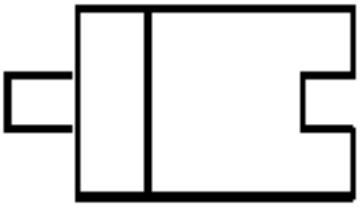
Question 11a.

Marks	0	1	2	3	4	Average
%	16	18	29	30	7	**1.9**

Students were asked to sketch the top, side and front views of the steel guide block shown in Figure 8 of the exam paper.

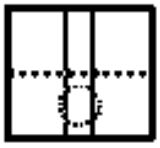
Marks were allocated for:

- conventional drawing systems used
- views shown in third-angle projection
- all hidden detail and centre lines shown
- views labelled.



Top view

Front view



Side view

Many students had difficulty with hidden lines and therefore missed out on full marks.

Question 11b.

Marks	0	1	Average
%	31	69	**0.7**

Minimum: 39.9 mm
Maximum: 40.1 mm

Question 11c.

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

Vernier caliper or vernier

Question 11di. and 11dii.

Marks	0	1	2	Average
%	58	38	4	**0.5**

Question 11di.
Length 163 mm, height 83 mm, width 83 mm

[(120 + 40) × 80 × 80]

Question 11dii.
Milling machine and lathe

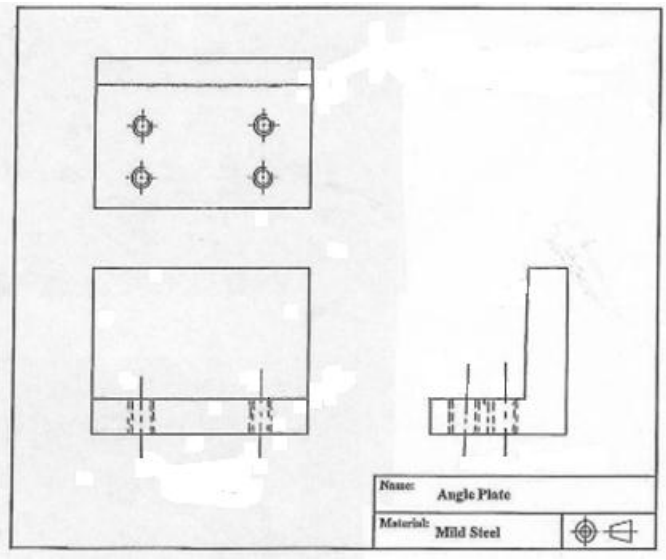
Question 12a.

Marks	0	1	2	3	4	Average
%	14	9	20	20	37	**2.6**

Students were asked to sketch the top, side and end views of the angle plate, showing views in third-angle projection and showing hidden detail and centre lines for the four holes.

Marks were allocated for:

- the general outline
- hidden outlines on one view
- centre lines on one view.



Question 12b.

Marks	0	1	Average
%	56	44	**0.5**

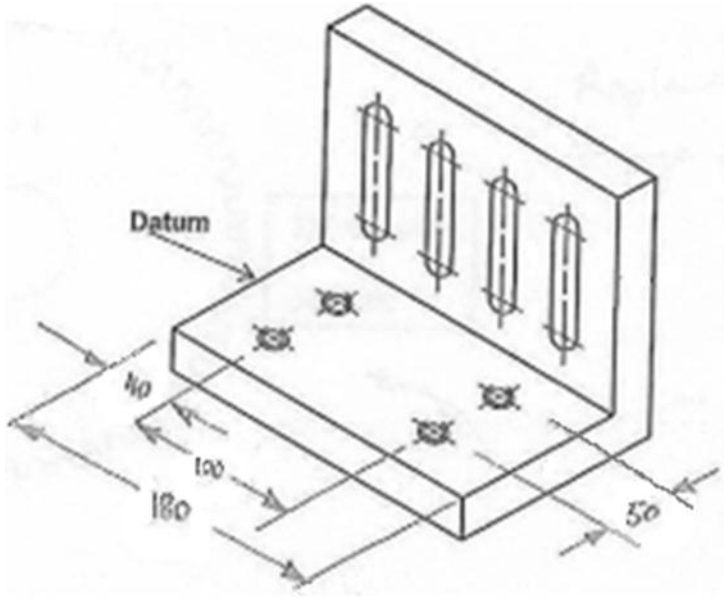
Any one of the following:

- tapped holes
- threaded holes
- thread
- screw holes.

Question 12c.

Marks	0	1	2	3	4	Average
%	17	4	5	20	54	**2.9**

Students were asked to complete the drawing.



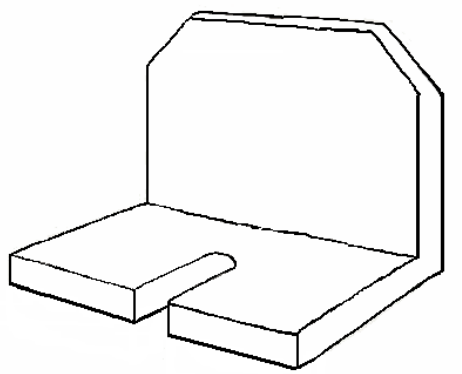
Question 13

Marks	0	1	2	3	4	Average
%	23	4	11	12	50	**2.6**

Students were asked to sketch an isometric view of the steel latch shown in Figure 11 in the exam paper.

Marks were allocated for:

- correct shape and outline
- isometric view.



Students had a good understanding of isometric drawings.

Question 14a.

Marks	0	1	2	3	Average
%	4	10	75	11	**2**

Any three of the following or similar:

- safety glasses or face shield
- suitable chemical gloves
- apron
- respirator.

Students struggled with the answer 'chemical gloves'. Many did not have an understanding of what isopropyl alcohol is or did not relate it to the data provided.

Question 14b.

Marks	0	1	2	Average
%	29	37	34	**1.1**

Any two of the following or similar:

- have a suitable fire extinguisher at hand
- ensure appropriate signage is provided
- work above a spill tray
- use a fume cabinet
- have a first-aid kit at hand
- use a ventilated area.

Question 14c.

Marks	0	1	2	Average
%	67	22	11	**0.5**

Isopropyl alcohol should be stored in a flammables cabinet due to its flammable nature and the high risk of fire in an engineering workshop.

Question 15a.

Marks	0	1	2	Average
%	28	20	52	**1.3**

Charge	Purpose of charge
water usage charge	charge for the amount of water consumed/used in kL, charged at $1.786 per kL
wastewater disposal charge	charge for the provision of wastewater removal or disposal service, the maintenance of pipes, etc. (waste water)

Question 15b.

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

The waste supply charge is a fixed charge.

Question 15c.

Marks	0	1	2	Average
%	51	33	16	**0.7**

Water used on average per month for the service period 1/10/2014 to 31/12/2014:

Cost of water used ($169.65) divided by cost per kL ($1.786) = 94.9888 kL (94.99 was acceptable)
Average water used per month in kL is:
average per month = cost for service period (3 months) divided by 3 = 31.6629 kL (31.66 was acceptable) or
= 31662.9 L

Students had difficulty with basic mathematics, identifying the three-month period and interpreting the bill.

Question 15d.

Marks	0	1	2	3	Average
%	43	32	19	7	**0.9**

Any three of:

- install water tanks
- install low-flow taps in the washbasins
- install auto-turn-off spring taps in the washbasins
- use half-flush cisterns or waterless systems
- use recycled water on gardens.

Students needed to relate their recommendations to reducing water usage, as this is the charge that is not fixed. They had difficulty in supplying three recommendations.

Question 15e.

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

Cost of tap water:
1 kilolitre = 1000 litres
$1.786 per kL is divided by 1000 to get cost per L = $0.00178 or 0.178 cents

Students had difficulty with basic mathematics.

Question 16a.

Marks	0	1	Average
%	50	50	**0.5**

'Greywater' is waste water that has been used in a shower, basin or sink, or washing machine.

Question 16b.

Marks	0	1	2	Average
%	64	17	20	**0.6**

Greywater storage of one cylinder using the provided formula:

Formula for volume of a cylinder = $\pi r^2 h$ Note: 1000 mm^3 = 1 cm^3 = 1 mL
Volume = $3.14159 \times (10^2) \times 63.7$
Volume = 20.011 cm^3 = 20 litres (or 20011.928 mm^3)

Students again had difficulty with basic mathematics. They needed to show substitution and provide the answer in litres for full marks.

Question 16c.

Marks	0	1	Average
%	40	60	**0.6**

5 × 20 L = 100 litres

Question 16d.

Marks	0	1	2	Average
%	39	26	35	**1**

Yes, this greywater storage system would have potential OH&S issues.

Reasons for these issues could include:

- it is contaminated water from the engineering works washroom and could contain grease and other chemicals
- it would not be good water to use where herbs are harvested raw to be eaten
- it is not clean, drinkable water
- it is a biohazard or could contain bacteria
- there is a potential leak risk.

Many students had difficulty with understanding what greywater is, as well as with OH&S issues associated with greywater.