2004 VCE VET Music Industry (Tech Prod): GA 2: Aural and written examination

GENERAL COMMENTS

The Music Industry (Technical Production) examination was comprised of a total of 100 marks. There were 35 questions – seven audio questions in Section A and 28 questions in Section B.

The overall results for this examination were reasonable considering it was the first year of the examination, however steady improvement is expected now that students and teachers have seen the exam format.

The exam is based on the underpinning knowledge of the four units of competence in Units 3 and 4. Students must have knowledge of these units of competence and also develop their practical skills. Many students seemed to have the knowledge to answer the questions but lacked the practical understanding of how to apply this knowledge.

Students displayed various levels of auditory skill in identifying signal processors, frequencies and mixdown procedures; however most students struggled with the parameters of effects and wave types. When researching the parameters of an effects process, students must understand how to operate and adjust the settings of common processors not just be able to turn them on. When describing a mix of a live or recorded sound it is imperative that all responses include the issue to be discussed and a suggestion for improvement. It is not adequate to give a broad, generic response rather than a specific solution. Students should only comment on the quality of sound on an excerpt, not the musician's technique or skill.

Examination technique

Music Industry terminology is quite varied, so the assessors allowed for a range of terminology; however, many students lacked the ability to describe what they were hearing using standard terminology. Students should develop the skills to describe sound in frequencies, parameters of application and texture in the same way that music performance students develop the terminology of pitch, harmony, rhythm and texture. Teachers should ensure students have a strong understanding of frequencies, as many students were unable to respond accurately to questions because they did not seem to have acquired an underpinning knowledge of sound. Students need to learn and practise the meanings of terms, using terminology relevant to the knowledge being examined.

Students should use the reading time to plan their answers so that their responses do not become repetitious. Successful students with good time management skills tended to use a bullet point approach, demonstrating the ability to present clear and logical responses. Students should practise responding to particular question types as part of their revision for the examination.

The most common areas of weakness were:

- lack of basic theoretical knowledge, especially regarding sound and frequencies names
- confused and/or inaccurate use of terminology.

Other concerns included:

- many students did not attempt to answer all of the questions. Students are advised to attempt every question
- a lack of awareness about the controls of mixing consoles, PA systems and common signal processors (that is, reverb units, delay units and compressors).

When preparing for the examination, students should take note of the following advice.

- The relative marks available for each question should provide an indication of the level of depth and/or breadth necessary for the response and how many key points are required. The space provided for each question is also an indication of how much students should write.
- Students should write as clearly as possible and should use a pencil (and an eraser) rather than a pen to allow for errors.
- Students should check their work to make sure that specific descriptions are used instead of generic responses.

Section A

Question 1
What signal processor is being applied to this guitar excerpt?

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

Reverb

Question 2
Describe the ways in which the parameters have been set to the following guitar excerpts.

Marks	0	1	2	Average
%	39	31	30	**0.9**

a. Reverb has a long decay time setting
b. Wet/dry mix is set to 100% wet (all reverb)

Thirty per cent of the students identified this signal processor, yet only half could operate it. All students must expose themselves to signal processors and learn how to operate and apply them. Signal processor units should include 'chorus', 'reverb', 'delay', 'gates', 'pan', 'flange', 'modulations' and 'resonant filters'.

All wave-editing software has virtual representation of effects that would be suitable for students to explore.

Question 3
Identify the two signal processors used on the following two guitar excerpts.

Marks	0	1	2	Average
%	11	55	34	**1.2**

a. Delay (echo) with feedback
b. Filter (Wah Wah)

Question 4
What signal processor is being applied to the following two vocal excerpts?

Marks	0	1	2	Average
%	22	46	31	**1.1**

a. Distortion (gain)
b. Modulation (chorus)

Question 5
Identify the frequencies you hear from the choices below.
(50 Hz, 125 Hz, 500 Hz, 1 kHz, 4 kHz, 8 kHz)

Marks	0	1	2	3	4	Average
%	43	30	13	10	4	**1.1**

a. 4 kHz
b. 125 Hz
c. 1 kHz
d. 500 Hz

The recognition of frequency and equalisation is very important as it appears in all four units of competence. Students and teachers should use the above multiple-choice question as a template of the frequencies to be assessed from year to year.

Question 6
Identify the following sound wave types from the choices below.
(sine, sawtooth, square)

Marks	0	1	2	Average
%	29	53	18	**0.9**

a. square

b. sine

Question 7
This excerpt of a recording was taken from a live demonstration CD of a Melbourne cover band. Answer the following questions regarding the recording issues.

Marks	0	1	2	3	4	5	6	7	8	9	10	11	12	Average
%	1	1	2	0	4	2	14	4	18	4	21	3	26	**8.8**

i. Identify three errors of the live mixing process and identify how they can be rectified.

Errors	Solutions
poor vocal intelligibility	use mid and high equalisation
poor drum balance	increase volume of kick/reduce snare
feedback in the system	check frequencies and tune the room prior to performance

ii. Identify three errors of the recording process and identify how they can be rectified.

Errors	Solutions
audience spill	position microphones higher, away from audience or use separate miking
poor frequency response	equalise the recorded master, increasing the high frequencies
distant and off-axis miking	Point the microphone at the stage/move closer to source or take direct line from mixing console

Most students performed well on this question. Students must always read the questions carefully so that their answers don't cross between the live and recorded sound. High-scoring students identified the required three errors and gave specific solutions on how to rectify each one. A range of answers was accepted, provided that each solution was clearly identified. Allowance was also made for the various systems on which the CD recording would have been played.

The aim of this question was to refine mixing and recording skills in a practical way. There are many ways to mix a show but it is important to have specific approaches to this task rather then generic guesses. Students are encouraged to use music technology terminology such as 'processor effects', 'equalisation frequencies' and 'mixdown procedures' when giving examples in a long answer format.

SECTION B

Question 1a-b

Marks	0	1	2	Average
%	63	28	9	**0.5**

1a
What is the frequency range of the human ear?
20 Hz – 20 kHz

1b
What is the fundamental frequency range of a 4 string bass?
41 Hz – 260 Hz

Although the majority of students knew what the frequency range of the human ear is, not many could give an appropriate answer to describe an instrument's frequency. In mixing instruments, students have to know which equalisation to apply. Students must expose themselves to this as a common practice, as this skill applies directly to three of the four units of competence. 40Hz – 500Hz was accepted; however, this made little difference as most students were not aware of what a low frequency is. The term 'fundamental' refers to the actual pitch notes, excluding its overtones.

Question 2
What are the symbols for the following terms?

Marks	0	1	2	Average
%	13	35	53	**1.4**

- frequency: F (Hz)
- decibel: dB

Students should be familiar with basic sound terminology. Although students weren't penalised in 2004, in future exams assessors will not accept the incorrect use of capitals; for example, DB would be incorrect.

Question 3
Label the sound envelope.

Marks	0	1	2	3	4	Average
%	52	8	10	6	24	**1.4**

A: attack
B: decay
C: sustain
D: release

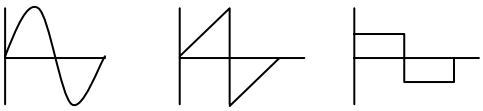
This should be common knowledge, however students performed poorly in this question. When editing sound, students should be aware of a waveshape and sound envelope. 'Attack, decay, sustain and release' is what identifies all musical instruments. Lack of knowledge in this area can destroy a mix, especially when using compressors and limiters.

Question 4a-b

Marks	0	1	2	3	4	5	6	Average
%	10	14	15	23	21	12	6	**2.9**

4a
Draw the following three wave types.

sine **sawtooth** **square**



4b
Identify an instrument for which each of the following wave types is predominant.
sine: flute (pure)
saw: violin/trumpet (bright)
square: clarinet/distorted electric guitar (hollow)

Although this area is usually taught early in the program, the majority of students were unable to recall this knowledge. A waveform should always be presented in its full 360 degree form. Many students could draw the waveforms but their response was deemed incomplete because they did not show its full cycle. Many responses that gave instruments that might not be predominant representations of the sound were accepted if they were within the following generic characteristics:

- sine = (pure)
- saw = (bright/brassy)
- square = (hollow/woody and synthesiser)

All students should apply sound and sound terminology to a practical example, but teachers should also ensure that they include terminology and theoretical background when teaching about sound editing.

Question 5
Describe each of the following editing functions.

Marks	0	1	2	3	4	Average
%	33	6	40	2	20	**1.7**

- normalise: the loudest peak in volume is detected. The volume of the entire file is increased to maximum without clipping that peak
- cross fade: first audio is faded out as second audio is faded in.

Both of these editing functions must be explored in 'Mix sounds sources' and 'Edit sound using digital systems'; however, surprisingly the average score was quite low. In 2005 a new unit of competence replaces 'Edit sound using digital systems'. Teachers and students should expose themselves to wave-editing software and explore the common processes such as 'normalise', 'gain', 'fade', 'reverse', 'time stretch', 'phase', 'pitch' and 'sample rate'.

Question 6
What is the sampling rate for CDs?

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

44.1

Question 7
Describe two procedures in mixing down the snare drum of a drum kit. Use the headings to assist your description.

Marks	0	1	2	3	4	5	6	7	8	Average
%	15	2	7	5	30	2	15	1	23	**4.4**

Signal processors	**The effect of the procedure**
compression	to increase the attack of the snare
room reverb	to place the snare in an acoustically realistic space
Equalisation	**The effect of the procedure**
boost 2 kHz	increases perceived attack and increases clarity
boost 100 Hz	fattens and adds weight and power to snare

Students who had practical experience in mixdown did quite well. Again, problems arose with this question because of a lack of frequency knowledge. 50Hz is a very low frequency, so altering this would make little or no difference to a snare drum; it is a frequency that best affects a kick drum. The assessors marked with the following in mind: snare (body 120Hz, 240Hz hollow 2.5 Hz fundamental).

Question 8
When compressing a signal, define the meaning of the following terms.

Marks	0	1	2	Average
%	45	24	31	**0.9**

- ratio: the **ratio of the amount of gain reduction** to the amount that the signal exceeds the threshold
- threshold: the level at which the **compressor will begin** to reduce gain.

Students performed quite poorly in this question. If providers do not own any external processors (that is, reverb units/compressors), teachers and trainers should be aware that all wave-editing and recording software have virtual equivalents that are more than adequate tools to teach editing sound and mixing sound sources.

Question 9
What is the function of components 3, 4, 5, 7 and 10 on this mixing console?

Marks	0	1	2	3	4	5	Average
%	14	12	23	21	17	12	**2.5**

- (3) insert: allows external signal processors to be connected (for example, compression)
- (4) trim: microphone preamplifier gain, signal level (gain)
- (5) low cut: low frequency roll off (removes rumble)
- (7) mid/freq: semi-parametric equalisation of mid-range frequency
- (10) pre: pre/post fader. Sets auxiliary, sends to pre fader output (for example, for foldback).

Considering that two of the units of competence are focused on operating mixing consoles, the results were quite poor. Many students would not be able to operate a mixing console and others only have very limited knowledge. It may be possible that the diagram was of another brand of console than what students were used to; however, students should be able to describe these basic functions even without an image. The main errors occurred with 'insert', 'mid/freq' and 'pre'.

Question 10
Describe the difference between gain and volume.

Marks	0	1	2	Average
%	16	22	62	**1.5**

- gain is used to describe the function of an amplifier
- volume is normally associated with perception (hearing).

Most students did well and the assessors looked for keywords; gain – input level and volume – output level.

Question 11
List two devices you would connect to auxiliaries.

Marks	0	1	2	Average
%	14	15	71	**1.6**

i. reverb unit, compressor
ii. equalisers, headphones (external processing units)

Numerous external devices were accepted by the assessors.

Question 12
What is the difference between a graphic and parametric equaliser (EQ)?

Marks	0	1	2	Average
%	60	17	23	**0.7**

A graphic EQ has fixed frequency filters. A parametric EQ has variable frequency and width.

Many students were aware of the difference yet had difficulty in putting this into words. Exposure to a mixing console should also be followed up by written response tasks in order for students to build their technical terminology.

Question 13
If you are producing an unwanted distorted signal, what would you adjust to rectify this situation?

Marks	0	1	Average
%	19	81	**0.8**

Reduce the gain at the point in the signal chain that was producing the distortion.

Distortion is a common fault in recording and this question was well answered. Assessors also accepted other common procedures, such as repositioning the microphones, adjusting external device levels and turning down the source.

Question 14
What is 'phantom power' and when is it required?

Marks	0	1	2	Average
%	31	14	55	**1.3**

It is 48Vdc and is used to power microphones and DI boxes. It is supplied at the microphone preamp or from an external power supply.

Many students had not been exposed to the practicality of phantom power, with some even confusing it with three phase power.

Question 15
Where could you connect an external compressor unit to a mixing console?

Marks	0	1	Average
%	33	67	**0.7**

At the insert point.

The function of a compressor is to control an erratic signal from a source. Although it is possible to connect it as an auxiliary, it should be connected as an insert so that the signal is controlled before it reaches the equalisation and effect units.

In live applications, a compressor is inserted in the output chain so that it controls the overall output signal, thus preventing erratic dynamic levels. Auxiliary send/return was not accepted as a correct answer.

Question 16
How does an enabled PRE fade switch on a mixing console affect an auxiliary unit?

Marks	0	1	Average
%	80	20	**0.2**

The signal is sent to the aux unit independent of fader position/level.

This question was one of the lowest-scoring questions on the examination, even though two units of competence are focused on the functions of a mixing console. An auxiliary unit's input level can be controlled either by the auxiliary sends or the fader position. The pre fade switch allows you to choose pre or post fader level. This is important when using an auxiliary output for foldbacks, as altering front of house levels may also alter stage levels. Students should note that 'pre' is not preset/pre gain or PFL.

Question 17
Describe the difference between a balanced and an unbalanced connector.

Marks	0	1	2	Average
%	72	13	16	**0.5**

Balanced signals can cancel out inducted interference. The difference is the number of connections unbalanced connectors have in phase and earth. Balanced connectors have in phase/out of phase earth.

Students were aware that a balanced connector has three wires, however many were confused about what the extra wire is. Both unbalanced and balanced connectors have an earth wire; however, a balanced connector also has a separate earth.

Question 18
You are in the middle of a session and while trying to record a guitar track you cannot hear the signal even though the meters are indicating otherwise. What could be two possible causes of the problem?

Marks	0	1	2	Average
%	12	22	66	**1.6**

i. the return channel fader is down or muted (the main mix switch disabled)
ii. the monitor amp is switched off.

Most students answered this question quite well. Other possibilities that assessors accepted were that the active speakers are off or a compressor is connected to the insert but not turned on.

Question 19
What is the function of a crossover?

Marks	0	1	Average
%	64	36	**0.4**

It divides an audio signal into separate frequency ranges. For example, low, mids, hi.

'Operate sound reinforcement system' needs to be taught with various size setups. Students should be prepared with more than a simple vocal system. Teachers and trainers should ensure that students have practice questions that prepare them for the real world. Even a simple two-way vocal system has an inbuilt crossover separating hi and lows.

Question 20
Describe the difference between an active and a passive speaker sound system.

Marks	0	1	Average
%	58	42	**0.5**

An active system is powered within the unit. Passive systems need an additional power amp.

Students often confused, or were unfamiliar with, the two speaker types. Some seemed to recall microphone types instead and described a condenser or the functionality of balanced as opposed to unbalanced. There was a common misconception between the recognition of a 'three-way,' or mono/stereo systems, and active/passive systems.

Question 21
List the order of equipment components, including cabling, in setting up a passive public address system from source to speakers.
Note: The unpowered mixing console already has an in-built graphic equaliser.

Marks	0	1	2	3	4	5	Average
%	10	9	20	21	13	26	**3.0**

1. Source: microphone
2. Microphone lead
3. Mixing console
4. Signal lead
5. Power amp
6. Speaker leads
7. Output: passive speakers

Full marks were awarded to any student who demonstrated knowledge in completing the circuit. Functionality was the primary concern for the overall assessment. Students commonly neglected to add crucial components, primarily the leads.

Question 22
Describe the following terms.

Marks	0	1	2	Average
%	46	36	19	**0.8**

- watts: a measurement of power output
- ohms: a measurement of resistance.

Many students knew the difference but had difficulty in putting this into words. Students should practise written response tasks in order to build their technical terminology.

Question 23
Explain why you should not use instrument cable to connect a power amp to speakers.

Marks	0	1	Average
%	62	38	**0.4**

The braided shielding on an instrument cable can cause inductance that may damage the amp and speakers.

Students often incorrectly made reference to mono/stereo and balanced/unbalanced plugs, instead of valid issues of shielding. Assessors also accepted overheating and loading concerns.

Question 24
Identify an electrical concern when operating a large sound and light system.

Marks	0	1	Average
%	42	59	**0.6**

- the maximum power consumption cannot exceed circuit capacity
- there could be problems if the sound and lights are connected to the same phase of power
- the dimmer buzz from lights could manifest in/as audio.

This question was simply directed at electrical concerns with the light and sound system. The question did not ask students to address OH&S issues. This was a common misconception and led students away from the main issue of overloading a power circuit.

Question 25
You have been asked to engineer a rock band and the public address system is occasionally experiencing high frequency feedback. Describe three methods of overcoming this problem.

Marks	0	1	2	3	Average
%	7	15	26	52	**2.3**

i. turn down the levels of everything
ii. reduce the high frequency equalisation at the problem frequency
iii. reposition the microphone or speakers.

Any technique used to reduce volume or frequency was considered accurate. There are a myriad of methods to overcome this problem, so most students who listed three scored highly.

Question 26
Describe two advantages and two disadvantages of using a condenser microphone.

Marks	0	1	2	3	4	Average
%	15	8	22	22	33	**2.5**

Advantages:

- sensitivity and high frequency response
- faster transient response/flatter frequency response.

Disadvantages:

- poor gain before feedback/requires power
- high sound pressure levels may cause distortion/fragile.

Students often confused, or were unfamiliar with, the two microphone types, and commonly neglected to give **two** advantages and disadvantages. Students should always use the mark allocation and the space provided as a guide to how much information to provide.

Question 27
If two signals mixing the same source are out of phase, what is the effect on the sound and how is this caused?

Marks	0	1	2	Average
%	48	29	23	**0.8**

- a reduction (or total loss) in level. Identical wavelengths at opposite phases will cancel each other out (for example, +6 + -6 = 0)
- if only slightly out of phase, a modulation effect may occur.

Either scenario was accepted – slightly out of phase or phase cancellation. Students were often unable to adequately describe what 'out of phase' would sound like, or failed to address both aspects of the question. For example, some explained what causes sound to be 'out of phase' without discussing the effect and vice-versa.

Question 28
A four piece band with vocals will perform in a long school hall with loud air conditioning and all hard surfaces. As the sound engineer, describe how these issues will alter your mixing procedures.

Marks	0	1	2	3	4	5	6	Average
%	3	3	8	26	21	12	27	**4.0**

- long hall: the mix will be without reverb (drier) and the hall itself will be used as the effect
- air conditioning: the air conditioner raises the floor noise, therefore the overall volume may need to be increased to mask the noise, or it could just be ignored. The low hum may be picked up in the microphones and therefore affect the EQ
- hard surfaces: the higher-frequencies may produce feedback. The Hf response of the system should be decreased to compensate.

Students generally demonstrated an understanding of the dilemma, but they should look at the allocated marks and address the question accordingly. This question was worth six marks with equal weighting to each of the three scenarios, so each scenario required a description of how the issues would alter the mixing procedures.