

## Electrical engineering manager of underground coal mines

Examiners' report November 2018

### Written examination

### CEE1 – Application of electrical engineering to mining

#### Summary of results and general comments

Exam Date:	2 August 2018
Number of Candidates:	7
Number who passed:	2
Highest mark:	67.5%
Average mark:	56.18%
Lowest mark:	50%

#### Question 1 (total of 10 marks)

Highest mark	6.5
Average mark:	4.64
Lowest mark:	3

**Examiners' comments** - Bowtie risk analysis and critical control identification have become prominent within the mining industry as a pathway to identifying those controls which have most impact on preventing rare but catastrophic unwanted events. Candidates who had familiarised themselves with the processes were well versed with the terminology and definitions. All candidates however, should be familiar with the controls to prevent electric shock, however many candidates failed to apply the hierarchy of controls and were reliant upon procedures, permits and labelling.

#### Question 2 (total 10 marks)

Highest mark:	10
Average mark:	6.79
Lowest mark:	4

**Examiners' comments** - This question led candidates through a systematic approach to the introduction of new technology to site. Candidates who scored well demonstrated their engineering knowledge by itemising potential issues that would need to be addressed prior to the introduction VVVF drives to the longwall face.

### Question 3 (total 10 marks)

Highest mark:	10
Average mark:	7.86
Lowest mark:	5

**Examiners' comments** - There was a wide variety of answers to this question which is surprising for a voltage regulation question. A number of applicants showed that they were not sure what voltage regulation really means and how it affects the operation of machines. This is an operational area where applicants need to review with their site senior engineers, to grasp the understanding, as these issues can be evident in any operation.

### Question 4 (total 10 marks)

Highest mark:	9
Average mark:	7.79
Lowest mark:	6.5

**Examiners' comments** – Damage to, or deterioration of flamepaths on flameproof enclosures is not a rare occurrence in underground coal mines. Candidates should be well versed with assessment and repair techniques available to them when the issue arises. Many candidates appeared unsure of how to apply the guidance provided within the Australian Standard.

### Question 5 (total 10 marks)

Highest mark:	4.5
Average mark:	2.36
Lowest mark:	1.5

**Examiners' comments** – The candidates did not have a grasp on how to perform basic fault level calculations. These questions have been part of the examination process for many years and have not been answered well. This question was a similar question to previous years which indicated the candidates have not been through the past papers and put an effort into understanding these types of scenarios that are part of mine electrical engineers' roles.

### Question 6 (total 10 marks)

Highest mark:	9
Average mark:	4.29
Lowest mark:	1.5

**Examiners' comments** – The candidates appear to struggle with calculation-type questions in practical scenarios. This was a simple question in regards to calculating the motor size given the load provided and taking the efficiency of the fan and motor into account. These are typical installations where installation practices and techniques should be understood by the candidates and showed poor understanding in this area which was reflected in the marks provided.

## CEE2 – Legislation and standards applicable to underground coal mines

### Summary of results and general comments

Exam date:	2 August 2018
Number of candidates:	7
Number who passed:	6
Highest mark:	84%
Average mark:	75.64%
Lowest mark:	57.0%

### Question 1 (total 10 marks)

Highest mark:	10
Average mark:	8.36
Lowest mark:	7.5

**Examiners' comments** – The candidates showed good understanding of the legislative requirements which was reflected in the marks obtained

### Question 2 (total 10 marks)

Highest mark:	9
Average mark:	7
Lowest mark:	5

**Examiners' comments** – This question was a recycled question from past years that wasn't answered very well at the time. Although these marks reflected a better understanding, candidates need to have a greater understanding of thread repairs to flameproof enclosures as required by the relevant Australian Standards

### Question 3 (total 10 marks)

Highest mark:	10
Average mark:	8.29
Lowest mark:	7

**Examiners' comments** - This question was handled well across all applicants, which shows that AS2290 is reasonably well understood, which it certainly needs to be. The main question where people were not consistent was who is responsible to 'determine the pre-overhaul frequency'. There were a number of failures on this question. Applicants need to be aware of responsibilities of the MEE.

### Question 4 (total 10 marks)

Highest mark:	6
Average mark:	5.14
Lowest mark:	4

**Examiners' comments** – The marks reflected the answers provided in relation to the understanding for assessing indentation in flame paths and compliance issues. As per some of the previous questions, better understanding should be demonstrated for critical infrastructure such as flameproof equipment in hazardous areas.

### Question 5 (total 10 marks)

Highest mark	10
Average mark:	5.21
Lowest mark:	0

**Examiners' comments** - From the results above there was a wide variety of answers to this essential area of understanding. We were quite surprised to see that some applicants did not have the gas monitoring knowledge required. Gas monitoring for face equipment and the requirements identified in AS2290 needs to be thoroughly understood, as this is critical safety equipment for any underground operation.

### Question 6 (total 10 marks)

Highest mark:	10
Average mark:	8.71
Lowest mark:	4

**Examiners' comments** - Again, as per question 5, the area of gas monitoring in underground coal operations must be thoroughly understood as this is critical safety equipment and these alarm and trip levels play a major role in mining operations, to keep workers out of harm.

This question was reasonably well understood, as it needs to be.

### Question 7 (total 10 marks)

Highest mark:	4.5
Average mark:	3.64
Lowest mark:	3

**Examiners' comments** – This question was poorly answered in relation to the process to be followed for the introduction of new or unknown technology into a typical coal operation. This process including design and operational risk assessments along with careful specification and software management is an area that is becoming more readily available and candidates need to understand these requirements for typical installations in the future.

### Question 8 (total 10 marks)

Highest mark	5
Average mark:	4.07
Lowest mark:	3

**Examiners' comments** – The candidates failed to understand typical electrical installations in regard to getting a power supply to a new pumping installation. This question was developed for typical surface installations where the mine electrical engineer is responsible for all these installations. AS3007 clearly states requirements for clearances and sign posting of overhead power lines. The marks reflected the answers provided by candidates to demonstrate their understanding.

### Question 9 (total 10 marks)

Highest mark:	5
Average mark:	3.07
Lowest mark:	1.5

**Examiners' comments** – This question again highlighted the poor understanding of candidates in relation to the critical safety application with relation to electrical protection and the importance of its application on a typical mine site.

### Question 10 (total 10 marks)

Highest mark:	9
Average mark:	7.43
Lowest mark:	6

**Examiners' comments** - This Ex e question was handled well by most applicants. However, there is still some confusion for all of the elements related to how the increased safety explosion protection technique is utilised. This is a commonly used technique across most longwall faces in NSW.

### Question 11 (total 10 marks)

Highest mark:	10
Average mark:	7.43
Lowest mark:	6

**Examiners' comments** - EES003 and all of the other technical references need to be well understood as even though they have been around for many years, they still cover the critical focus areas needed in our industry, and the basic principles still apply.

### Question 12 (total 10 marks)

Highest mark:	10
Average mark:	7.29
Lowest mark:	0

**Examiners' comments** - The Safety File or Verification Dossier is a critical document for any machine used in an underground coal operation, and carries the essential reference materials, to ensure that the equipment is suitable for use in the face areas. There were a wide variety of answers to this question, which was surprising as this is a critical element to ensuring safety.

## Oral examination

Date: 10+11 October 2018

Number of candidates: 4

Number deemed competent: 1

### General comments

The candidates were generally very nervous throughout the assessment and struggled to answer the required questions without putting themselves under extreme pressure. It was clear that the personnel who had prepared best and were able to keep their nerves under control were generally assessed as 'competent'.

The candidates struggled with some basic scenarios provided by overthinking the question at hand and not being able to provide the required information. If the sites control plans and SEP's were clearly understood from a technical and practical perspective, then the confidence in answering the questions would be easily expressed.

Some of the candidates were clearly not ready for this examination and not prepared for the practical side of the assessment. This showed in the overall assessment process where those that had experience in a more supervisory role with practical experience performed better in the assessment.

## More information

NSW Department of Planning and Environment

Resources Regulator

Mining Competence Team

T: 02 4063 6461

Email: [minesafety.competence@planning.nsw.gov.au](mailto:minesafety.competence@planning.nsw.gov.au)

## Acknowledgments

Manager of electrical engineering of underground coal mines examination panel

© State of New South Wales through the NSW Department of Planning and Environment 2018.

This publication is copyright. You may download, display, print and reproduce this material in an unaltered form only (retaining this notice) for your personal use or for non-commercial use within your organisation. To copy, adapt, publish, distribute or commercialise any of this publication you will need to seek permission from the NSW Department of Planning and Environment.

Disclaimer: The information contained in this publication is based on knowledge and understanding at the time of writing (February 2022). However, because of advances in knowledge, users are reminded of the need to ensure that information upon which they rely is up to date and to check currency of the information with the appropriate officer of the NSW Department of Planning and Environment or the user's independent advisor.

DOC18/885411