20 June 2025

Electrical Engineering Manager of Underground Coal Mines Certificate of Competence

Examiners' report 2024-2025

Written examination

CEE1 – Electrical engineering applied to coal mines

Summary of results and general comments

Exam date: 4 September 2024

Number of candidates: 5

Number who passed: 5

Highest mark: 93%

Average mark: 82.6%

Lowest mark: 63%

Examiners' comments:
All candidates were deemed competent in this exam, demonstrating a solid grasp of critical topics such as portable electrical apparatus management and arc flash safety.

Key strengths included handling electrical protection and cable management.

However, challenges were noted in areas such as understanding the nuances of high voltage configurations, lightning protection methods, and distinguishing between design alterations and amendments for PWS.

Candidates showed some difficulty with specific standards related to welding equipment and functional safety.

Question 1 – Portable apparatus (ESSENTIAL)

Candidates must get 6 out of 10 marks to pass this question.

Highest mark: 10

Average mark: 9.2

Lowest mark: 8

Examiners' comments – this question was an essential question requiring candidates to score at least 6/10 to pass. The question focused on the management of portable electrical apparatus underground. PEA management has been very topical in industry, highlighted by the Resource Regulators' publication of a position paper focusing on the 'Use of non-certified electrical equipment in a hazardous zone'. This question was answered well by candidates.

Question 2 – Earthing

Highest mark: 9

Average mark: 7.8

Lowest mark: 6

Examiners' comments – candidates are expected to be familiar with WHS (Mines and Petroleum Sites) Regulation (WHS(MPS)R) 2022 section 34 – Electrical Safety.

Earthing is a fundamental aspect of electrical design, as such it is expected that candidates will possess the required knowledge to manage earthing systems onsite.

Question 3 – Protection & arc flash

Highest mark: 10

Average mark: 7.7

Lowest mark: 5

Examiners' comments – electrical protection & arc flash management have been the focus of multiple presentations at the UG electrical engineers forums. Candidates are expected to have a sound understanding of arc flash categories, reduction strategies and PPE requirements. Candidates struggled with questions relating to arc flash PPE. TCC questions were answered well by candidates which is an improvement from previous exams.

Question 4 – Calculations

Highest mark: 9

Average mark: 7.3

Lowest mark: 4.5

Examiners' comments – high voltage installations on mine sites often have multiple configuration modes available. The Electrical engineering manager needs to be able to identify which configuration best suits the needs of the operation. It is important that candidates understand the impact that changing operating mode has on fault levels.

Question 5 – Lightning

Highest mark: 10

Average mark: 8.3

Lowest mark: 5

Examiners' comments – AS/NZS 1768 is a key standard utilised for design & management of lightning protection systems at mine sites. Lightning management was generally handled well by candidates.

Understanding of the rolling sphere method of lightning protection was an element that candidates struggled with.

Question 6 – Cables

Highest mark: 10

Average mark: 9.5

Lowest mark: 8.5

Examiners' comments – selection, identification, use and maintenance of cables is an essential skill for statutory electrical engineers. This question was handled well by all candidates.

Question 7 – Welders & generators

Highest mark: 10

Average mark: 8.1

Lowest mark: 5.5

Examiners' comments – mines often utilise large numbers of welding machines. Electrical standards of welding equipment have been identified as an issue at multiple sites in NSW, often the subject of Statutory enforcement notices.

Candidates in general had a poor understanding of the definition of welding categories.

Question 8 – Winders

Highest mark: 10

Average mark: 7.6

Lowest mark: 5.5

Examiners' comments – the difference between design alteration and design amendment was poorly understood. Candidates were unable to identify inclusions of the 5-year safety audit.

Question 9 – Explosion protection & HAC

Highest mark: 10

Average mark: 8.8

Lowest mark: 7

Examiners' comments – classified hazardous areas are common in CHPP's and reclaim tunnels. Candidates need to understand the different groups, zones & equipment requirements. This question was in general answered well.

Question 10 – Functional safety

Highest mark: 10

Average mark: 8.3

Lowest mark: 7

Examiners' comments – WHS (Mines and Petroleum Sites) Regulation (WHS(MPS)R) 2022, section 34 requires that the operator ensure the reliability of electrical safeguards provided to control the risk from both electrical and non-electrical hazards is sufficient for the level of risk being controlled. Function safety is a common approach to fulfilling this requirement.

Candidates generally performed well in this question. Change management and proof testing were poorly handled by candidates.

CEE2 – Legislation and Australian Standards applicable to underground mines

Summary of results and general comments

Exam date: 4 September 2024

Number of candidates: 5

Number who passed: 5

Highest mark: 86%

Average mark: 76.75%

Lowest mark: 62%

Examiners' comments

The recent Electrical Engineering Managers Legislation Exam concluded with all candidates passing and several achieving high scores.
Overall, candidates demonstrated a solid understanding of essential topics, including the role of the Statutory electrical engineering manager and key standards such as AS/NZS 3000.
However, some areas showed room for improvement, particularly in applying specific standards and concepts related to functional safety and maintenance procedures.
Despite these areas of challenge, all candidates appeared well-prepared & will advance to the oral examination stage.

Question 1 – WHS(Mines and Petroleum Sites) Regulation (WHS(MPS)R) 2022 (ESSENTIAL)

Candidates must get 6 out of 10 marks to pass this question.

Highest mark: 9.5

Average mark: 9.1

Lowest mark: 8.5

Examiners' comments – this question was essential, requiring candidates to get at least 6/10 to pass. Candidates are expected to have a good knowledge of the defined role of the Statutory electrical engineering manager & electrical live work requirements. Candidates were informed of this expectation at this year's electrical exam briefing session & generally performed well in this question.

Question 2 – AS3000

Highest mark: 8

Average mark: 7.3

Lowest mark: 6

Examiners' comments – AS/NZS 3000 is one of the few standards directly referenced in legislation. It is expected that candidates have a good understanding of mandatory tests and equipment classes. Candidates need to be aware of the latest acceptable values for earth continuity.

Question 3 – AS3007

Highest mark: 9.5

Average mark: 7.2

Lowest mark: 5.5

Examiners' comments – this question relates to the practical elements within AS/NZS 3007. Candidates struggled to identify standards relating to functional safety and reliability engineering.

Question 4 – AS4871

Highest mark: 8.5

Average mark: 6.75

Lowest mark: 4.5

Examiners' comments – Candidates need to understand that the standard applies to Quarries and underground mines. This question was generally answered well by all.

Question 5 – AS/NZS 2290.1

Highest mark: 8

Average mark: 7.2

Lowest mark: 6.5

Examiners' comments – maintenance of explosion protected equipment is a fundamental aspect of the role of the EEM, as such candidates are expected to have a good working knowledge of overhaul and inspection frequencies. Candidates were generally unable to apply the principals of Appendix B.

Question 6 – AS 60079 Series

Highest mark: 9.5

Average mark: 8.2

Lowest mark: 6.5

Examiners' comments – candidates were expected to demonstrate a good understanding of equipment groups, exd & exi systems. Calculation questions were answered well. The answer given did not utilise the exact wording from standards, but candidates generally understood the intent.

Question 7 – AS 3800

Highest mark: 10

Average mark: 9.5

Lowest mark: 8

Examiners' comments – this question is common in the exam and was answered well by all candidates.

Question 8 – WHS Act – Duty of care, Duty of workers

Highest mark: 10

Average mark: 8.3

Lowest mark: 4.5

Examiners' comments – this question is a repeat from the previous year's exam. The question was answered poorly by candidates in 2023. This year's candidates demonstrated a good understanding.

Question 9 – AS 2081

Highest mark: 9

Average mark: 7.6

Lowest mark: 6

Examiners' comments – candidates were expected to acknowledge that relying on earth continuity circuits to trip power is not an acceptable means of isolation. Candidates struggled to identify the use of EC settings to limit cable lengths.

Question 10 – AS 2067

Highest mark: 7.5

Average mark: 5.6

Lowest mark: 2.5

Examiners' comments – a limited understanding of AS/NZS 2067 was demonstrated by most candidates. This was an area of weakness for all candidates.

Oral examination

Exam date: 20 November 2024

Number of candidates: 5

Number deemed competent: 0

Examiners' comments:

Poor results from this oral exam.

Candidates did not have sufficient knowledge of protection systems used in mines. Some could not explain the process for determining the safety of existing protection settings. Some understood the process but did not remember what would be in the plan

Candidates could not address concerns raised by EHSR. They did not have a systematic approach to the audit and the recommissioning of the safety systems on site.

Candidates lacked the understanding of the Resources Regulator notification process and prohibition notice requirements. They also failed to identify a dangerous incident and did not notify the Resources regulator in the required time frame. A Technical understanding was also lacking.

Post oral examination

Exam date: 29 May 2025

Number of candidates: 5

Number deemed competent: 3

Examiners' comments:

The exam comprised three practical scenarios, covering both surface and underground infrastructure. Candidates were evaluated on their ability to address real-world engineering challenges in complex operational environments.

Successful candidates demonstrated:

- Proficiency in managing power demand and protection systems,
- A practical understanding of hazardous zones and the associated Equipment Protection Levels (EPLs),
- Competence in conducting and contributing to incident investigations.

These competencies reflect critical skills required for effective leadership and the management of electrical risks in mining. It is consistently evident throughout the examination process that candidates with experience acting in the EEM role, or closely working with the EEM role, are most likely to succeed in the oral examination.