



Regional
NSW

CANDIDATE NUMBER: _____ / _____ **(write in from your letter)**

EXAMINATION: MECHANICAL ENGINEER

EXAM PAPER: CME 3 – Safety and mining legislation applicable to surface coal mines

DATE: Wednesday 3rd August, 2022 – 1:10 pm to 3:50 pm

EXAMINATION FOR CERTIFICATE OF COMPETENCE TO BE A MECHANICAL ENGINEER OF COAL MINES OTHER THAN UNDERGROUND COAL MINES

Issued under the *Work Health and Safety (Mines and Petroleum Sites) Regulation 2014*

INSTRUCTIONS TO CANDIDATES:

Unless otherwise stated all references to Act and Regulations are to the

Work Health and Safety Act 2011

Work Health and Safety Regulation 2017

Work Health and Safety (Mines and Petroleum Sites) Act 2013

Work Health and Safety (Mines and Petroleum Sites) Regulation 2014

Candidates shall be seated in the exam room no later than 1:00 pm for exam instructions.

10 minutes reading time is allowed prior to the start of the examination. Candidates can use a **highlighter only** to mark points of importance during the reading time, but may not begin answering the questions. You must NOT use any other writing item during the reading time such as a pen.

After reading time is over place your identification number only, **NOT** your name, on the cover of this paper at the commencement of the exam. Electronic aids may not be used, apart from a non-programmable calculator.

It is expected that candidates will present their answers in an engineering manner, making full use of diagrams, tables, and schematics as appropriate, and showing full workings in calculations. **Poor legibility in diagrams and handwriting** may affect the candidate being deemed competent.

Provide answers in point form wherever appropriate. If you are unable to fit your answers in the available space use the three (3) blank pages included at the end of the paper. Ensure the question you are answering is clearly marked.

All ten (10) questions are to be attempted. All questions are of equal value.

Candidates will be marked as competent, or not yet competent. If a question is identified as **ESSENTIAL** then then the candidate must be deemed competent in that question in order to be deemed competent in the exam. If a part of a question is identified as **ESSENTIAL** then the candidate must be deemed competent in that part in order to be deemed competent in that question.

This examination is a **closed book** examination and no reference material may be used during the exam. Reference material will be provided in the exam paper as applicable.

EXAMINATION BOOKLET

Question Number	Essential	Competent	Not yet competent	Assessed by <i>Name</i>	Comments to justify, as necessary
1	a	Essential			
	b	Essential			
	c	Essential			
	d	Essential			
	Verdict				
2	a				
	b				
	c				
	d				
	Verdict				
3	a				
	b				
	c				
	d				
	Verdict				
4	a				
	b				
	c				
	Verdict				
5	a				
	b				
	c				
	d				
	Verdict				

Question Number		Essential	Competent	Not yet competent	Assessed by <i>Name</i>	Comments to justify, as necessary
6	a	Elements				
	b					
	Verdict					
7	a					
	b					
	c					
	Verdict					
8	a					
	b					
	c					
	d					
	Verdict					
9	a					
	b					
	c					
	d					
	Verdict					
10	a	Elements				
	b					
	c					
	Verdict					
PAPER	Verdict					<i>Marks checked by:</i>

If marking is reviewed under approved processes, then examiner is to record details:

Date	Examiner	Questions reviewed	Marks changed	Details/justification, as necessary
Eg. 2/8/19	Andrew Palmer	All	Q1 – 4 (previously 5)	Found one more criteria

Question 1 – Role of Mechanical Engineer and MECP

Essential

The candidate must be assessed as competent for this question in order to be considered as being competent for the entire exam

The role of the Mechanical Engineer

Work Health and Safety (Mines and Petroleum Sites) Regulation

Schedule 10 Part 2 Underground coal mines

Clause 21 Mechanical engineer

(1) The statutory functions of mechanical engineer are—

(a) to _____

for the life cycle of mechanical plant and installations at the mine, and

(b) to supervise the _____

of mechanical plant at the mine.

(2) The requirement for nomination to exercise the statutory functions is that the individual nominated must—

a. What are four (4) requirements in relation to clause 1) a. above?

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b. What are the four requirements in relation to clause 1) b. above?

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Work Health and Safety (Mines and Petroleum Sites) Regulation

Clause 26 Principal Control Plans

(4) **Mechanical engineering control plan** The operator of a mine or petroleum site at which there is a risk to health and safety associated with the mechanical aspects of plant and structures at the mine or petroleum site—

- (a) must ...
- (b) must ensure ...

c. Under section 4 (a) what must be done in relation to risks to health and safety from mechanical aspects of plant and structures?

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d. According to section 4 (b) what must be ensured, and by whom?

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Question 2 – Stockpiles and reclaim tunnels

Work Health and Safety (Mines and Petroleum Sites) Regulation

87 Ventilation _____

- (1) This clause applies to the following items of plant—
 - (a) any component of the ventilation system of an underground coal mine,
 - (b) _____ used at an underground coal mine or in a reclaim tunnel at a coal mine.
- (2) The regulator may, by notice published in the Gazette, identify an item of plant to which this clause applies and specify the testing and certification process for determining whether the item of plant is _____
- (3) The mine operator of a coal mine must ensure that an item of plant specified in a notice under this clause is not used at the mine unless it has been tested and certified in accordance with the notice.

a. According to Clause 87 (1) (b) what items of plant are referred to, and what must they be?

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b. Very few Australian Standards are specifically referred to in the Work Health and Safety (Mines and Petroleum Sites) Regulation. Schedule 2 (2) (4) (c) refers to which Australian Standard?

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MDG28 Safety requirements for coal stockpiles and reclaim tunnels

- c. Section 3.1.4 refers to dozer engulfment. List six (6) risks of harm to the dozer operator in relation to the stockpile draw down points.

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- d. Section 3.2.1 identifies recommended minimum controls for dozers working on coal stockpiles. List six (6) mitigative controls required

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Question 3 – WHS Regulation – Confined Space

You have accepted the position as the Mechanical Engineer at an existing open cut mine and have been requested to review the Confined Spaces at the mine, and the conditions for working in them.

- a. As detailed in Clause 5 Definitions what are the requirements for a confined space

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- b. What technical references specifically addressing the management of confined spaces would you refer to in your review. Identify two (2).

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Question 4 – WHS Act - Consultation

Work Health and Safety Act Part 5 Division 2 Consultation with workers places duties on the Operator (PCBU) of a coal mine to engage in consultation, and includes the following sections:

- 46. Duty to consult with other duty holders
- 47. Duty to consult with workers
- 48. Nature of consultation
- 49. When consultation is required

a. What requirements are placed on the PCBU to consult with workers?

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b. What requirements are placed on the nature of consultation?

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c. What is the primary difference between the high potential incident events identified in Clause 128 (5) (a), which refers to events in Clause 179 (a), and the dangerous incidents identified in Clause 179

C NYC

d. Apart from the incident type events described in Clause 179 (a) there are twenty one (21) additional incidents that have to be reported in Clause 128 (5). List three (3).

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b. Without disturbing the incident scene, for a collision incident list five (5) items of information you would make note of for each of the following investigation areas to assist you in assessing the root cause prior to notifying the relevant authorities.

People

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Equipment






	C NYC
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Environment

	C NYC
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Question 7 – Hydraulics

- a. For the following table of hydraulic schematic symbols draw a line to link the symbol to the correct component description

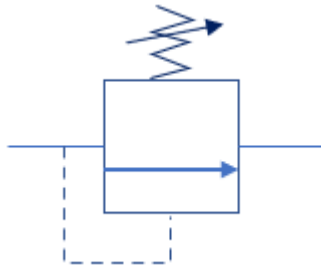
Large square or rectangle			Visible indicator or orifice
Large circle			Connectors (hoses, pipes, etc)
Diamond			Rotary motion (pump/motor)
Small circle			Pressure / flow control valve
Intersecting lines			Fluid conditioning device

C NYC

- b. Draw the hydraulic schematic symbol for an open center, three position, lever operated, spring return, directional control valve

C NYC

c. Explain the operation of the hydraulic component depicted by the following schematic symbol



C NYC

Sitting in the centre of the desk when you arrive is a copy of the annual structural Integrity report dated yesterday, identifying 100 different defects in the following categories:

- Five (5) of Critical ranking
 1. Reject bin support leg has been struck by a reject truck (unreported)
 2. Spirals support beams have lost 50% of their cross sectional area
 3. External sheeting purlins on the plant feed surge bin are almost non existent
 4. External sheeting is loose and flapping in high winds
 5. Underpans are missing on the skyline feed conveyor above the CHPP access road
- Twenty (20) of High ranking
- Seventy (70) of Moderate ranking
- Five (5) of Low ranking

b. Based on the above summary what should your top four (4) immediate actions be?

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c. What defect items would you prioritise?

	C NYC
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Question 10 – Safety critical systems

Essential Elements

The mining industry continues to have reportable incidents with regards to the failure of safety critical systems on mobile plant, and a number of safety alerts have been issued.

- a) For a standard rear dump haul truck identify four (4) safety critical systems. **Two of these safety critical systems are considered essential answers and must be included. If they are not included the candidate will be deemed not yet competent for the question.**

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- b) Select two (2) of the safety critical systems you identified above, and for each one describe three (3) possible modes of failure.

END OF QUESTIONS

**BLANK PAPER TO WRITE ANSWERS THAT YOU COULD FIT INTO THE SPACE
PROVIDED – INDICATE QUESTION NUMBER AT START OF ANSWER**

END OF PAPER