

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 3 rd 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 Name	Comments to justify, as necessary
	а	Essential				
	b	Essential				
1	С	Essential				
	d	Essential				
	Verdict					
	а					
	b					
2	С					
	d					
	Verdict					
	а					
	b					
3	С					
	d					
	Verdict					
	а					
4	b					
4	С					
	Verdict					
	а					
	b					
5	С					
	d					
	Verdict					

Questio	n Number	Essential	Competent	Not yet competent	Assessed by Name	Comments to justify, as necessary
	а	Elements				
6	b					
	Verdict					
	а					
7	b					
,	С					
	Verdict					
	а					
	b					
8	С					
	d					
	Verdict					
	а					
	b					
9	С					
	d					
	Verdict					
	a	Elements				
10	b					
	С					•
	Verdict					
PAPER	Verdict					Marks checked by:

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 alouge 1) a. above?		
a. What are four (4) requirements in relation to clause 1) a. above?		
	С	NYC
		INTO
b. What are the four requirements in relation to clause 1) b. above?		
		.
	С	NYC

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? C NYC d. According to section 4 (b) what must be ensured, and by whom?	Mork	Joelth and Safaty (Mines and Datroloum Sites) Pagulation		
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			С	NYC
C NYC		d. According to section 4 (b) what must be ensured, and by whom?		
C NYC				
			С	NYC

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 plant is	item	of			
(3) The mine operator of a coal mine must ensure that an item of plant specified in a notice	und	er			
this clause is not used at the mine unless it has been tested and certified in accordance wit notice.	h the				
a. According to Clause 87 (1) (b) what items of plant are referred to, and what must the	ey be	∋?			
	С	NYC			
b. Very few Australian Standards are specifically referred to in the Work Health and S (Mines and Petroleum Sites) Regulation. Schedule 2 (2) (4) (c) refers to which Aus Standard?	•				
	С	NYC			
		<u>"</u>			

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 oper relation to the stockpile draw down points.	ator i	in
	С	NYC
d. Section 3.2.1 identifies recommended minimum controls for dozers working on coal stockpiles. List six (6) mitigative controls required	l	
	<u> </u>	
	С	NYC

Question 3 – WHS Regulation – Confined Space		
You have accepted the position as the Mechanical Engineer at an existing open cut mine an been requested to review the Confined Spaces at the mine, and the conditions for working in		
a. As detailed in Clause 5 Definitions what are the requirements for a confined spac	Э	
	С	N
b. What technical references specifically addressing the management of confined specifically would you refer to in your review. Identify two (2).	aces	

C.	Part 4.3 Clauses 67 to 76 identify control requirements in relation to the management	nt of	
	confined spaces. Identify three (3).		
-			
		С	NYC
d.	With respect to entry into confined spaces for each of the items below detail both the meaning of the acronym and your understanding of the term.	e	
	i. LEL ii. UEL		
	iii. TWA iv. STEL		
		С	NYC

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: Duty to consult with other duty holders 46. 47. Duty to consult with workers

Nature of consultation 48.

49.	When o	consultation	ie	required
49.	VVIIGII	Jonsulation	15	required

49. When consultation is required		
a. What requirements are placed on the PCBU to consult with workers?		
	С	NYC
b. What requirements are placed on the nature of consultation?		
		NVC

c. When is consultation required?	
C. When is consultation required:	
	C NYC

Question 5 – WHS (MPS) Regulation – Notifiable incidents		
The Work Health and Safety (Mines and Petroleum Sites) Legislation identifies conditions and timeframes for when notification to the Regulator is required.		
a. In the WHS (Mines and Petroleum) Act 2013 Part 3 Incident Notification Section 14, are the three (3) categories of "notifiable incidents"?	14, what	t
	С	NYC
b. WHS (Mines and Petroleum) Regulation 2014 Clause 179 Dangerous Incidents identwenty four (24) requirements to notify, name twelve (12) of the categories of "Dang incidents"?		

		С	NYC
C.	What is the primary difference between the high potential incident events identified Clause 128 (5) (a), which refers to events in Clause 179 (a), and the dangerous incidentified in Clause 179		:S
		С	NYO
d.	Apart from the incident type events described in Clause 179 (a) there are twenty on additional incidents that have to be reported in Clause 128 (5). List three (3).		
d.			NY(

Question 6 - Scenario

Essential Elements

A vehicle collision incident has occurred on site not far from you involving three of your fitters, and you are the first senior statutory official to arrive.

a.	When arriving at ANY incident scene what immediate actions would you take? List your five (5) actions. Two (2) of these actions are considered essential and will be requibe identified in your answer to be considered competent for this question		
		С	NYC

b. Without disturbing the incident scene, for a collision incident list five (5) items of infection you would make note of for each of the following investigation areas to assist you is assessing the root cause prior to notifying the relevant authorities.	C N	n
People		
	С	NYC
Equipment		
Environment	С	NYC
	С	NYC

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

_	
C	NYC

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

c. Explain the operation of the hydraulic component depicted by the following sch	ematic symbol
	C NYC
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Question 8 – Structural integrity

You are commencing as Mechanical Engineer at an ageing coal mine. The mine has a Coal Handling and Preparation Plant (CHPP) with the following attributes:

- 25 years old
- ROM receival hopper
- Primary, secondary and tertiary crushers
- ROM coal feed conveyor to a plant feed surge bin, then separate conveyor to each module
- Twin 500 tph capacity modules (1000 tph nameplate plant)
- Clean coal conveyors with a tripper skyline
- Reclaim tunnel with vibratory feeder draw points, and a fan on the second egress
- Reclaim conveyor to a train load out bin
- Belt press filters onto a reject conveyor to a reject bin
- Poor housekeeping standards

a.	integrity inspection process	ctura	
		С	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?		
		С	NYC
C.	What defect items would you prioritise?		
		С	NYC

action	you would cons	ider implementii	ng immediate	ly			
						С	١

Question 9 – Hot work		
Hot work at a mine site is generally managed by the Mechanical Engineer		
 a. List three (3) principal hazard management plans or principal control plans that directly manage aspects of hot work 	′	
	С	NYC
b. Technical Reference Guide (TRG) Hot Work (cutting and welding) at mines and petrole sites replaced MDG 25 in June 2021. Section 2.3 common hazards of hot work identified factors involved singularly or cumulatively in hot work incidents, and also includes a list hazards associated with hot work. List eight (8) hazards associated with hot work.	es	
	С	NYC

	ork activities. List five (5) controls associated with hot work.	
		С
d. L	ist four (4) control requirements for Category C environment welding work.	
		С

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.

u)	For a standard rear dump haul truck identify four (4) safety critical systems. Two of the safety critical systems are considered essential answers and must be included. If are not included the candidate will be deemed not yet competent for the question	the	/
		С	NYC
b)	Select two (2) of the safety critical systems you identified above, and for each one desc three (3) possible modes of failure.	ribe	

		С	N
c)	As the Mechanical Engineer you are reviewing your management systems for mobile p List ten (10) controls you will ensure you have in place to minimise the potential for inci involving the failure of safety critical systems.		S

END OF QUESTIONS					
BLANK PAP	ER TO WRITE A	NSWERS TH	IAT YOU CO	ULD FIT INT	O THE SPACE
PROVID	DED – INDICATE	QUESTION	NUMBER AT	START OF	ANSWER



