



(CME1)

NSW Coal Competence Board

EXAMINATION FOR CERTIFICATE OF COMPETENCE AS Mine Mechanical Engineer

(Coal Mine Health & Safety Act 2002)

Thursday 7 March 2013 - 9.30 am to 12.30 pm

Mechanical engineering applicable to underground coal mines

INSTRUCTION TO CANDIDATES

Unless otherwise stated all references to *Regulations* are to the *Coal Mine Health and Safety Regulation 2006* or the *Work Health and Safety Regulation 2011*.

It is expected that candidates will present their answers in an engineering manner making full use of diagrams, tables, and relevant circuits where applicable and showing full working in calculations.

Credit marks will be given for such work in assessing marks for these questions. Neatness in diagrams is essential and will be considered in the allocation of marks.

Provide answers in point form wherever appropriate.

Electronic aids may not be used.

5 only questions are to be attempted of which **Questions 1 to 4 are Compulsory** with the remainder question selected from questions 5 to 8.

All questions are of equal value but parts of questions may vary in value.

Place your identification number only, NOT your name on each page of your answers.

10 minutes reading time is allowed prior to the start of the examination.

Candidates can highlight points of importance during the reading time, using highlighters, but not begin answering the questions.

CLOSED BOOK EXAM

Question 1 Compulsory (total of 60 Marks)

You have just received notification from underground that a rubber tyred vehicle (RTV) has collided with a stationary load haul dump (LHD). The vehicle (RTV) was returning to the surface at the end of night shift and was fully loaded with men.

Reports from underground indicate there are no injuries, however the driver of the vehicle (RTV) is convinced the brakes failed to stop the vehicle when they were applied.

- a) Describe your initial response, immediate actions and list a series of steps you would use when investigating this incident?
- b) Describe what tests/inspections you would undertake when investigating this incident to verify if a failure has occurred within the braking system.
- c) When you compare previous dynamic brake testing from a week before the incident, you identify a reduction in braking efficiency. How would this information impact on your investigation?
- d) A review of the plant maintenance records show the brakes were replaced only a month prior to the incident and readjusted a week before the incident. How would this information impact on your investigation?
- e) At the completion of your investigation you have identified a number of failed defences as well as areas of opportunity. With these outcomes how would you improve safety at your mine as well potentially improve industry safety?

Question 2 Compulsory (total of 60 Marks)

As the Manager of Mechanical Engineering for a coal operation you have been requested to develop a tender specification for the supply of hydraulic hose assemblies and adaptors for the next 5 years to your location.

(Your reference document for your tender specification will be MDG 41. section 3.7.5. Marking and Identification)

A section within your tender specification is titled "**Marking and identification**"

List the requirements for the following:

- a) General requirements for hoses and hose assemblies
- b) Hose identification
- c) Hose end identification
- d) Hose assembly identification
- e) Fittings and Adaptors

Question 3 Compulsory Multiple choice (total of 60 Marks)

Please circle or mark the correct answer

- a) Which MDG would you refer to when conducting and reviewing a risk assessment:
- i) MDG 1010
 - ii) MDG 1014
 - iii) MDG 1010 & MDG 1014
 - iv) None of the above
- b) What is the maximum distance a fire extinguisher should be located in the vicinity of the hot works working area:
- i) 5m
 - ii) 10m
 - iii) 15m
 - iv) 20m
- c) MDG for Mobile and transportable equipment used at mines:
- i) MDG 25
 - ii) MDG 15
 - iii) MDG 33
 - iv) MDG 26
- d) A supplier of mobile plant should provide the owner with:
- i) A statement of compliance to the relevant MDG
 - ii) Information as required by legislation
 - iii) Results of test reports
 - iv) All of the above
- e) Storage of gas cylinders is in accordance with what Australian Standard:
- i) AS 4332
 - ii) AS 1940
 - iii) AS 1596
 - iv) All of the above

- f) What would be included in the synopsis of plant:
 - i) The systems operating limits and capacities
 - ii) General arrangement drawings showing physical dimensions
 - iii) All hydraulic and pneumatic circuit diagrams
 - iv) All of the above

- g) Park brakes on mobile plant should have a capacity of holding equipment stationary on a grade of:
 - i) 5%
 - ii) 10%
 - iii) 15%
 - iv) 20%

- h) A welding management plan (WMP) should be based on a quality OH&S Management system as defined in:
 - i) AS 4606
 - ii) AS 4804
 - iii) AS 4801
 - iv) AS 4801 & AS 4804

- i) Fire extinguisher for mobile plant with a capacity of engine rated less than 100 kW should be:
 - i) 30B(E): 2kg - 3kg
 - ii) 80B(E): 4.5kg – 9kg
 - iii) 80B(E): 40kg – 60kg
 - iv) None of the above

- j) Hydraulic intensification can occur in:
 - i) Single acting hydraulic cylinders
 - ii) Air driven hydraulic intensifiers
 - iii) Automatic greasing systems
 - iv) All of the above

- k) LPG bulk storage tanks require inspection:
 - i) Monthly
 - ii) Annually
 - iii) Every four years
 - iv) At time of manufacture

- l) Magnetic particle non-destructive testing is used to determine:
 - i) If the material is ferrous or non-ferrous material
 - ii) The microstructure of the material
 - iii) Evidence of cracking in the material
 - iv) None of the above

- l) Which Australian standard would you consult for Fixed platforms, walkways, stairways and ladders:
 - i) AS 4024
 - ii) AS 4100
 - iii) AS 1657
 - iv) AS 1418

- m) The minimum width of a walkway should be less than:
 - i) 500mm
 - ii) 550 mm
 - iii) 600 mm
 - iv) 650mm

- n) The manufacture of mobile plant shall provide all necessary limits of operation for the equipment supplied: These include:
 - i) Maximum working gradient (%)
 - ii) Maximum load (tonnes)
 - iii) Brake capacities
 - iv) All of the above

Question 4 Compulsory (total of 60 Marks)

As the Manager of Mechanical Engineering for your mine you are about to reintroduce a program of conveyor belt vulcanising with a contract company. The contractor will be responsible for splicing the belt and supplying all necessary equipment to complete the splices. It is expected the vulcanising program will take some nine months to complete with the majority of the vulcanising to be hot vulcanised joints.

- a) List all the documentation you expect the contractor to supply to the mine.
- b) What equipment inspections are you going to conduct as part of your site introduction and why?
- c) What competencies would you require for the work and how would you verify the competency of the persons engaged to carry out the works?
- d) Describe the list of inspections and tests you would implement as part of your contractor management system, considering both people and equipment.
- e) How would you confirm ongoing compliance to both the contractors and mines safety management plan?

Question 5 Elective (Worth a total of 60 Marks)

You have just become the Manager of Mechanical Engineer for the site and also inherited an expansion of the mines infrastructure and coal handling and preparation plant.(CHPP) The expansion in the CHPP is to be carried out by contractors and their subsequent sub contractors.

- a) List how you validate competencies of the personnel
- b) What would you expect to see in the SWMS for the work from each contractor?
- c) One of the contractors have notified you they are using labour hire to make up the numbers
 - i) What would you require for competencies from the labour hire and who would be responsible for this?
 - ii) What would you expect the labour hire company to review and what would you be looking for when auditing the contractor?
 - iii) The work to be carried out would include the use of specialised tools, how would you confirm the personnel have been trained to use this equipment?

Question 6 Elective (total 60 marks)

You have just accepted a position at a mine as Manager of Mechanical Engineering. The mine is a typical drift entry mine, using a drift winder for men and materials to access the seam and a drift conveyor for the conveyance of ROM material to the surface.

The drift conveyor also can be configured to act as a second egress conveyance if required.

As the Manager of Mechanical Engineering you have been made aware of two (2) previous incidents where drift conveyors have sustained serious mechanical damage when the belt has run backwards at excessive speed.

Damage included: drive motor damage, brake path damage, drive gear box damage with the drive coupling disintegrating propelling brake components out of the winder room, with some damaged components being located some 200m from the winder room as well as structural damage to the pit bottom loading facility.

- a) As the Manager of Mechanical engineering how are you going to satisfy yourself the plant at your site is being operated safely?
- b) List a series of tests and checks you would be looking for as part of the mines inspection and maintenance system.
- c) What specific safety devices would you expect to find on this system and why?
- d) What additional checks/tests would you conduct to ensure the plant is being operated safely?
- e) You have identified the plant is some 25 years old, how is this going to influence your management of the plant and why?

Question 7 Elective (total 60 marks)

You are the Manager of Mechanical Engineering at an adit entry mine. Your coal is transported to the surface stock pile facility by a conveyor in a separate roadway. The ROM material is dumped onto a ROM stockpile awaiting dispatch by rail to your customer via a reclaim tunnel system

At the request of the purchasing department you have been asked to review a tender submission from a series of contract companies for the supply and operation of a stock pile push dozer.

- a) List the documentation you would expect the tenderer to supply with his submission.
- b) List the documentation you would consult with to assist you in developing a site entry check list for the dozer.
- c) What specific safety related items would you insist on being fitted to the dozer?
- d) List the hazards associated with a dozer operating on coal stock piles.
- e) List the controls required to mitigate the identified hazards with Dozers operating on stock piles.

Question 8 Elective (total 60 marks)

Your mine has decided to overhaul/upgrade a number of your longwall roof supports at the completion of the next longwall block. It has also been decided to undertake the works in house due to budget constraints.

You have been asked by the operator to identify and prioritise the repair works.

Preliminary lists of repairs and upgrades have been provided by the longwall engineer, these include mechanical component replacement, hydraulic component replacement, welding repairs and some modifications and upgrades

- a) What sources of information would you access to help develop and prioritize the work scope?
- b) What documentation would you consult with to help you develop your standards for the work to be carried out?
- c) What type of risk based approach/s would you consider and why?
- d) How would you determine if your tradespersons, including both mine site employees and contractors, have suitable competencies to undertake the works?
- e) How are you going to satisfy yourself the works undertaken at the mine are without risk to health and safety to persons?

END OF QUESTIONS

END OF PAPER



Trade &
Investment
Mine Safety

CME2

NSW Coal Competence Board

EXAMINATION FOR CERTIFICATE OF COMPETENCE AS Mine Mechanical engineer

(Coal Mine Health & Safety Act 2002)

Thursday 7 March 2013

1.30 pm to 2.30 pm

Legislation and Standards applicable to Underground Coal Mines

INSTRUCTIONS TO CANDIDATES

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Provide answers in point form wherever appropriate.

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All questions are to be attempted

All questions are of equal value but parts of questions may vary in value

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OPEN BOOK EXAM

Question 1 (total of 20 Marks)

Reference: *Work Health & Safety Regulation 2011*

Your mine has recently taken delivery of a new piece of plant. During the site entry inspection it has been brought to your attention that the plant is emitting an excessive level of **“Noise”**. i.e. above 85dba weighted average

- a) In the process of acquiring the plant who has responsibility for ensuring noise emissions are as low as reasonably practicable? (5 marks)
- b) How are you going to determine the level of noise being emitted by the plant when in use? (5 marks)
- c) Where and how can you source the information on noise emission of the plant? (5 marks)
- d) With the information you have obtained regarding the noise emissions of the plant how can the site introduction process be progressed? (5 marks)

Question 2 (total of 20 Marks)

Reference: *Work Health & Safety Regulation 2011*

You are reviewing your Safe Work Procedure of the **“Management of risk of fall”**

- a) Who has the responsibility of managing the risks to health and safety associated with falls? (5 marks)
- b) What would be your scope for the SWP “Management of risk of fall”? (5 marks)
- c) List 5 areas of risk of falls which your SWP would need to provide for. (5 marks)
- d) What alternates are you required to provide? (5 marks)

Question 3 (total of 20 Marks)

Reference: *Coal Mine Health and Safety Regulation 2006*

The operator of your mine is reviewing the “**Contents of major hazard management plan: underground transport management plan**”

He has asked you as the Manager of Mechanical Engineering for the operation, to review and add input where required.

- a) Of the 11 items listed in *Coal Mine Health and Safety Regulation 2006* (a to k), list which items where you would be expected to provide input. (5 marks)
- b) In general, list what strategies you would develop to ensure compliance with this clause. (5 marks)
- c) How would you ensure hire equipment complies with the above requirements? (5 marks)
- d) How would you ensure overall compliance with your identified items from part “a”? (5 marks)

Question 4 (total of 20 Marks)

Reference: *Coal Mine Health and Safety Regulation 2006*

You are reviewing your Standards of Engineering Practice for the safe storage of “**Flammable materials**” in and/or about the mine.

- a) What specific requirements would you need to include to your SEP? (5 marks)
- b) What is the definition of “Flammable materials”? (5 marks)
- c) List 4 examples of Flammable materials. (5 marks)
- d) List 4 publications you could consult with to determine if a substance or material is classified as a “Flammable material”. (5 marks)

Question (5) (total of 20 Marks)

Gazettal No 24 dated 2 February 2007

“Requirements for design registration of canopies on continuous miners”

(attached at back)

Your mine is about to take delivery of a non-remote control continuous miner fitted with an onboard operators compartment and protective canopy, The continuous miner is to be use underground for roadway brushing.

- a) Would you consider the requirements of the Gazettal applicable in this application, (i.e. Roadway brushing) Provide reasoning with your answer. (4 marks)
- b) How would you determine if the designer’s qualifications are in accordance with the Gazettal? (4 marks)
- c) What are the main conceptual aspects of the canopy design? (4 marks)
- d) How would you determine if the material used to manufacture the canopy conforms to the requirements of the Gazettal? (4 marks)
- e) What load tests are used to confirm the design of the canopy? (4 marks)

**END OF QUESTIONS
END OF PAPER**

OCCUPATIONAL HEALTH AND SAFETY ACT 2000**Notice under clause 112A of Occupational Health and Safety Regulation 2001****Requirements for design registration of canopies on continuous miners**

I, ROBERT REGAN, Chief Inspector under the *Coal Mine Health and Safety Act 2002*, pursuant to clause 112A of the *Occupational Health and Safety Regulation 2001* (the Regulation), by this notice, specify the requirements set out in the Schedule below as the requirements that must be met prior to canopies on continuous miners used in underground mines at a coal workplace (referred to in this notice as canopies) being registered under Subdivision 1 of Division 3 of Part 5.2 (as modified by Schedule 4A) of the Regulation.

Dated this 29th day of January 2007.

ROBERT REGAN

Chief Inspector

NSW Department of Primary Industries

(by delegation)

Schedule**1.0 DESIGN REQUIREMENTS**

Canopies must be designed by a qualified practicing structural or mechanical engineer who is registered on the National Professional Engineers Register (administered by Engineers Australia) or a qualified practicing engineer acceptable to the chief inspector and must be designed in accordance with the relevant Australian Standards, good engineering practice and the following requirements.

1.1 Definitions

For the purpose of these requirements, the following definitions apply:

Canopy roof means the platework and any associated bracing commonly utilised to provide protection above the driver's enclosure

Lateral edge means the edge of the canopy roof usually located at 90 degrees to the centreline running from the head to the tail of the continuous miner.

longitudinal edge means the edge of the canopy roof usually located parallel to the centreline defined above

Support includes the support legs and any associated steel work, other than the canopy roof, which interconnects the support legs.

Support leg means the vertical or near vertical member connecting the continuous miner chassis or driver's enclosure to the canopy roof

1.2 Conceptual Aspects

In the event of the canopy being subjected to a fall of roof which exceeds the elastic limit of the canopy design then yielding should be progressive and limited to the extent that the driver can safely remain within the operator compartment i.e. 1000mm minimum headroom space remains between the seat and canopy roof.

Note: Consideration should be given to suspending the driver's seat from the underside of the canopy roof.

It is acknowledged that there are practical limitations in the design of canopies. However, each canopy design together with the operator compartment should endeavour to provide an enclosure which will prevent driver injury in the event of a fall from the roof.

The canopy design should consider access into the operator compartment and the driver's visibility in all directions particularly to the driver's front and rear and as far as reasonably practical to the sides.

1.3 Canopy Design Material and Loading Criteria

1.3.1 Materials

All main load bearing components used in the construction of protective canopies must be in accordance with Standards Australia AS 4100:1998 '*Steel structures*' as amended or AS 3990:1993 '*Mechanical equipment – Steelwork*'.

1.3.2 Welding

All welding carried out during the construction of protective canopies must be in accordance with AS 1554.21:2004, '*Structural steel welding – Welding of steel structure*' and shall comply with Category SP welds.

All welded joints must be non-destructively examined in accordance with the above welding code.

There must be a minimum of four supports for the canopy roof.

It is preferred that the canopy roof be attached to the support legs by either bolted or welded-connections.

However, where pinned connections are used, maximum clearances must not exceed H7 and C9 to AS 1654.1:1995, '*ISO system of limits and fits*'.

The base of the canopy support legs must be securely bolted or welded to the main frame of the continuous miner or driver enclosure.

The canopy roof must be constructed by utilising a substantial one piece solid plate devoid of uneven structural protrusions above the roof line (including cable support structures etc).

The design of the canopy roof and seat should be such that when the driver leans slightly to the right, as is customary by many drivers, the driver's head remains underneath the canopy roof.

2.0 TESTING CRITERIA

Continuous miner canopy load testing shall be undertaken in the presence of an independent competent person.

2.1 Vertical Load Test

The protective canopy is required to have a minimum structural capacity to support elastically a static uniform load of 8.2 tonnes or a force equivalent to a static load of 105 kilopascals distributed uniformly over the greatest plan view area of the canopy roof, whichever is the lesser.

An acceptable method of test provides for the test load to be distributed within the middle ninth of the roof's plan view area.

2.2 Horizontal Load Test

The protective canopy is required to have a minimum structural capacity to support elastically a static uniform load of two (2) tonnes applied horizontally to the edge of the canopy roof.

An acceptable method of test provides for the test load to be distributed along the middle third of the longitudinal and lateral edge of the roof separately.

The horizontal loading must be applied in both the longitudinal and lateral directions separately and the results must be satisfactory in both directions.

2.3 Permanent Set

For all the load tests as per 2.1 and 2.2 above, the permanent set shall be less than 10% of the maximum deflection measured with the load applied.

A dial indicator is suitable for measurement of the maximum deflection and the permanent set caused by the application of the test load.

3.0 TEST DATA SHEET

CONTINUOUS MINER PROTECTIVE CANOPIES

Date.....

Organisation

Organisation Address

Test carried out at

Canopy for continuous miner type:

Model number

Drawing Number(s)

Manufacturer's stated strength (based on U.T.S.)

in vertical direction

in lateral horizontal direction

in longitudinal horizontal direction

Notes

1. A canopy will only be registered if it can elastically resist a minimum test load of 8.2 tonnes applied vertically and a minimum test load of 2.0 tonnes applied horizontally in both longitudinal and transverse directions independently.

2. Larger test loads should be considered by applicant where considered appropriate for conditions where canopy is to be used. The registration document will record the maximum load for which tests are successful.

3.1 Test Method

With canopy fully extended unless otherwise stated the following tests must be conducted:-

1. Apply vertical test load to middle ninth plan view area i.e. to one third span of width and length.

- a) For fixed type canopy apply preload of between 300-500 Kg to remove slack from joints, set dial indicator to zero then apply test load. Record deflection "A" under the test load and the residual deflection "B" on removal of the test load.

"B" divided by "A" must be less than 10% for the canopy to be satisfactory.

Note: It may be necessary to repeat this test or other tests in order to further eliminate any initial movement in pinned or bolted connections.

- b) For canopies initially supported by hydraulic cylinders measure pressure and load at hydraulic cylinders when full test load is applied then increase test load till cylinders yield, record yield pressure and load. Ensure that pressure relief system reseats when load is reduced i.e. reload a second time.

Note: If the yield testing of the hydraulics requires a load which is beyond the elastic limit of the canopy then separate bench testing of the hydraulics will be permitted.

With canopy lowered to its minimum height and oil removed from the support cylinders i.e. canopy resting on its mechanical stops apply test load and record deflections as for fixed canopy previously mentioned.

2. Re-extend canopy to maximum height and apply horizontal test load along the middle one third of the canopy edge directing the load away from the centreline of the machine.

Preload and deflection measurements are as in 1(a) above.

3. Repeat test 2 but with the load applied towards the centreline of the machine. This test is only necessary if there is a significant difference in the strength of the canopy supports between the 2 directions.

4. Apply horizontal test load along the middle one third of the canopy edge directing the load from the rear to the front of the machine.

Preload and deflection are as in 1(a) above. For canopies fitted with rear hydraulic cylinders the cylinder should not be the item that stops any upward movement that may occur i.e. a mechanical stop should prevent over extension of the canopy.

5. Repeat test 4 but with the load applied directed from the front to the back of the machine. This test is only necessary if there is a significant difference in the strength of the canopy supports between the 2 directions.

Note: Test 1(b) above is only applicable for canopies with hydraulic height adjustment where the support cylinders are required to elastically support the test load without pressure relief occurring. Canopies having different philosophy of hydraulic system design will require an alternative test procedure. This procedure will be determined by the Senior Inspector of Mechanical Engineering Department of Primary Industries, Mine Safety upon request.

3.2 Test Results

Test Remarks1. *Vertical test*

test load (KN) | |

initial deflection "A" (mm) | |

residual deflection "B" (mm) | |

 $\frac{B}{A} \times 100$ (%) | |

A | |

Additional Vertical test-hydraulic supported canopies

- test load (KN) | |

pressure in cylinders (kPa) | |

effective area of canopy cylinders mm² | |

calculated load on canopy cylinders (kN) | |

yield pressure on canopy cylinders (kPa) | |

calculated yield load on canopy cylinders (kN) | |

does relief system reseal | |

2. *Horizontal test away from machine centreline*

test load - (KN) | |

initial deflection "A" (mm) | |

residual deflection "B" (mm) | |

 $\frac{B}{A} \times 100$ (%) | |

A | |

3. *Horizontal test towards machine centreline*

test load - (KN) | |

initial deflection "A" m.m. | |

residual deflection "B" m.m. | |

 $\frac{B}{A} \times 100$ (%) | |

A | |

4. *Horizontal test towards front of machine*

test load - (KN) | |

initial deflection "A" m.m. | |

residual deflection "B" m.m. | |

 $\frac{B}{A} \times 100$ (%) | |

A | |

5. *Horizontal test towards rear of machine*

test load - (KN)		
initial deflection "A" m.m.		
residual deflection "B" m.m.		
$\frac{B}{A} \times 100$ (%)		
A		

6. Distance from underside of canopy in the vicinity of a man’s head to the top of the horizontal section of the drivers seat with the canopy in its lowest position (must be +1m).

Comments

.....

7. Welding specifications as per Design Guidelines.

Comments

.....

8. Spatial and other relevant requirements as per Design Guidelines.

Comments

.....

Note: Pass or fail must be nominated in remarks column for each test.

4.0 CERTIFICATION

The design and testing must be certified to comply with these requirements by a qualified structural or mechanical engineer who is registered on the National Professional Engineers Register (administered by Engineers Australia).

5.0 ASSESSMENT

The following documents must be provided for assessment with the application under clause 107 of the Regulation for registration of plant design:

- a) detailed manufacturing drawings and technical specifications signed by a qualified engineer,
- b) performance and testing certificate, and
- c) a certification document stating that the design complies with these requirements by a qualified engineer.



(CME3)

NSW Coal Competence Board

**EXAMINATION FOR CERTIFICATE OF COMPETENCE AS
Mine Mechanical Engineer**

(Coal Mine Health and Safety Act 2002)

**Thursday 7 March 2013
1.30pm – 3.30pm**

Safety and Mining Legislation Applicable to Open-cut Coal Mines

INSTRUCTIONS TO CANDIDATES

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Place your identification number only, NOT your name, on each page of your answers

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Part A open book - Part B closed book

PART A Legislation Section:

Work Health and Safety Regulation 2011 and Coal Mine Health and Safety Act 2002 & Coal Mine Health and Safety Regulation 2006 ONLY

Open book format

Question 1 (total of 25 Marks)

Reference: *Work Health and Safety Regulation 2011*

You have recently taken delivery of a new piece of plant. During the site entry inspection it has been brought to your attention the excessive level of **“Noise”** being emitted by the plant.

- a) In the supply chain of plant who has responsibility for ensuring noise emissions are as low as reasonably practicable?
- b) You receive a report that a newly supplied piece of plant is excessively noisy. How are you going to determine if the plant is in fact excessively noisy?
- c) What information are you going to require to assist you in assessing the levels of noise being emitted by the plant?
- d) Who in the supply chain will you be able to source the above information from?

Question 2 (total of 25 Marks)

Reference: *Work Health & Safety Regulation 2011*

You are reviewing your Safe Work Procedure for the **“Management of risk of fall”**

- a) Who has the responsibility of managing the risks to health and safety associated with falls?
- b) What would be your scope for the SWP “Management of risk of fall”?
- c) List 5 areas of risk of falls which your SWP would need to provide for:
- d) What alternatives are you required to provide?

Question 3 (total of 25 Marks)

Reference: *Coal Mine Health and Safety Regulation 2006*

You are reviewing your Standards of Engineering Practice for the safe storage of **“flammable materials”** in and/or about the mine.

- a) What specific requirements would you need to include to your SEP?
- b) What is the definition of “flammable materials”?
- c) List 4 examples of flammable materials.
- d) List 4 publications you could consult to determine if a substance or material is classified as a “flammable material”.

Part B Mechanical Practices Section

Closed book format

Question 4 - Multiple choice (circle or mark the correct answer - total of 25 Marks)

- a) Which MDG would you refer to when conducting and reviewing a risk assessment?
- i) MDG 1010
 - ii) MDG 1014
 - iii) MDG 1010 & MDG 1014
 - iv) None of the above
- b) What is the maximum distance a fire extinguisher should be located in the vicinity of the hot works working area?
- i) 5m
 - ii) 10m
 - iii) 15m
 - iv) 20m
- c) MDG for Mobile and transportable equipment used at mines
- i) MDG 25
 - ii) MDG 15
 - iii) MDG 33
 - iv) MDG 26
- d) A supplier of mobile plant should provide the owner with:
- i) A statement of compliance to the relevant MDG
 - ii) Information as required by legislation
 - iii) Results of test reports
 - iv) All of the above
- e) Park brakes on mobile plant should have a capacity of holding equipment stationary on a grade of:
- i) 5%
 - ii) 10%
 - iii) 15%
 - iv) 20%

- f) Storage of gas cylinders is in accordance with
- i) AS 4332
 - ii) AS 1940
 - iii) AS 1596
 - iv) All of the above
- g) A welding management plan (WMP) should be based on a quality OH&S Management system as defined in:
- i) AS 4606
 - ii) AS 4804
 - iii) AS 4801
 - iv) AS 4801 & AS 4804
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- i) The system s operating limits and capacities
 - ii) General arrangement drawings showing physical dimensions
 - iii) All hydraulic and pneumatic circuit diagrams
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 - ii) 80B(E): 4.5kg – 9kg
 - iii) 80B(E): 40kg – 60kg
 - iv) None of the above
- j) Hydraulic intensification can occur in:
- i) Single acting hydraulic cylinders
 - ii) Air driven hydraulic intensifiers
 - iii) Automatic greasing systems
 - iv) All of the above
- k) LPG bulk storage tanks require inspection:
- i) Monthly
 - ii) Annually
 - iii) Every four years
 - iv) At time of manufacture

- l) Magnetic particle non-destructive testing is used to determine:
- i) If the material is ferrous or non-ferrous material
 - ii) The microstructure of the material
 - iii) Evidence of Cracking in the material
 - iv) None of the above
- m) Which Australian standard would you consult for Fixed platforms, walkways, stairways and ladders:
- i) AS 4024
 - ii) AS 4100
 - iii) AS 1657
 - iv) AS 1418
- n) The minimum width of a walkway should be on less than:
- i) 500mm
 - ii) 550mm
 - iii) 600mm
 - iv) 650mm
- o) The manufacture of mobile plant shall provide all necessary limits of operation for the equipment supplied. These include:
- i) Maximum working gradient (%)
 - ii) Maximum load (tonnes)
 - iii) Brake capacities
 - iv) All of the above

Question 5 (total of 25 Marks)

As the Mechanical Engineer (Qualified Engineer) for a coal operation you have been requested to develop a tender specification for the supply of hydraulic hose assemblies and adaptors for the next 5 years to your location.

(Your reference document for your tender specification will be MDG 41. section 3.7.5. Marking and Identification)

A section within your tender specification is titled “**Marking and identification**”

- a) List the requirements for the following:
- i) General requirements for hoses and hose assemblies
 - ii) Hose identification
 - iii) Hose end identification
 - iv) Hose assembly identification
 - v) Fittings and Adaptors

Question 6 Slings, Chains and lifting equipment (total of 25 Marks)

- a) A recent review of your sling, chain and lifting equipment SEP has identified a number of gaps or short falls.

A report was provided to you from your independent auditor who has identified the purchase and supply of some non Australian standard approved lifting equipment.

- i) As the Manager of Mechanical Engineering how do you intend to resolve this issue in the short term?
- ii) Your investigation leads you to the company’s purchasing department who has purchased this equipment from a new supplier. How would you ensure any newly purchased equipment meets the required standards?
- iii) You find out from the purchasing officer the new supplier was recommended to them by the workshop superintendent. What will be your actions knowing this supplier has not gone through the supply qualification process?
- iv) What improvements would you make to your SEP so as to prevent a reoccurrence?
- v) How would you communicate your requirements to the mines process superintendents for procurement for equipment?

- b) After a recent incident you have been asked to review your current towing and pulling standards.

This review should identify all circumstances where mobile plant is used in towing activities.

Outline the items you should consider when providing a fit for purpose equipment and safe system of work.

Question 7 (total of 25 Marks)

As the Mechanical Engineer (Qualified Engineer) for a coal operation you have been requested to put together the specifications for the purchase of a new Dozer to operate on the new stockpile / reclaim system (tunnel will be 500 metres long) being included in the Mines expansion.

- a) List the Hazards associated with Stockpiles
- b) List the requirements you would insist being included in the specification for the dozers.
- c) List the controls required to mitigate the hazards with reclaim tunnels:

Question 8 (total of 25 Marks)

You are the Mechanical Engineer (Qualified Engineer) for a coal operation that wishes to engage a contractor for the first time to perform maintenance work in the Coal Handling Preparation Plant (CHPP).

The work will include:

- Changing out worn steel pipes, some in elevated positions.
- General boiler making repairs including installation of liner plates in bins and replacement of structural members.
- Maintenance of mechanical components such as slurry pumps, screen vibration mechanisms and gearboxes.

The contact company maintenance crew will be expected to be fully self sufficient and provide all personnel and equipment to perform these tasks. The frequency of work will be a planned 12 hour maintenance shutdown every week.

- (a) Outline all of the tasks that would require specific competencies to be held by the personnel that would make up this maintenance crew.

- (b) Draw a structure of the maintenance crew identifying each position by title and list all of the competencies you would require that position to hold. If multiple positions of each type are required just describe them once.
- (c) Describe the process you would follow to reach the point where you are satisfied that the contract company and all of its employees are ready to commence work on site.
- (d) What documentation would you require from the contract company before they start on site and during each maintenance period on site?
- (e) What process would you put in place to ensure that the contract is complying with your site and legislative requirements?

END OF QUESTIONS

END OF PAPER