(CME1)

NSW Coal Competence Board

EXAMINATION FOR CERTIFICATE OF COMPETENCE AS
Mine Mechanical Engineer

(Coal Mine Health and Safety Act 2002)

Thursday 6 March 2014 - 9.30am to 12.30pm

Mechanical engineering applicable to underground coal mines

INSTRUCTIONS 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 remaining question to be 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 your paper

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 60 marks)

As a result of a recent incident at your mine you have been instructed by your local Mechanical Inspector to undertake a Hydraulic Analysis of the mines Fire water reticulation and Hydrant system

a) What document or documents are you going to refer to ensure your systems is compliant to current industry standards? (10 Marks)

/10

b) How would you satisfy yourself that you have engaged the correct person to undertake the review of your system? (10 Marks)

/10

c) When reviewing the Fire water Reticulation and Hydrant system what specific areas of testing should be included in the workscope. (10 Marks)

/10

Questions continue on next page

d) What is meant by the term: “Hydraulically disadvantaged hydrant”? (10 Marks)

/10

e) How would you determine how and when a hydrant is “Hydraulically disadvantaged”? (10 Marks)

/10

f) What are the three typical Classes of hydrant hose and the typical maximum static hydrant pressure for each? (10 Marks)

/10

Questions continue on next page

Question 2 Compulsory (Total 60 marks)

At the mines morning management meeting you are informed that a rubber tyred diesel vehicle (RTV) has overheated during the return trip to the surface.
Your diesel coordinator informs you the engine temperature sensors have failed to shut the engine system down.

Investigations by your diesel coordinator have identified an issue with the heat sensors that have led them to not operate as intended. The issue can be either due to a faulty sensor or how the unit was hosed into the safety circuit.
Note: Your answer must cover both scenarios

a) What are your immediate actions once you become aware of the sensor/fitment issues and why? (10 Marks)

/10

b) The machine in question has only just returned from a code D inspection at a recognised service facility (RSF). What will be your actions and why? (10 Marks)

/10

c) What changes are you going to implement as a result of your identified failings? (10 Marks)

/10

d) What will be your long term strategy to ensure engine monitoring sensors operate as intended? (10 Marks)

/10

e) What reference documents would you consult to assist you in the development of your strategy? (10 Marks)

/10

f) Provide (2) examples of how you would test engine monitoring sensors to ensure they operate as intended. (10 Marks)

/10

Question 3 Compulsory (Total 60 marks – 4 marks each part)
Multiple choice questions - please circle the correct answer

a) To which Australian Standard would you refer to when you undertake a design risk assessment on a Safety critical component :

i) AS 4240
ii) AS 4024
iii) AS 4100
iv) None of the above

All fluid power components have a minimum factor of safety of:

i) 4.0 to 1
ii) 3.0 to 1
iii) 2.5 to 1
iv) 2.0 to 1

b) Which of the following is the correct definition for TRS:

i) Temporary roof support
ii) Time related sequence
iii) Total resource solutions
iv) None of the above

c) What element or elements listed below should be contained in a plant safety file

i) Risk control measures
ii) Plant alterations
iii) Change of procedures, monitoring, audit and review reports
iv) All of the above

d) The MDG for Fluid power systems safety at mines is which of the following:

i) MDG 10
ii) MDG 16
iii) MDG 36
iv) None of the above

e) All signs, labels and warning notices should be designed and installed in accordance with which of the following:

i) AS 1318
ii) AS 1319
iii) AS 1318 & AS 1319
iv) None of the above

Questions continue on next page

f) A Non-destructive rope test report does NOT include which of the following:

i) Origin of rope manufacture
ii) Date of test
iii) Date of rope installation
iv) Test equipment used.

g) Winding ropes may deteriorate due to some of the cumulative effects of the following:

i) Lightning strikes
ii) Localised heating
iii) Fretting
iv) All of the above

h) What minimum distance should gas fuel cylinders be stored away from fuel bays, fuel outlets and mobile equipment under repair?

i) 5 metres
ii) 10 metres
iii) 15 metres
iv) 20 metres

j) Which of the following best describes the definition of a conveyance?

i) A carriage
ii) A skip
iii) A stage
iv) All of the above

k) Factor of safety (FOS) for a balance rope shall be not less than:

i) 6
ii) 5
iii) 4
iv) None of the above

l) A drum winding rope when hauling personnel can safely operate with a FOS of:

i) Not less than 6 and less than 4
ii) Not less than 8 and less than 6
iii) Not less than 10 and less than 8
iv) A suitable factor of safety as determined by a competent person

Questions continue on next page

m) When installing a new rope onto a winding drum the dead coils should be pre-tensioned to, at least, what % of the normal working rope tension from the list below:

i) 100%
ii) 75%
iii) 50%
iv) 25%

n) What is the minimum height of the water between the water seal and the exhaust conditioner minimum flameproof water level?

i) 25mm
ii) 50mm plus the height above the water level where effective mixing of raw exhaust gas and the conditioner water commences
iii) 50mm
iv) (ii) or (iii)

o) When testing open joints on the inlet or exhaust system of a diesel engine system, what is the maximum thickness of the feeler gauge that should be used?

i) Less than 0.5mm
ii) Less than 0.2mm
iii) Less than 0.3mm
iv) Less than 0.1mm

Questions continue on next page

Question 4 Compulsory (Total 60 marks)

You are the Manager of Mechanical Engineering for a mine which is upgrading the main drift conveyor from 1000 TPH to 2000 TPH.
Part of the upgrade is to replace the existing conveyor belting with new steel cord belting.

Note: Space is provided on page 17 for sketches to assist in answering the question.

a) Describe the construction of a steel cord belt. (10 Marks)

/10

b) What is meant by a two staged splice and how is it constructed? (10 Marks)

/10

c) List (3) important factors that must be considered in the selection and storage of the steel cord belting “splice kit”. (10 Marks)

/10

d) How are you going to satisfy yourself that the onsite splices or field splices are going to be fit for purpose? (10 Marks)

/10

e) Describe (2) methods of in-situ, non-destructive testing of your new steel cord conveyor belt, including the splices? (10 Marks)

/10

Questions continue on next page

f) Describe (2) methods of detecting damage to the belting and or the pending failure of spliced joints. (10 Marks)

/10

Question 5 Elective (Total 60 marks)

You are the Manager of Mechanical Engineering at an old coal operation and as such you have recognised the need that some of your surface structures and buildings require certain levels of repairs/maintenance.

Works include but are not limited to:

- Excavation works
- Demolition works
- Asbestos removal
- Working at heights requiring the erection of scaffolding
- Steel erection
- Concrete emplacement
- The cladding of roofs and external walls

a) Describe how you intend to control the working area? (15 Marks)

/15

b) List (5) specific risk controls which would apply to structures and buildings undergoing repairs and maintenance. (15 Marks)

/15

Questions continue on next page

c) List (5) codes of practice you would consult for guidance to control the works. (15 Marks)

/15

d) List (5) units of competency required for the types of works being carried out. (15 Marks)

/15

Question 6 Elective (Total 60 marks)

You are the Manager of Mechanical Engineering (MME) for an adit entry mine with the distance from the surface to the furthest work face being approximately14km's
All materials are transported from the surface to the working faces via rubber tyred diesel vehicles (RTV's).

It has been reported to you by the mines supply drivers which operate the RTV's of a pungent smell of rubber coming from the RTV's, particularly when transporting supplies from the surface into the longwall installation face.

Further checks have revealed an increasing number of tyre failures; these include delamination, side wall failures as well as catastrophic failures with a sudden release of the inflation medium.

a) In point form, describe how you would investigate these incidents? (10 Marks)

/10

b) What information are you going to require, that will assist you with your investigation? (10 Marks)

/10

c) Is this type of incident a notifiable incident? Explain why you answered either “YES” or “NO”. (10 Marks)

Questions continue on next page

/10

d) What changes, if any, are you going to make and how would recommend these be carried out? (10 Marks)

Questions continue on next page

/10

e) What recommendations are you going to make to the mine operator in an attempt to prevent a reoccurrence, and why? (20 Marks)

/20

Question 7 Elective (Total 60 marks)

You are the Manager of Mechanical Engineering (MME) of a modern longwall mine. The longwall is currently being relocated to a new panel. During the course of the relocation some roof supports are being sent to a temporary location underground for repairs.

Repairs include but are not limited to:

- Replacement of leg cylinders and canopy cylinders
- Flipper plates
- Spring loaded side shields
- Welding repairs to top and rear canopies.
- Welding repairs to pontoons
- Hydraulic re-hosing
- Upgrade to the in-chock hydraulic control system

a) List Five (5) hazards associated with this type of work. (10 Marks)

/10

b) Describe the controls you would employ to control the seven (7) listed works and the working area. (15 Marks)

/15

c) List the types of isolation you would use for each of the points above. (15 Marks)

/15

d) What power systems would you use to assist in undertaking the hydraulic works, the replacing of large components and how would you ensure that these systems would be safe to use both before and during the works? (20 Marks)

Questions continue on next page

/20

Questions continue on next page

Question 8 Elective (Total 60 marks)

You are the Manager of Mechanical Engineering (MME) for an older underground operation.
At the next longwall changeover you are planning to undertake works on your underground below seam bin. The below seam bin discharges coal onto the drift belt via two vibrating feeders and a transfer point.
Access to the drift belt feeders and transfer point is via an extension to the drift winder and rail system, which runs beside the drift conveyor. Access into this area is difficult and is single entry for the last 50m. Access to the top of the bin is gained via an open cut through at seam level.

Note: Detailed design information and drawings are not available due to the age of the installation.

The workscope include:

- Replacement of the vibrating feeders
- Replacement of the discharge chutes
- Replacement of the cone internal wear liner plates
- General repairs to below seam structure of the bin
- Non-destructive testing (NDT) critical joints and welds
- Repairs to corroded footings/foundations
- Hot works

a) List (5) hazards associated with this workscope. (10 Marks)

/10

b) What risk control measures are you going to implement for each of the (5) hazards you have identified. (10 Marks)

/10

c) How would you propose entry into the bin to replace the liner wear plates and what specific challenges would need to be overcome? (10 Marks)

/10

d) What are the specific risks associated with this work? (10 Marks)

/10

e) What would be your preferred method of securing the liner wear places to the steel cone of the bin and why? (10 Marks)

/10

f) For future non-destructive testing (NDT) thickness testing of the liner wear plates, what modification are you going to include in your upgrade of your below seam bin? (10 Marks)

/10

END OF QUESTIONS

END OF PAPER

(CME2)

NSW Coal Competence Board

EXAMINATION FOR CERTIFICATE OF COMPETENCE AS
Mine Mechanical Engineer

(Coal Mine Health and Safety Act 2002)

Thursday 6 March 2014- 1.30pm to 2.30pm

Legislation and Standards applicable to Underground Coal Mines

INSTRUCTIONS 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

***All* questions are to be attempted**

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

Place your identification number only, NOT your name, on your paper

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

Open book exam

Question 1 - (Total 20 marks)

Work Health and Safety Act 2011

Health and safety duties – Part 2 Division 3

You have had a Consultant Design Engineer design a hydraulically operated air and water hose reeler for the supply of air and water to the development panel's continuous miner. The cable reeler is to be used by the mines operational personnel.

You have been provided with all the drawings and information required to manufacture the cable reeler.

You have decided to use your own tradespersons, employed by the mine, to manufacture the cable reeler for you.

a) What are the specific duties of a person conducting businesses or undertakings that ***"manufacture plant"***? (10 Marks)

/10

b) In your own words, how would you, as a site Manager of Mechanical Engineering (MME), best achieve this? (10 Marks)

/10

Question 2 - (Total 20 marks)

Work Health and Safety Act 2011

a) When are you required to ***"review control measures"***? (10 Marks)

/10

b) In your own words, how would you as a site Manager of Mechanical Engineering (MME) best achieve this? (10 Marks)

/10

Question 3 - (Total 20 marks)

Coal Mine Health & Safety Regulation 2006

CL 13 (f) "a mechanical engineering management plan"

The clause above covers the life cycle of mechanical plant and installations, and mechanical engineering practices, at the coal operation, that is developed, implemented and periodically reviewed through consultation with a qualified mechanical engineer, to control risks.

Subclause (viii) requires you to provide safeguards for mechanical plant and installations, with a probability of failure appropriate to the degree of risk posed by any mechanical plant or installation.

In your own words, how would you as a site Manager of Mechanical Engineering (MME) best achieve this? (20 Marks)

Questions continue on next page

/20

Questions continue on next page

Question 4 - *Coal Mine Health & Safety Regulation 2006* (Total 20 marks)

As a newly appointed Manager of Mechanical Engineering (MME) to a coal operation you are undertaking a review of the operation's Mechanical Engineering Management Plan (MEMP) and during the review you have identified the need to amend the MEMP.

a) Outline the process you would use to carry out the review (5 Marks)

/5

b) Who is required to be notified of any amendments? (5 Marks)

/5

Questions continue on next page

c) What are the prescribed waiting periods for amendments? (5 Marks)

/5

d) Describe what occurrences would require you to amend your MEMP (5 Marks)

/5

Questions continue on next page

Question 5 Gazettal (Total 20 marks)

"Diesel Fuel Used Underground" Gazette Notice No. 38 21 April 2011 Pg 2678 (Attached)

As the Manager of Mechanical Engineering (MME) for your operation you are introducing a new supplier to provide diesel fuel for your underground fleet of diesel vehicles.

For each of the seven (7) points of the gazettal, describe what you would put in place at your mine to ensure compliance and allow the system to be easily audited. (20 Marks)

Questions continue on next page

/20

END OF QUESTIONS

END OF PAPER

Questions continue on next page

OFFICIAL NOTICES

Department of Primary Industries

COAL MINE HEALTH AND SAFETY ACT 2002

Instrument of Appointment

I, BRAD MULLARD, Executive Director Mineral Resources, Department of Trade and Investment, Regional Infrastructure and Services, pursuant to section 145 (1) (d) of the Coal Mine Health and Safety Act 2002 (the Act), hereby appoint as an Investigator the person named in Column 1 of the Schedule below, subject to the limitation of functions speci fed in Column 2 of the Schedule opposite the person's name.

SCHEDULE

Column 1 *Name of Person*	*Column 2* *Limitation of Functions*
Mark John LAYCOCK.	The person appointed is not to have any function under section 150 of the Act.

Dated this 12th day of April 2011.

BRAD MULLARD,
Executive Director, Mineral Resources,
Department of Trade and Investment,
Regional Infrastructure and Services
(under subdelegation from Director-General of authority delegated by the Minister)

COAL MINE HEALTH AND SAFETY ACT 2002

Notice under Clause 73 (1) (a) of Coal Mine Health and Safety Regulation 2006

Diesel Fuel Used Underground

I, ROBERT REGAN, Chief Inspector , pursuant to Clause 73(1)(a) of the Coal Mine Health and Safety Regulation 2006 (the Regulation), hereby:

(a) revoke the notice under clause 73 (1) (a) of the Regulation published in *New South Wales Government Gazette* No. 93 of 26 June 2009, at page 3601; and

(b) specify the requirements set out in the Schedule below as the requirements to which the operator of a coal operation must ensure that diesel fuel used (or for use) in the under ground parts of the coal operation (in this notice referred to as diesel fuel) conforms.

Dated this 12th day of April 2011.

ROBERT REGAN,
Chief Inspector,
Department of Trade and Investment,
Regional Infrastructure and Services

SCHEDULE

1. All diesel fuel must comply with the Fuel Quality Standards Act 2000 of the Commonwealth (the Fuel Act), the Fuel Quality Standards Regulations 2001 under that Act and the National Fuel Standard (Automotive Diesel) Determination 2001 (the Determination), as amended, unless (and except to the extent that) a relevant approved variation under the Fuel Act was in force at the time of supply of the fuel concerned.
2. The sulfur content of diesel fuel must not be greater than 10 mg/kg when tested in accordance with ASTM D5453.
3. The f ash point of diesel fuel must not be less than 61.5°C when tested in accordance with either:
   (a) Clause 67 (3) of the Regulation; or
   (b) the Determination.
4. With the exception of:
   (a) Fyrex CI in a mixture of 500 parts diesel fuel to one part Fyrex CI (500:1); and
   (b) Shell 'Diesel Extra' with 500 parts diesel fuel to one part Nemo fuel additive,

   only diesel fuel additives that have been registered by the Environmental Protection Agency of the United States of America may be used.
5. Flammable liquids must not be added to diesel fuel.
6. The manager of mechanical engineering for the coal operation must ensure that suff cient testing of the diesel fuel is carried out so as to ensure compliance with this notice.
7. Records of tests required under clause 6 above must be kept at the coal operation for a minimum of 2 years.

FISHERIES MANAGEMENT ACT 1994

FISHERIES MANAGEMENT (AQUACULTURE) REGULATION 2007

Clause 39 (4) – Notice of Aquaculture Lease Renewal

THE Minister has renewed the following Class 1 Aquaculture Leases:

OL91/030 within the estuary of Port Stephens, having an area of 0.1788 hectares to George Frederick BROWN of Karuah, for a term of 15 years expiring on 14 February 2026.

OL94/043 within the estuary of Brisbane Water, having an area of 0.8515 hectares to Paul KOLACEK of South Kincumber, for a term of 15 years expiring on 14 February 2026.

OL65/282 within the estuary of Wapengo Lake, having an area of 1.7764 hectares to Rodney RUTTER and Robert SHERLOCK of Tathra, for a term of 15 years expiring on 21 December 2025.

OL95/027 within the estuary of Wagonga Inlet, having an area of 0.5086 hectares to SOUTHERN MANAGEMENT CONSULTANTS PTY LIMITED of Garran, ACT, for a term of 15 years expiring on 14 February 2026.

OL81/091 within the estuary of the Pambula River, having an area of 0.8542 hectares to Ben MILLS, Michael MILLS and Marcus RAYMOND of Merimbula, for a term of 15 years expiring on 17 January 2026.

EXTRA SPACE if required (Note Question no)

Questions continue on next page

(CME3)

NSW Coal Competence Board

EXAMINATION FOR CERTIFICATE OF COMPETENCE AS
Mine Mechanical Engineer
(restricted to surface operations only)

(Coal Mine Health and Safety Act 2002)

Thursday 6 March 2014 - 1.30pm to 3.30pm

Safety and Mining Legislation Applicable to Open-cut Coal Mines

INSTRUCTIONS 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

***All* questions are to be attempted**

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

Place your identification number only, NOT your name, on your paper.

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

Part A Open book - Part B Closed book

PART A - Legislation Section - Open book format

Question 1 (Total 25 marks)

Work Health and Safety Act 2011

Health and safety duties – Part 2 Division 3

You have had a Consultant Design Engineer design a hydraulically operated cable reeler that fits onto a Front End Loader. The cable reeler will be used by the mine's operational personnel to handle high voltage cables for the electric rope shovel.

You have all the drawings and information required to manufacture the cable reeler.

You have decided to use your own tradespersons, employed by the mine, to manufacture the cable reeler.

a) What are the specific duties of a person conducting businesses or undertakings that ***"manufacture plant"*** (10 Marks)

/10

b) In your own words, how would you as a site Qualified Mechanical Engineer (QME) best achieve this? (15 Marks)

/15

Questions continue on next page

Question 2 (Total 25 marks)

Coal Mine Health & Safety Regulation 2006

CL 13 (f) "a mechanical engineering management plan"

The clause above covers the life cycle of mechanical plant and installations, and mechanical engineering practices, at the coal operation, that is developed, implemented and periodically reviewed through consultation with a qualified mechanical engineer, to control risks.

Subclause (viii) requires you to provide safeguards for mechanical plant and installations, with a probability of failure appropriate to the degree of risk posed by any mechanical plant or installation.

In your own words, how would you as a site Qualified Mechanical Engineer (QME) best achieve this? (25 Marks)

Questions continue on next page

	/25

Questions continue on next page

Question 3 (Total 25 marks)

As a newly appointed Qualified Mechanical Engineering (QME) to a coal operation you are undertaking a review of the operation's Mechanical Engineering Management Plan (MEMP) and during the review you have identified the need to amend the MEMP.

a) Outline the process you would use to carry out the review (7 Marks)

/7

b) Who is required to be notified of any amendments? (6 Marks)

/6

c) What is the prescribed waiting periods for amendments? (6 Marks)

/6

d) Describe what occurrences would require you to amend your MEMP (6 Marks)

/6

Part B - CLOSED BOOK

Question 4 (Total 25 marks – 2 $^{1/2}$ marks each part)

In one or two sentences show your understanding (including examples of each) of the following:

a) WRAC

/2$^{1/2}$

b) FMECA

/2$^{1/2}$

c) Human error analysis

/2$^{1/2}$

d) QRA

/2$^{1/2}$

e) CAT level

/2$^{1/2}$

Questions continue on next page

f) SIL

	/2$^{1/2}$

g) MSDS

	/2$^{1/2}$

h) ROPS/FOPS

	/2$^{1/2}$

i) Fail safe

	/2$^{1/2}$

j) Fixed guarding

	/2$^{1/2}$

Questions continue on next page

Question 5 (Total 25 marks)

As a result of a recent incident at your mine you have been instructed by your local Mechanical Inspector to undertake a Hydraulic Analysis of the mine's Fire water reticulation and Hydrant system

a) What document or documents are you going to refer to ensure your systems is compliant to current industry standards? (4 Marks)

/4

b) How would you satisfy yourself that you have engaged the correct person to undertake the review of your system? (4 Marks)

/4

Questions continue on next page

c) When reviewing the Fire water Reticulation and hydrant system what specific areas of testing should be included in the workscope? (4 Marks)

/4

d) What is meant by the term: “Hydraulically disadvantaged hydrant”? (4 Marks)

/4

e) How would you determine how and when a hydrant is “Hydraulically disadvantaged”? (4 Marks)

/4

f) What are the three typical Classes of hydrant hose and there typical maximum static hydrant pressure for each? (5 Marks)

/5

Question 6 (Total 25 marks)

You are the site Qualified Mechanical Engineer of a fairly old coal operation, as such you have recognised the need for some of your surface structures and buildings require certain levels of repairs/maintenance

Works include but are not limited to:

i. Excavation works
ii. Demolition works
iii. Asbestos removal
iv. Working at heights requiring the erection of scaffolding
v. Steel erection
vi. Concrete emplacement
vii. The cladding of rooves and external walls

a) Describe how you intend to control the working area? (10 Marks)

Questions continue on next page

/10

b)

b) List five (5) specific risk controls which would apply to structures and buildings undergoing repairs and maintenance. (5 Marks)

/5

c) List five (5) codes of practice you would consult for guidance to control the works. (5 Marks)

/5

d) List five (5) units of competency required for the types of works being carried out. (5 Marks)

/5

Questions continue on next page

Question 7 (Total 25 marks)

Your mine operates a dragline to strip overburden and you are to participate in a Risk Assessment on the operation and maintenance of the dragline.

a) From a mechanical engineering point of view, what are the major risks during the operation of the dragline? (9 Marks)

/9

b) What specific controls would you put in place to control the above risks? (8 Marks)

/8

c) What are the major risks during a hoist rope replacement and how would you control those risks? (8 Marks)

/8

Question 8 (Total 25 marks)

You are the Qualified Mechanical Engineer (QME) at a mine which is upgrading the main overland conveyor from 1000 TPH to 2000 TPH.

Part of the upgrade is to replace the existing conveyor belting with new steel core belting.

Note: Sketches may be used to assist in answering this question.

a) Describe the construction of a steel cord belt. (5 Marks)

/5

b) What is meant by a two stage splice and how is it constructed? (4 Marks)

/4

c) List three (3) important factors that must be considered in the selection and storage of the steel cord belting “splice kit”. (4 Marks)

/4

d) How are you going to satisfy yourself that the onsite splices or “field splices” are going to be fit for purpose?

/5

e) Describe two (2) methods of in-situ non-destructive testing for your new steel cord conveyor belt, including the splices. (4 Marks)

/4

f) Describe two (2) methods of detecting damage to the belting and or pending failures of the splices. (4 Marks)

/4

END OF QUESTIONS

END OF PAPER