mineral resources & energy
Department:
Mineral Resources and Energy
REPUBLIC OF SOUTH AFRICA

MINE MANAGER'S CERTIFICATE OF COMPETENCY EXAMINATION

MINING 1

COAL MINING

DATE: 07 MAY 2024

TOTAL MARKS: 100

TO PASS: 50

TIME ALLOWED: 3 HOURS

(09h00 to 12h00)

NOTE:

- This question paper consists of **THREE** pages including cover page.
- All questions must be answered.
- All answers and sketches to be presented in a neat and decipherable manner. Papers will not be marked if not decipherable.
- Restrict the use of highlighters.
- Do not use a red pen.
- Read the instructions on the front page of your answer book carefully.
- No cellular phones and electronic devices shall be allowed in the examination venue.
- The use of computers, laptops and palmtops is prohibited.

QUESTION 1

1.1 You are an underground manager of a mine that consists of three shafts, production is achieved through seven continuous miner sections and two stonework sections. The coal is conveyed through a network of 34 km trunk conveyors designed to carry an annual production of 6.6 million tons.

a. You are notified of a belt burning at one of your longest trunk belt next to a magnet. List what could possibly cause this fire. (5)
b. Based on your answers above, how would you ensure that the risks of fire are mitigated? (5)
c. What methods can be used to detect fires underground? (5)
d. What causes spontaneous combustion underground? (5)

1.2 You have been appointed as Construction Manager for a recently approved project to access a new coal reserve at your mine. Describe how you would prepare for, develop, and equip a single inclined shaft, containing both conveyor belt and men/material access, to a single coal seam 60 metres below surface, using a road-header for the rock development. Assume all relevant contracts have been concluded but no site work has commenced.

(15)

Total **[35]**

QUESTION 2

A Power Station enters into a contract with a coal supplier to supply coal for a period of 18 years. Quantities and Qualities are stipulated in the agreement. Two clauses are stipulated in the contract, one of the clauses defines the allowable “abrasive index of coal” or allowable “abrasiveness” and the other clause states that “No wet Coal must be supplied to the power station”.

2.1 What other coal quality measures must be specified in the contract? (5)
2.2 How can the coal supplier ensure the committed quality coal is delivered to the power station?

a. In a strip mining operation? (5)
b. In an underground operation? (5)

2.3 What controls can the coal supplier put in place to avoid supplying ultra-fines to the Power Station? (5)

Total **[20]**

QUESTION 3

As part of reserve optimization initiative on your mine, you have identified remnant blocks of good quality coal that can increase the life of mine by 5 years. The area was mined 10 years ago. The mining block is surrounded by abandoned panels and sealed off areas that are used as compartments.

3.1 Discuss the measures that you would put in place to ensure that you do not inadvertently hole into the water compartments? (15)

3.2 In the unfortunate event that you have holed into the water compartment, what would be the result and impact of this unwanted event? (5)

Total **[20]**

QUESTION 4

4.1 A flexible conveyor train has been described as an alternative to conventional shuttle cars and battery cars for the underground transportation of coal. Describe how the flexible conveyor train operates. (8)

4.2 Compare the flexible conveyor train to conventional shuttle cars. (2)

4.3 Discuss benefits that may be realized should the full calendar operation system be used instead of traditional two shift system in a bord and pillar mining section. (5)

4.4 Describe how you would use two continuous miners in the same section to improve production output. (5)

4.5 Compare the shortwall mining and longwall mining methods. (5)

Total **[25]**

Grand Total **[100]**