



MINE MANAGER'S CERTIFICATE OF COMPETENCY EXAMINATION

MINING TECHNICAL SERVICES

MINING 11 (METAL)

DATE: 5 OCTOBER 2022

TOTAL MARKS: 100

TO PASS: 50

TIME ALLOWED: 3 HOURS

(08H30 to 11H30)

INSTRUCTIONS:

- This question paper consists of **FIVE** pages including the cover page.
- **All** questions must be answered and are to be presented in a neat and readable manner. Answer books will not be marked if not readable.
- Read the instructions on the front page of your answer book carefully.
- The use of a non-programmable calculator is allowed.
- Use a pen that writes in ink and should not be erasable.
- Do not use a red pen.
- Restrict the use of highlighters.
- No cellular phones, computers, laptops and any other related devices shall be allowed in the examination venue.

QUESTION 1

- 1.1. You are a manager at a mine that has been temporarily stopped with a Section 54 instruction due to a fall of ground accident that involved the removal of a temporary support (Camlock props) at the end of shift. Answer the following questions:
- 1.1.1. How do you plan to get the Section 54 uplifted? (3)
- 1.1.2. Explain the short-term and long-term remedial actions you would put in place to prevent similar accidents from occurring. (5)
- 1.2. Discuss the following:
- 1.2.1. How does stress induced fracturing occur in shallow mines? (2)
- 1.2.2. How does stress fracturing regularly occur in deep mines? (2)
- 1.2.3. What are the reasons for mining-induced seismicity and rock burst? (2)
- 1.2.4. What causes rock falls and rock bursts? (2)
- 1.3. Draw force-deformation curves for the following support units:
- 1.3.1. Grout pack (1)
- 1.3.2. Pre-stressed elongates timber pole (1)
- 1.3.3. Pre-stressed timber pack (1)
- 1.3.4. End-anchored and tensioned rock bolt (1)

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QUESTION 2

- 2.1. Answer the following questions on gases:

Gases	Sources of gas	Dangers	Explosives Range
Hydrogen	2.1.1		2.1.2
Carbon Monoxide		2.1.3	2.1.4
Nitrous fumes	2.1.5		
Carbon Dioxide		2.1.6	
Hydrogen Sulphide	2.1.7		2.1.8
Methane	2.1.9		2.1.10

(10)

- 2.2. Filter bags are available from two suppliers; details are provided in the table below. Which filter bag is more cost effective for a tip size of 3.5 m long and 2.0 m wide?

	Length	Diameter	Cost
Supplier A	2.0 m	150 mm	R 100 per bag
Supplier B	1.5 m	200 mm	R 75 per bag

(5)

- 2.3. List Five (5) objectives for sampling mine water. (5)

- 2.4. List Five (5) objectives for sampling airborne pollutants (5)

- 2.5. A comprehensive survey of fan repair costs has revealed the following information concerning two 570mm diameter fans:

	Fan A	Fan B
Average cost per repair	R 2 400	R2 900
Average time between repairs	10 Months	15 Months
Cost of new fan	R10 850	R13 100
Overall efficiency	70%	78%
Power costs	28 cents per kWh	28 cents per kWh

Both fans have rated duties of 6.5m³/s of air at a pressure of 2 400Pa. Each fan is expected to run for 8 years and the interest rate is 20%. From present value tables, the present value of R1 per year for 8 years at 20% is R3.84. Assume that the fans run continuously for 24 hours per day and 365 days per year. Which fan would be more economical? (10)

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QUESTION 3

3.1. You are appointed as a manager at a mine Platinum mine, mining both UG2 and Merensky. The commodity prices are at a record high, you are requested to increase production outputs to satisfy the demand. You have no economical constraints except the unavailability of developed ore reserves.

Discuss the use of latest technology to increase the immediate available ore reserves to enable the increase in stoping and production. (10)

3.2. You are a manager of a gold mine; you have recently made a decision to use a new contracting company to open up an old worked out area to start vamping and reclamation operations. This section was completely sealed off for the past 6 years. Answer the following questions:

3.2.1. Explain what risks might exist in this worked area. (5)

3.2.2. Explain how the contractor is expected to deal with these risks. (5)

3.2.3. Define the term Contractor Management (2)

3.2.4. How would you ensure that the Contractor delivers on set targets? (3)

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QUESTION 4

- 4.1. Define the term Risk Management (1)
- 4.2. Hierarchy of risk control is a system used in industry to minimize or eliminate exposure to hazards. The system is widely used in the mining industry to promote safe standard practices in the workplace. Answer the following questions.
- 4.2.1. List the 5 hierarchy of risk control in the order from most to least effective. (5)
- 4.2.2. Define each control listed above. (5)
- 4.2.3. Give scenarios where each control might be used (5)
- 4.3. Differentiate between a hazard and risk. (2)
- 4.4. Differentiate between continuous and issue-based risk assessments. (2)

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GRAND TOTAL 100