

## QUESTION 1

1.1 You are the Section Manager of a shaft comprising 2 continuous miner sections, each targeted to produce 65 000 tons of coal per month, giving a total of 130 000 tons of coal per month. You have unexpectedly intersected a dyke with a zone of burnt coal in the one section. You expect that it will take three months to develop through the area. What are the risks associated with dykes and how would you mitigate them? (8)

1.2 Describe how you would develop through the dyke and how you would establish the section on the other side? (8)

1.3 What steps will you take to maintain your targeted monthly production output from both sections? (8)

This question was answered very well with an average score of 65% - 4 of the 6 students passed.

- The risks and mitigations from dykes were explained well.
- The practical methods of developing through a dyke were not explained in enough detail.
- Few students analysed the numbers presented reflecting a lack of practical production understanding of the problem. This is a situation that occurs in a manger's life frequently.

Total [24]

## QUESTION 2

2.1 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)

2.2 Compare the flexible conveyor train to conventional shuttle cars. (8)

This question was well answered by all students with an average score of 59% - but 5 of the students managed to get above 50%. The main issues were:

- Not understanding the technology described, i.e. not keeping up to date with technological developments
- Describing advantages and disadvantages as opposed to comparing

Total [16]

### QUESTION 3

A large block of coal is being investigated for exploitation. It is separated from the rest of the mine by a very shallow section (less than 25 metres deep) which has a stream traversing it on surface. There is deep weathering (more than 15 metres) associated with the stream. The seam then dips away from the stream gradually reaching a depth of more than eighty (80) metres.

3.1 List the alternative mine access options you would consider in accessing this block of coal. (5)

3.2 Describe how you would develop a shaft inclined at eight (8) degrees into this block of coal before you hand it over to a production section? (20)

3.3 What service excavations would you establish at shaft bottom? (5)

This was the most difficult question with an average score of 45%, and only two students answering correctly. Here the main issues were:

- Not reading the question correctly and not answering what was asked;
- Not understanding what a service excavation is.

Total [30]

### QUESTION 4

4.1 The overburden of a mini-pit mine is 15 metres and comprises alternating sandstones and shale. The mineable reserve is 500m wide by 2 500m long and overlays a coal seam which was previously mined by bord and pillar methods. The extraction rate was 60%. Assuming that the seam is 5.0 metres thick, the density of coal is  $1.50 \text{ t/m}^3$ , overburden density is  $2.0 \text{ t/m}^3$  and with additional mining and geological losses of 10%.

Calculate:

4.1.1 The ROM strip ratio (assume no further contamination) (3)

4.1.2 The Saleable strip ratio, assuming a beneficiation yield of 75% (4)

4.1.3 The life of mine (in months), assuming a rate of 900 000 Run of Mine (ROM) tons per annum (6)

4.1.4 Assume that the loader available is capable of loading the monthly coaling requirement, and that the mine will operate on day shift only with a production time of 8 hours, calculate the number of 80 ton trucks required to achieve the monthly coal requirement, assuming:

The average cycle time is 40 minutes.

The engineering availability is 85%

Utilisation is 90%

A maximum of 21 days in a month

Load factor of 100% (8)

4.2 Spontaneous combustion usually occurs when mining old underground areas from surface. Describe 2 methods to prevent spontaneous combustion of the coal seam (4)

4.3 List 5 issues to be considered when establishing the position a discard dump. (5)

This was the most well answered question with an average of 67% and 4 of the students answering correctly. One student even scored full marks, which helped 'him' to pass overall.

- The calculation was well understood, but all except one misunderstood the implication of previously mined extraction rates;
- Some students explained their thought process very well
- Some other calculations were, however, poorly executed. This refers to how many trucks were required.
- The Sponcom question was well answered

Total [30]

Overall, the one student who scored top marks passed all the questions. For the rest the standard was above average passing between 2 and 3 questions. One student did not pass 3 questions, but scored very well on the calculation question.

I feel that this paper was sufficiently well answered to warrant a 100% pass rate, and I enjoyed the confidence of some of the answers.

Total Marks [100]