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#### MANICALAND STATE UNIVERSITY OF APPLIED SCIENCES

FACULTY OF ENGINEERING, APPLIED SCIENCES AND TECHNOLOGY

**DEPARTMENT: MINING AND MINERAL PROCESSING ENGINEERING**

**MODULE: COAL MINING METHODS**

**CODE: HMIE 325/ENGP 325**

### SESSIONAL EXAMINATIONS

**JUNE 2023**

**DURATION: 3 HOURS**

**EXAMINER: MR MUTIZHE**

## INSTRUCTIONS

1. *Answer* ***all*** *questions in Section A and any three(3) questions from section B*
2. *Each question carries 20 marks*
3. *The paper consist of 5 printed pages*
4. *Total marks 100*

***Additional material(s):*** *pen, pencil*

**SECTION A**

**Question 1**

1. Briefly discuss points considered when opening a box cut in coal strip mining **[6]**
2. Discuss how coal quality can be assessed **[8]**
3. Discuss the following properties of coal and how they affect the quality of coal;
4. Ash content
5. Sulphur Content
6. Moisture content? **[6]**

**Question 2**

* 1. A 2.2m thick coal seam located at a depth of 200m is to be mined by room and pillar method. The designed rooms span is 7.5m. Compute the pillar width and areal percentage extraction if the safety factor is 1.8 **[10]**



1. For the following diagram calculate the factor of safety using the slender pillar formula and the squat pillar formula when the coal seam is overlain by a massive dolerite sill. Comment on your answers. **[7]**
2. What improvements can you make to the system to increase your primary extraction? **[3]**

**SECTION B**

**Question 3**

1. A coal mine is to increase production by 60kt per month, which will be achieved by the addition of one CM section. The mine has one block which will limit the section to 7 roads. Assuming a pillar width of 16m and bord width of 6m and seam thickness of 3.5m, what will be the advance per month of the 7 road to produce 60kt, given that the SG of the coal is 1.6 t/m3? How long will it take to advance 1000m if you want to mine 90ktpm?

 **[10]**

1. A Continuous miner was used to develop a 5 road primary development bord and pillar section with pillar centres of 30m x 30 m and bord width of 6,5m and a mining height of 3,0 m.
2. What is the overall extraction percentage of this section?
3. If the section is required to produce 85 000 tons per month, how far would the panel advance in 9 months? Assume the density of coal to be 1,5 tons/m3 **[10]**

**Question 4**

1. Distinguish between retreat and advance approach in longwall mining? **[4]**
2. Discuss the operating cycle of a coal shearer and armored face conveyor (AFCs) **[8]**
3. Explain the following ventilation system used in longwall mining
4. R-ventilation system **[4]**
5. Z- ventilation system **[4]**

**Question 5**

Discuss the following points considered when selecting coal underground mining method

1. Geological factors **[4]**
2. Geometric factors ` **[4]**
3. Market consideration **[4]**
4. Technological factor **[4]**
5. Environmental factors **[4]**

**Question 6**

1. Explain four factors considered on overburden and waste dumping in surface mining coal. **[4]**
2. Discuss four major factors which causes spontaneous combustion of coal?**[4]**
3. Discuss any two methods use in pillar extraction, stating their advantages and disadvantages **[12]**

**Question 7**

1. Discuss the working sequence of a dragline **[4]**
2. What do you understand by coal bed methane? **[2]**
3. Discuss precautions taken in underground coal mines against methane explosions. **[3]**
4. Discuss the following dragline coal ore body access operating methods

Box cut **[3]**

Simple side casting **[3]**

1. A dragline is required to remove 300 000m3 of coal per month the bank volume basis considering it is required to work effectively 450hours per month with a bucket fill factor of 0.8, cycle time 65seconds and Swell factor of 1.25. Compute the required bucket capacity of the dragline in cubic meters. **[5]**