PROGRAM	**:**	**NATIONAL DIPLOMA MINING ENGINEERING**
DATE & ASSESSEMENT	**:**	**MAIN EXAMINATION**
SUBJECT	**:**	**TECHNICAL SERVICES**
CODE	**:**	**MTL3211**
DATE	**:**	**13/11/2019**
DURATION	**:**	**3 HOURS (12H30 – 15H30)**
TOTAL MARKS	**:**	**100 Marks**
WEIGHTING	**:**	**60% YrMark**

EXAMINER	**:**	**WB MOTLHABANE**
MODERATOR	**:**	**T. MATAMBELE**

INSTRUCTIONS

1. ANSWER ALL QUESTIONS
2. UNDERLINE AFTER EACH QUESTION AND LABEL THE QUESTIONS AS LABELLED IN THE PAPER
3. NO CELLPHONES (SWITCH-OFF)
4. DO NOT USE TIPPEX.

QUESTION ONE

1. Explain scientifically how dust explosion will cook you on the outside when you get exposed to it. **[6]**
2. Which deadly gas would accumulate in the blood stream when inhaled? **[2]**
3. The smell of rotten eggs can paralyse a respiratory system. True or False? Substantiate. **[2]**
4. List and discuss at least five (5) potential causes of heat leading to methane ignition. **[5]**
5. State the form and occurrence of methane in situ. **[2]**
6. Discuss with reference to three (3) underground coal mining methods, the measures to relief coal mining environments of substantial methane levels. **[3]**

[20 marks]

QUESTION TWO

a) Discuss five (5) measures aimed at reducing the risk of coal dust explosion. **[5]**
b) Discuss quality assurance measures in regards to stone dust product. **[5]**
c) How much fresh air should be directed onto a source of 0,000 3m3/s of CO to ensure that the concentration does not exceed 0,005%?**[5]**
d) A quantity of 40m3/s flows through an airway. The pressure drop across the length of the airway is 1000Pa. What size regulator will be required to reduce the quantity of air to 25m3/s? **[5]**

[20 marks]

QUESTION THREE

a. Modulus of rigidity y= 33 GPa
   Mining height = 1.2m
   Poisson ratio = 0.3

Depth below surface = 2000m

Rock specific weight = 24 kN/m^3

When the span is 10m and mine pole is installed 1.5m from the face.

i. When the span is 50m, calculate the length of the same mine pole. **(10)**

ii. Calculate the span when the length of the same mine pole is 1.1m. **(10)**

iii. If it takes half a year for the same mine pole length to reach 0.5m, calculate the closure rate of the panel. **(10)**

iv. When the same mine pole length is 0.3m, calculate the Energy release rate from the panel face. **(10)**

b. Discuss at least six (6) physical factors in a deep mining excavation that correlate with the magnitude of Energy Release Rate. **(10)**

[50 marks]

QUESTION FOUR

A support unit has to resist 120 k N within a tributary area of 4m^2 , determine the density of the rock if the fall out thickness is 1.5m. For safety factor of 1.5 determine the minimum peak strength required of the support unit**.[10]**

[10]

[TOTAL MARKS 100]