THE PAPUA NEW GUINES UNIVERSITY OF TECHNOLOGY

DEPARTMENT OF MINING ENGINEERING

2021 FIRST SEMESTER EXAMINATION

Third Year Mining Engineering

MN314 – ROCK FRAGMENTATION

DATE: **MONDAY 21St 2021**

TIME: **8:50 A.M.**

TIME ALLOWED: **3 HOURS**

INFORMATION FOR CANDIDATE:

1. You have ten minutes to read this question paper. You **SHOULD NOT** begin writing during this period.

2. There are **7 Questions** in this Paper. **You are required to answer all questions**

3. Marks for each question is as indicated. **ALL** questions carry a maximum of 10.

4. **ALL** answers must be written on the answer booklet provided. No other written materials will be accepted.

5. Write your **NAME** and **STUDENT NUMBER** clearly on the **ANSWER BOOK. DO THIS NOW.**

Question 1. *(10 marks)*

Define and discuss Rock Fragmentation and Excavation and its significance in the following industry;

1. Mining Industry
2. Construction Industry
3. Petroleum Industry

Question 2. *(10 marks)*

Discuss the importance of drilling and blasting in mining operations

Question 3 *(10 marks)*

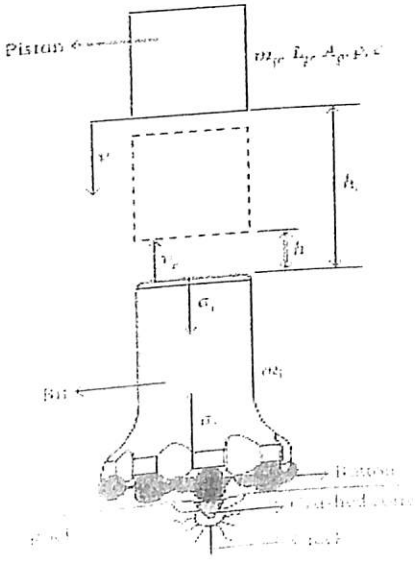
In drilling and blasting there are main key parameters classified as the controllable and uncontrollable parameters in drilling of blast holes for blasting. List the key controllable and uncontrollable parameters and discuss their importance.

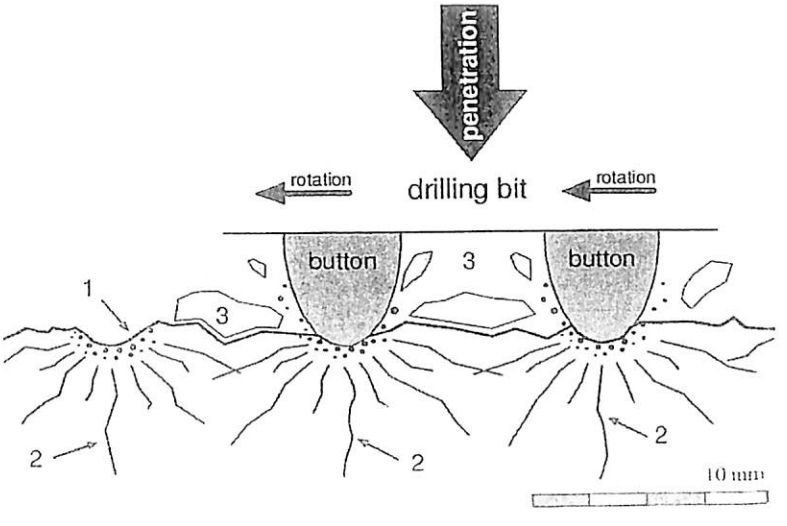
Question 4 *(10 marks)*

The systems of rock drilling that have been developed and classified according to their order of present day applicability. There are different types of drilling methods or drilling system to drill rocks. List five (5) of them and give one 2 or 3 examples of each.

Question 5 *(10 marks)*

With the help of the attached diagram below, describe the process of rock fragmentation and penetration. How the mechanical energy is transmitted through to achieve penetration by the bit. Use diagrams, equation etc... to aid your explanation.





Question 6 *(10 marks)*

i) The table below shows data of a particular blast hole drilling information.

Calculate;

a) Average drilling penetration rate
b) Total time to drill the blast holes
c) Total volume of explosives to be used to charge the whole bench

ID#	Drill Time (Seconds)	Hole Depth (m)	ID#	Drill Time (Seconds)	Hole Depth (m)
1	320	25	13	318	24
2	335	27	14	316	23
3	319	24	15	333	26
4	318	24	16	330	26
5	316	23	17	314	25
6	333	26	18	329	24
7	330	26	19	328	26
8	314	25	20	333	26
9	329	24	21	330	26
10	328	26	22	314	25
11	335	27	23	329	24
12	319	24	24	328	26

- Re-position and Set up time for each drill home is 15 minutes
- The drill rods are 5 meters length, time taken to change (add when drilling and remove when retrie
- Drill hole diameter is 7 cm

Question 7 *(10 marks)*

The diagram below shows the cross-section of a surface mine bench with penetration rate for the different geology/rock types.

From the penetration rate, you are to draw a profile of the section showing different rock types from the penetration rate data measured by the drilling machine.

Penetration data