UNIVERSITY OF MINES AND TECHNOLOGY, TARKWA

SECOND SEMESTER EXAMINATION, MAY 2018

COURSE NO: MN 275
COURSE NAME: GROUND FRAGMENTATION
CLASS: MN II TIME: 3 HOURS

Name**:** _____Index Number: _____

SECTION A (20 marks)

Answer True/False to the Following Questions

1. The tool bar is that section of the whole ripper assemblage on which the shank is attached.
2. Hinged type of rippers is relatively inexpensive.
3. The efficiency of ripping increases as the formation gets progressively harder.
4. Refraction seismograph technique gives the degree of consolidation of the formation.
5. The ripping distance method is claimed to be the best ripping method available.
6. The tractors gross weight determines the penetration that can be achieved and maintained.
7. The main components of the ripper are: tip, point, shank, tool bar, beam and power assembly.
8. In conventional top-hammer drilling, the mechanism impacting energy remains outside the hole.
9. Drag-bit rotary drilling and Roller-bit rotary drilling apply shaving action.
10. Flushing is sometimes used to stabilize the walls of the drill hole.
11. Explosives need two fundamental components: fuel and oxidizer.
12. The primer has higher detonation velocity than the explosive column.
13. Detonation pressure is also known as blasthole pressure.
14. Sensitivity is how responsive an explosive material is to an intentional stimulus.
15. After firing, 10 minutes is adequate for blast fumes to clear in surface mines.
16. Low explosives detonate while high explosives deflagrates.
17. The distance between the individual holes in a row is called spacing.
18. The S-wave is also called the secondary wave and it is the fastest wave through the ground.
19. Ground vibration velocity also depends on the inclination of the blast hole.
20. People in general react to vibration values far below the limit for damage on building.

SECTION B (20 marks)

Choose the Correct Answer

1. In this method, the area to be ripped is first determined after which ripping depth or penetration is measured to obtain the volume of material ripped.
   (a) Ripping distance method
   (b) Number of scrapper hauled method
   (c) Cross-section method
   (d) Bank-volume method

2. All the following are physical characteristics which favour ripping except
   (a) Weathering (b) Large grain size (c) Massive and homogeneous formations (d) Moisture permeated clay

3. Drilling accessories includes the following except
   (a) Circulatory fluid (b) Drill bits (c) Drill rods (d) Coupling sleeves

4. The joining of two or more drill rods is called …….
   (a) Tungsten (b) Coupling (c) Drill-string (d) Drilling system

5. The process of removing debris from a drill hole is known as
   (a) Drill cuttings (b) Circulating fluid (c) Flushing (d) Blasting

6. Parameters to consider when choosing a drill bit for a drilling system includes the following except
   (a) Penetration rate (b) Flushing medium (c) Service life (d) drill hole straightness

7. Which of the following is not a blasting agent
   (a) TNT (b) ANFO (c) Slurry (d) Water-gel

8. Low explosive have VODs less than
   (a) 2500 m/sec (b) 3500 m/sec (c) 7500 m/sec (d) None of the above

9. Explosives are classified into:
   (a) Nitroglycerine based explosives and Commercial high explosives
   (b) Non-nitroglycerin and military explosives
   (c) Military explosives and commercial explosives
   (d) Mining and Commercial High explosives

10. Explosives energy is released into the surrounding rock in two different forms, namely:

    (a) Detonation Pressure and Blasthole Pressure
    (b) Military Explosives and Commercial
    (c) Detonation and Shock pressure
    (d) Borehole and blast hole pressure

11. The strength of explosive can be expressed as the except
    (a) Absolute Weight Strength (b) Absolute Bulk Strength
    (c) Relative Weight strength (d) Relative Mass strength

12. The susceptibility of explosive to initiate is called
    (a) Sensitiveness (b) Sensitivity (c) Strength (d) None of the above

13. Boosters have the following conditions except
    (a) Should have low VOD
    (b) Should have high explosive density
    (c) Diameter must be large enough to go down the blasthole
    (d) Booster explosive should have np suspicion of dual VOD

14. A supersonic shockwave which travels through the material is
    (a) Deflagration (b) Borehole pressure (c) Velocity of Detonation (d) Detonation

15. The property of an explosive which shatters the rock is known as
    (a) Brisance (b) Shockwave (c) VOD (d) Borehole pressure

16. ……ensures creation of the weaker plane which defines the blasting area and avoids propagation of vibrations beyond this line.
    (a) Pre-splitting (b) Splitters (c) Muffling (d) Overbreak Control

17. Which one among the following is a phase of an explosion
    (a) Reaction (b) Intense heat (c) Fragmentation (d) Displacement

18. Air over pressure can be measured in the following except
    (a) dB (b) kPa (c) mbar (d) mm/sec

19. Which of the following is a surface wave
    (a) C – waves (b) P – waves (c) S – waves (d) R – waves

20. The size of ground vibrations does not depend on
    (a) Quantity of co-operating changes
    (b) Constriction
    (c) Drilling pattern
    (d) Characteristics of the rock

SECTION C (60 marks)

Answer all Questions

With your background in Ground Fragmentation (MN 275), you have been consulted to assist Yenz Quarry Limited (YQL) in the design of their drilling and blasting operations. The drill and blast parameters provided by management are as follows: Blasthole diameter (127 mm), Burden (3.5 m), Spacing (4 m), Hole depth (10), Stemming height: (3 m), Explosive density: 1.25 g/cc (emulsion). Fig. 1 is a layout of the proposed blast design. Management has decided to construct an explosive magazine on site and also contract explosive service providers for the supply of explosives to the quarry.

Use this preamble to answer the questions below:

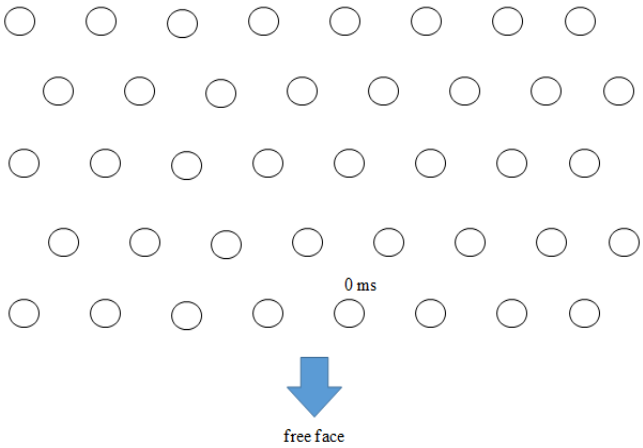

Fig. 1 Blast Layout

1. Name three explosive companies you can contract to supply explosives to YQL? (3 marks)
2. Give three (3) each external and internal features you would see at the explosive magazine site (6 marks).
3. Give three (3) security features you would put in place at the magazine. (3 marks)
4. How far should the explosive magazine be located from human settlement? (1 mark)
5. Name the regulation that governs the storage and handling of explosives in Ghana? (1 mark)
6. List three (3) uncontrollable factors that could affect the results of this blast. (3 marks)
7. State three (3) factors that could affect the performance of the emulsion to be used. (3 marks)
8. What drilling pattern is employed in this design (Fig. 1)? Any alternative? (2 marks)
9. Calculate the total quantity of explosives required for this blast. (5 marks)
10. What name (in full) is given to the explosive truck used to transport emulsion to the blast site? (1 mark)
11. What is the powder factor for this blast? (2 mark)
12. What initiation system would you adopt for the blast and why? (2 marks)
13. Given that; the downline has 500 ms delay, design the firing sequence for the blast using 25 ms delay between the rows and 17 ms between the holes in the rows. (6 marks)
14. What is the Maximum Instantaneous Charge (MIC) for this blast? (5 marks)
15. Give any three stemming material you can employ for this blast (3 marks)
16. Give three (3) precautions you would take before firing the holes? (3 marks)
17. What undesirable effects (4) do you expect from this blast. (4 marks)
18. What factors (3) would determine the level of ground vibrations for this blast? (3 marks)
19. Under what circumstances (2) would you employ deck loading for this blast? (2 marks)
20. Name one (1) software you can use for fragmentation analysis. (2 marks)

GOOD LUCK!

Sylvester Yenzanya