Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII (NEW) EXAMINATION – SUMMER 2022

Subject Code:3172213 Date:08/06/2022

Subject Name:Rock Fragmentation

Time:02:30 PM TO 05:00 PM Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	Draw the line diagram or sketch of components of drilling equipment & name the components.	**03**
	(b)	Explain delay detonators and its advantages with neat sketch	**04**
	(c)	A project in granite rock will have an average bench height of 25 feet. An explosive having a specific gravity of 1.2 has been proposed. A drill machine can easily drill 3.0 inch diameter of holes. Assume diameter of explosive will be 2.6 inch and delay blasting technique will be used. Develop a blast design for the project. Take specific gravity of granite is 2.9.	**07**
Q.2	**(a)**	Differentiate between low explosive & high explosive with suitable examples.	**03**
	(b)	Discuss the properties of explosive in detail.	**04**
	(c)	What is mechanics of drilling? Explain the mechanism of rock breakage by percussive drilling with neat sketch.	**07**
		OR	
	(c)	Write a short note on stoper and drifter. Also discuss the construction and operation of wagon drill machine.	**07**
Q.3	**(a)**	Make a tree diagram of classification of drilling methods. Also write the factors affecting the selection of drill machine.	**03**
	(b)	Discuss the principle and operation of "jack hammer" drill machine used in underground coal mining.	**04**
	(c)	Define powder factor with its importance in blasting? Calculate the powder factor (kg/m^3) from below data :- (i) Bench Height – 12 m (ii) Hole Dia. – 165 mm and amount of explosive loaded in blast hole = 11.5 kg/m. Assume the parameters if required.	**07**
		OR	
Q.3	**(a)**	Compare rotary drilling method with percussive drilling method.	**03**
	(b)	Discuss the blast design pattern using in surface mine with neat sketch.	**04**
	(c)	Why control blasting methods are used in mines? Explain any two method of control blasting in detail.	**07**
Q.4	**(a)**	Explain the importance of permitted explosive in underground coal mines. Also write its type.	**03**
	(b)	What is VOD and how it is determined?	**04**
	(c)	Calculate the powder factor in tonne/kg from below data: ☙ Bench height including subgrade drilling = 10 m ☙ Burden = 4 m ☙ Spacing = 5 m ☙ Subgrade drilling = 0.5 m ☙ Stemming length = 3 m	**07**

If the diameter of the hole is 200 mm and density of explosive and rock is 0.9 tonne/m^3 and 2 tonne/m^3 respectively.

OR

Q.4 **(a)** Explain the application and importance of high speed video camera in mining. **03**

(b) Why drillability is important? Also write the factors affecting the drillability of rock. **04**

(c) Discuss the causes and Impact of ground vibration and air blast on the neighboring structures and communities. Also explain its mittigative measures. **07**

Q.5 **(a)** What are the advantages of using image analysis technique for fragmentation analysis of a muckpile? **03**

(b) What do you mean by penetration rate and how it is determined in the mine? Explain with one example. **04**

(c) What is secondary blasting? Explain its types in detail. **07**

OR

Q.5 **(a)** Differentiate between the term slurry and emulsion explosive. **03**

(b) Relative weight strength of an unknown explosive is 1.5 times of ANFO in Jules/gm. Absolute strength of TNT is 4000 Jules/gm. TNT has relative bulk strength of 3 times of the ANFO in Jules/cm^3. If the specific gravity or density of ANFO, TNT and unknown explosive 0.9, 1.5 and 1.2 respectively. Determine the absolute strength of unknown explosive in Jules/gm and Jules/cm^3. **04**

(c) Discuss the blast design pattern using in underground mine with neat sketch. **07**

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