Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII (NEW) EXAMINATION – WINTER 2023

Subject Code:3172213 Date:08-12-2023

Subject Name: Rock Fragmentation

Time: 10:30 AM TO 01:00 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)	Describe blast design parameters in details.	**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)	Discuss the blast design pattern using in surface mine with neat sketch.	**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)	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.	**07**
		OR	
Q.3	**(a)**	Compare rotary drilling method with percussive drilling method.	**03**
	(b)	Discuss the construction and operation of wagon drill machine.	**04**
	(c)	Write the purpose of control blasting methods? 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)	Write a short note on VOD probe.	**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 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.	**07**
		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)**	Write are the application of image analysis technique in mining? Also name the software used for the same.	**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)	Calculate the powder factor, if the bench height is 7.5 m, subgrade drilling is 0.3 m, stemming height is 1.5 m, burden is 2 m and spacing is 3 m. Take specific gravity of explosive is 1.2 and loading rate of explosive per meter is 7.5 kg.	**04**
	(c)	Discuss the blast design pattern using in underground mine with neat sketch.	**07**

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