Enrollment No./Seat No.:

GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering - SEMESTER - VII EXAMINATION - WINTER 2025

Subject Code: 3172216 **Date: 13-11-2025**

Subject Name: Rock Excavation Technology

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)**	List the major parameters that must be known to select an optimal rock excavation method.	**03**
	(b)	State the relationship between the physico-mechanical properties of rock and the energy consumption during the excavation process.	**04**
	(c)	Describe the composition and function of primary ingredients in a typical commercial explosive used in mining.	**07**
Q.2	**(a)**	Define Contour Blasting and Coupling Ratio in blasting.	**03**
	(b)	Differentiate between the techniques of Pre-split Blasting and Smooth Blasting in terms of objective and final result.	**04**
	(c)	Outline the procedure for designing a blast hole timing sequence for a multi-row blast, and explain the significance of sequential firing.	**07**
		OR	
	(c)	Analyze the factors that influence the determination of Burden and Spacing in a blasting pattern and explain the general principle for spacing relative to burden.	**07**
Q.3	**(a)**	Draw a neat sketch showing the major components of a Surface Miner and label its key cutting mechanism.	**03**
	(b)	Explain the specific applications where Scrapers and Ripper-Dozers are preferred over conventional shovel-dumper systems in surface excavation.	**04**
	(c)	Describe the constructional and operational features of a BWE and its advantages for very large-scale, soft rock excavation.	**07**
		OR	
	(a)	List the different types of cutting tools used on a TBM and state the rock type each is best suited for.	**03**
	(b)	Differentiate between the operational principles of a Road Header and a Continuous Miner in underground excavation.	**04**
	(c)	Explain the importance and process of Equipment's selection criteria and procedures for a new large-scale surface mine.	**07**

Q.4	**(a)**	Describe the influence of geological and environmental factors on the location and shape design of a mine tunnel.	**03**
	(b)	Evaluate the advantages and disadvantages of using a TBM versus the Drill and Blast method for excavating a long, deep, circular mine tunnel in competent rock.	**04**
	(c)	Describe the sequential procedure for shaft sinking using the conventional drilling and blasting method.	**07**

OR

	(a)	List four types of Stress and Strain measuring instruments used in excavation monitoring.	**03**
	(b)	Justify the need for Slope Stability Radars and Total Stations as monitoring tools in a large surface excavation site.	**04**
	(c)	Explain the working and application of Ground Penetrating Radars (GPR) in pre-excavation rock mass assessment.	**07**
Q.5	**(a)**	List the parameters that define the Blast Quality in a typical excavation project.	**03**
	(b)	Explain the working mechanism and utility of a Bore Hole Logging System in site investigation for a new rapid excavation project.	**04**
	(c)	Describe the process of monitoring and assessing data via instruments for performance monitoring in an underground excavation, focusing on convergence and deformation.	**07**

OR

	(a)	State the scope and importance of rock excavation engineering in civil construction industries.	**03**
	(b)	State the different classification of underground excavations based on their purpose and size.	**04**
	(c)	Describe the procedure for Vibration Control in blasting near civil structures and specify the parameters that must be monitored and restricted.	**07**

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