Enrollment No./Seat No.:

GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering - SEMESTER - VII EXAMINATION - WINTER 2025

Subject Code: 3172211 **Date: 28-11-2025**

Subject Name: Advanced Mining Methods

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)**	What are the primary functions of a General Support System in an underground mine?	**03**
	(b)	List and explain the major categories of problems associated with mining thick coal seams, focusing on ground control and safety.	**04**
	(c)	Describe the major components of a Powered Support with neat sketch and explain the specific role of each component in controlling strata movement.	**07**
Q.2	**(a)**	Provide a concise definition of Horizon Mining.	**03**
	(b)	Differentiate between the Chock Shield and Frame Shield/Trepanner types of powered supports.	**04**
	(c)	What planning considerations are involved in ensuring that the cross-cuts in various horizons are driven directly above one another?	**07**
		OR	
	(c)	Describe the Layout of Horizon Mining with a labeled sketch, clearly indicating the main stone headings (horizons), cross-cuts, and laterals.	**07**
Q.3	**(a)**	Explain the mechanism of the Hydro-chemical method.	**03**
	(b)	Explain the concept of Sublevel Caving method and the mechanism by which the coal is extracted from the sublevel.	**04**
	(c)	Describe the application and benefits of the Shield method of mining in thick coal seams.	**07**
		OR	
	(a)	Define a Thin Coal Seam and outline the unique Problems encountered during their mining.	**03**
	(b)	Describe the general Principle of Slice Mining and how it is used to extract the full thickness of the seam in sequential steps.	**04**
	(c)	What are the primary factors that influence the selection of a mining method and the required equipment for a thin coal seam? Explain in Details.	**07**
Q.4	**(a)**	State the salient features of shield method of mining.	**03**

	(b)	If a thick seam is to be mined in a section with known geological discontinuities (faults, dykes), how would this influence the selection between a slicing method and a caving method?.	**04**
	(c)	Describe the necessary design adaptations required in a Longwall Shearer (e.g., drum size, cutting profile) to make it suitable for a thin seam face.	**07**

OR

	(a)	List and elaborate on three significant Advantages of using the Hydraulic Mining method for coal.	**03**
	(b)	Define Ore Mining by Leaching and write the fundamental principle (solubility) upon which this selective extraction method is based.	**04**
	(c)	How are boreholes interconnected in underground coal gasification systems? Describe the techniques used to create this linkage.	**07**
Q.5	**(a)**	What are the key Disadvantages and limitations of the Hydraulic Mining method, especially concerning water sourcing, consumption, and slurry management?	**03**
	(b)	What is the fundamental Principle of Underground Coal Gasification (UCG)?	**04**
	(c)	What are Manganese Nodules and where are they primarily found? Describe the technological and environmental challenges associated with Deep-sea Mining for these nodules.	**07**

OR

	(a)	Explain the importance of the pressure and flow rate of the water jet in determining the efficiency and productivity of hydraulic mining.	**03**
	(b)	Explain the fundamental processes that occur during UCG and how they contribute to coal conversion.	**04**
	(c)	Define Hydraulic Mining and briefly describe the fundamental operation process using high-pressure water for mineral disintegration and transport.	**07**

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