Enrollment No./Seat No.:

GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering - SEMESTER - V EXAMINATION - WINTER 2025

Subject Code: 3152201 **Date: 19-11-2025**

Subject Name: Mine Machinery II

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)**	Define Working Head and Manometric Efficiency for a mine centrifugal pump.	**03**
	(b)	Explain the function and constructional features of a Safety Detaching Hook used in winding systems.	**04**
	(c)	Describe the factors that govern the selection and design of Belt Conveyors for material transportation in a large underground mine.	**07**
Q.2	**(a)**	List the constructional features of a Shuttle Car and state its primary use in underground coal mines.	**03**
	(b)	Differentiate between a Koepe Winder and a Drum Winder based on their capacity, application, and principle of operation.	**04**
	(c)	Describe the working mechanism and applications of a Load Haul Dump (LHD) machine and a Scoop Tram in a metal mine.	**07**
		OR	
	(c)	Describe the design and application of the various Overwind and Overspeed protection systems incorporated in modern winding engines.	**07**
Q.3	**(a)**	List the advantages of Trackless Haulage over Rail Haulage in underground metal mines.	**03**
	(b)	Explain the operational principle of a Shearer and a Roadheader machine and state the environment where each is best suited.	**04**
	(c)	Draw and explain the typical Performance Characteristics Curves of a centrifugal pump and explain how these curves are used for selecting the pump.	**07**
		OR	
	(a)	List the various conditions under which Multistage Centrifugal Pumps are preferred for mine dewatering.	**03**
	(b)	Explain the operational differences between an Underground Drill Jumbo and a Jack Hammer in hard rock excavation.	**04**
	(c)	Describe the detailed safety precautions and operational procedures necessary for running a Locomotive Haulage System in an underground mine.	**07**

Q.4	**(a)**	List the different types of Winding Engine Brakes and state the function of the Limit Switch in the braking circuit.	**03**
	(b)	Explain the importance of the Tensioning Device (Take-up) in a belt conveyor system and describe its working.	**04**
	(c)	Describe the constructional features and working of a Continuous Miner and a Coal Plough and discuss their respective roles in highly mechanized longwall mining.	**07**

OR

	(a)	List the different types of Rope Haulage Systems used in mines.	**03**
	(b)	Explain the role and construction of various Loading Machines used at the face in metal mines.	**04**
	(c)	Evaluate the significance of Total Energy Cost and Maintenance Cost in the long-term selection of a large mine dewatering pump.	**07**
Q.5	**(a)**	List the major types of Reciprocating Pumps and state their primary application in mining.	**03**
	(b)	Describe the basic layout and operational sequence of a typical Pit Top and Bottom Circuit for Cage winding in a deep shaft mine.	**04**
	(c)	Describe the various types of Couplings and Clips used to attach cars to a haulage rope and explain the safety measures associated with their use.	**07**

OR

	(a)	List four types of Safety Devices used on winding engines beyond basic brakes and detaching hooks.	**03**
	(b)	Explain the concept of Slip and Creep in a winding rope and its effect on winder performance.	**04**
	(c)	Evaluate the factors that determine the appropriate selection of a face machine for a new coal mine.	**07**

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