Seat No./Enrollment No.: _____

GUJARAT TECHNOLOGICAL UNIVERSITY
BACHELOR OF ENGINEERING – SEMESTER 6 – EXAMINATION – SUMMER 2026

Subject Code: 3162207 **Date: 22/05/2026**

Subject Name: Mine Ventilation

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.**

Q.1	**(a)**	Why carbon monoxide gas is considered as the most dangerous gas in mines?	**03**
	(b)	What do you understand by standard of ventilation?	**04**
	(c)	Explain about Firedamp in details with its detection by flame safety lamp.	**07**
Q.2	**(a)**	What do you understand by blackdamp?	**03**
	(b)	Write the Salient points of Cowards Diagram with neat sketch.	**04**
	(c)	Discuss the physiological effect and detection of carbon monoxide gas in mines.	**07**
		OR	
Q.2	**(c)**	A man, when doing hard work in a confined space breaths 60.9 m^3 of air per minute. He consumes 2.5 m^3 of oxygen and produces 2.4 m^3 of carbon dioxide per minute. Calculate the percentage composition of exhaled air. Assume the parameters if required.	**07**
Q.3	**(a)**	Differentiate between the term laminar & turbulent flow with neat sketch.	**03**
	(b)	Explain 'superjacent heading method' of methane drainage with neat sketch.	**04**
	(c)	Calculate the pressure as well as power required to circulate 20 m^3 of air per second, through a mine airway 300 m long, 2.5 high and 3 m wide? The coefficient of friction of the airway is 0.01 N s^2m^{-4}. Also calculate the frictional resistance coefficient (f) for the airway taking the air density at 1.2 kg/m^3. Assume the parameters if required.	**07**
		OR	
Q.3	**(a)**	Write the recommendations of air velocity required at various places of underground mine as per CMR 1957?	**03**
	(b)	Write a note on Kata Thermometer.	**04**
	(c)	How is natural ventilating pressure produced? Derive the equation of natural ventilation pressure from air density.	**07**
Q.4	**(a)**	Differentiate between frictional resistance and shock resistance.	**03**
	(b)	Determine the nature of air flow in a mine airway of 2.2×1.8 m size if the velocity of air in the airway is 0.5 m/s. Also calculate the maximum velocity at which the flow still remains truly laminar. Assume $\upsilon = 0.16 \times 10^{-4}$ m^2/s	**04**
	(c)	Discuss the construction, application and operation of whirling hygrometer with neat sketch.	**07**
		OR	
Q.4	**(a)**	Explain the resistance of airways in series and parallel.	**03**
	(b)	What do you mean by equivalent orifice? Explain with neat sketch.	**04**

	(c)	Explain the construction and working of centrifugal fan. Also write the equation of theoretical head developed by centrifugal fan.	**07**
Q.5	**(a)**	Explain the factors affecting the economic design of mine airway.	**03**
	(b)	Discuss auxiliary ventilation system with neat sketch.	**04**
	(c)	Describe the types of ventilation system based on air direction with neat sketch.	**07**

OR

Q.5	**(a)**	Write the Desirable features of ventilation system.	**03**
	(b)	Explain the effect of heat & humidity at the work places.	**04**
	(c)	Discuss the construction and working of vane anemometer with neat sketch.	**07**

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