Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

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

Subject Code:3132103 Date:16-01-2024

Subject Name:Mineral Processing

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: Mineral, Ore and Concentrate.	**03**
	(b)	Define classification. Explain about sizing and sorting.	**04**
	(c)	List out ores/minerals of metals like Al, Cu, Fe, Zn, Pb, Sn and Mg with their chemical composition.	**07**
Q.2	**(a)**	What is the difference between Crushing and Grinding ?	**03**
	(b)	Explain the comminution and mechanism of comminution.	**04**
	(c)	Give classification of crushers. Explain Black Jaw Crusher with neat diagram.	**07**
		OR	
	(c)	Define the term classifier. Explain the working process of any classifier with the help of a schematic diagram.	**07**
Q.3	**(a)**	Discuss different grinding media.	**03**
	(b)	In a smooth roll crusher, the feed size of material is 10 mm (spherical) and the product size desired is below 5 mm. Calculate the minimum diameter of rolls under limiting conditions. Assume coefficient of friction between material and roll to be 0.3.	**04**
	(c)	Discuss the physio-chemical principles involved in froth floatation? Discuss various reagents used in froth floatation process.	**07**
		OR	
Q.3	**(a)**	Explain the different variables in ball mill.	**03**
	(b)	If crushing rolls of 100 cm diameter are set so that the crushing surfaces are 1.3 cm apart and angle of nip is 31°. What is the maximum size of particles which should be fed to the rolls ?	**04**
	(c)	Derive an equation for the critical speed of a ball mill. What is the effect of speed of the mill on the grinding action ?	**07**
Q.4	**(a)**	Write a short note on Heavy Media Separation.	**03**
	(b)	Explain the Rittinger's Law and Kick's Law.	**04**
	(c)	Explain with the help of flowsheet how the copper ore is processed by flotation process?	**07**
		OR	
Q.4	**(a)**	Write a short note on Gravity concentration methods.	**03**
	(b)	Discuss the theory of ball mill operation with neat sketch showing different zones in a ball mill.	**04**
	(c)	Draw the flow sheet for the flotation process adopted for concentration of zinc ores.	**07**
Q.5	**(a)**	What do you mean by Frothers, Collector and Modifier.	**03**
	(b)	Draw simplified beneficiation flow sheets of Iron ore.	**04**
	(c)	Explain the principle of magnetic separation and mention the process	**07**

description.

OR

Q.5	**(a)**	What is free settling and hindered settling.	**03**
	(b)	Draw simplified beneficiation flow sheets of Bituminous coal.	**04**
	(c)	What is Jigging? Explain its principles and applications.	**07**