

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE- SEMESTER-III (NEW) EXAMINATION – WINTER 2024****Subject Code:3132103****Date:26-11-2024****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.

- Q.1** (a) List out ores and Minerals for Mg, Al and Cu with their chemical composition. **03**  
 (b) Write in brief about the scope of mineral processing in the field of extractive metallurgy. **04**  
 (c) What are the advantages of mineral processing? Draw a simplified flowsheet for the various processes involved in mineral processing. **07**
- Q.2** (a) What are the characteristics of a jaw crusher ? **03**  
 (b) What do you understand by locking and unlocking of minerals and gangue. **04**  
 (c) Discuss the theory of ball mill operation with a neat sketch showing different zones in ball mill. **07**
- OR**
- (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.3** (a) Discuss the main purpose of fine grinding during mineral dressing ? **03**  
 (b) Estimate the diameter of a set of rolls to take feed of a size equivalent to 50 mm sphere and crush to 12 mm if the coefficient of friction is 0.60? **04**  
 (c) Discuss the physio-chemical principles involved in froth floatation? Discuss various reagents used in froth floatation process. **07**
- OR**
- Q.3** (a) What is the difference between Crusher and Grinder ? **03**  
 (b) In a smooth roll crusher, the feed size of material is 15 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) Draw the flow sheet for the flotation process adopted for concentration of zinc ores. **07**
- Q.4** (a) Write the advantages and disadvantages of heavy media separation process. **03**  
 (b) Discuss about Electrostatic Separators. **04**  
 (c) Describe with a suitable flowsheet the beneficiation of Iron ore. **07**
- OR**
- Q.4** (a) What is Rittinger's crushing law ? **03**  
 (b) Discuss briefly about Magnetic Separation Process. **04**  
 (c) Describe with a suitable flowsheet the beneficiation of Bituminous coal. **07**
- Q.5** (a) What is the role of frothers and activators in floatation process? **03**  
 (b) Explain sieve analysis in brief. **04**  
 (c) Describe the working principle of concentration table with suitable diagram. **07**
- OR**
- Q.5** (a) Write a short note on jigging operation? **03**  
 (b) Explain the concept of free settling and hindered settling ? **04**  
 (c) What is classification? Name different types of classifiers and explain air classifier. **07**

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