

**M.Tech. II Semester Degree Examination, Sept./Oct. - 2024****MINERAL PROCESSING****Computational Techniques in Mineral Processing****(NEP)**

Time : 1 Hour

Maximum Marks : 30

1. The purpose of using a connection matrix in complex mass balancing is to _____.
(A) simplify the analysis of multiple interconnected streams
(B) identify the chemical composition of each stream
(C) measure the particle size distribution
(D) none of these
2. In a flotation process, the term “concentrate” refers to _____.
(A) the final tailings product (B) the valuable mineral-rich product
(C) the initial ore feed (D) none of these
3. _____ is not typically used in error minimization in mineral processing.
(A) Statistical sampling (B) Process modelling
(C) Thermal imaging (D) None of these
4. The efficiency of a classifier is influenced by which of the following factors ?
(A) Feed rate (B) Particle size distribution
(C) Operating temperature (D) All of these
5. What does a “mass balance” typically involve in a mineral processing context ?
(A) Calculating the weight of the raw ore
(B) Ensuring that the mass of feed equals the mass of product plus waste
(C) Estimating the total energy consumption
(D) None of these
6. For a closed-circuit ball mill with a feed rate of 1,000 tons/hr, a circulating load of 500 tons/hr and a product size of 20 mm, what is the circulating load ratio ?
(A) 0.5 (B) 0.67 (C) 1.0 (D) None of these



7. To optimize a mineral processing plant using machine learning, which type of data is important ?
- (A) Historical performance data (B) Real-time operational data
(C) Experimental lab data (D) All of these
8. If the Bond Work Index for a material is 11 kWh/ton and the initial particle size is 500 μm with a final size of 100 μm , what is the energy required to grind 80 tons of ore ?
- (A) 11,000 kWh (B) 12,000 kWh
(C) 13,000 kWh (D) None of these
9. A Screening operation has a feed rate of 200 tons/hr. If the screen efficiency is 85%, what is the mass flow rate of the undersize material ?
- (A) 170 tons/hr (B) 180 tons/hr
(C) 190 tons/hr (D) None of these
10. In a closed-circuit grinding system, if the feed rate is 500 tons/hr and the classifier overflow is 350 tons/hr, what is the circulating load ratio if the classifier underflow is 150 tons/hr ?
- (A) 0.3 (B) 0.6 (C) 1.0 (D) None of these
11. If the energy required to grind a material is 12 kWh/ton and the feed size is 1,000 μm with a desired product size of 250 μm , what is the energy required to grind 80 tons of ore ?
- (A) 960 kWh (B) 1,080 kWh (C) 1,200 kWh (D) None of these
12. Error reconciliation in mineral processing typically involves which of the following techniques ?
- (A) Linear regression (B) Statistical process control
(C) Machine learning algorithms (D) All of these
13. In material balancing, which term describes the ratio of the mass of the product to the mass of the feed ?
- (A) Recovery (B) Efficiency (C) Yield (D) None of these
14. _____ concept is used to estimate recovery efficiency in a beneficiation process.
- (A) Mass Balance (B) Energy balance
(C) Particle size distribution (D) None of these



15. Ctrl+Y is used to _____.
- (A) Undo (B) Underline
(C) Re-do (D) All
16. Lagrangian multipliers are used in optimization to address which type of problem ?
- (A) Non-linear constraints (B) Linear constraints
(C) Quadratic constraints (D) None of these
17. A mass balance around a grinding circuit shows that the feed rate is 500 tons/hr, the product rate is 300 tons/hr and the circulating load is 200 tons/hr. What is the classifier overflow rate ?
- (A) 300 tons/hr (B) 400 tons/hr (C) 500 tons/hr (D) None of these
18. If a hydrocyclone has a separation cut point of 50 μm and the feed density is 1.6 g/cm^3 , what is the approximate cut size if the feed rate is 200 m^3/hr ?
- (A) 40 μm (B) 45 μm (C) 50 μm (D) None of these
19. The purpose of using depressants in flotation is _____.
- (A) to increase bubble size (B) to prevent certain minerals from floating
(C) to reduce slurry viscosity (D) to enhance froth stability
20. What is the main factor determining the selectivity in a froth flotation process ?
- (A) Particle size (B) Type of collector
(C) Air flow rate (D) None of these
21. The function of a dewatering screen is _____.
- (A) to classify particles by size (B) to increase water content
(C) to remove water from solids (D) to crush ore
22. What is a “beneficiation process” in mineral processing ?
- (A) A process that increases the economic value of the ore
(B) A process that reduces the ore size
(C) A process that dries the ore
(D) A process that combines different ores



23. Which type of pump is typically used for slurry transport ?
(A) Centrifugal pump (B) Gear pump
(C) Piston pump (D) Diaphragm pump
24. In which section of a mineral processing plant would you find a surge bin ?
(A) Grinding (B) Crushing
(C) Flotation (D) Tailing management
25. Which factor does NOT affect the selection of a grinding mill ?
(A) Ore hardness (B) Particle size distribution
(C) Ore Moisture content (D) Ambient temperature
26. In a cyclone separator, the primary force responsible for particle separation is _____.
(A) magnetic force (B) centrifugal force
(C) gravitational force (D) frictional force
27. What is the typical purpose of a regrind mill ?
(A) Coarse crushing (B) Fine grinding
(C) Magnetic separation (D) Flotation
28. What is the primary objective of comminution in mineral processing ?
(A) To separate ore from gangue
(B) To reduce particle size
(C) To increase metal recovery
(D) To enhance mineral surface properties
29. What is the role of a frother in the flotation process ?
(A) Depress unwanted minerals (B) Increase bubble formation
(C) Collect valuable minerals (D) Suppress unwanted froth
30. Which method is used to determine the grindability of an ore ?
(A) Ball mill index test (B) Bond work index test
(C) Hardgrove Grindability index test (D) Crushing Strength test

