

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

Subject Code: 3162202

Date: 08/06/2026

Subject Name: Underground Metalliferous Mining

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) Define the terms 'Adit,' 'Shaft,' and 'Winze' in metal mining development. **03**
 - (b) Explain the factors governing the selection between a vertical shaft and an incline. **04**
 - (c) Elaborate on the 'Classification of Stopping Methods' based on the support of the worked-out area. **07**
- Q.2**
- (a) What is the present status and scope of the Indian metal mining industry? **03**
 - (b) Describe the layout and application of the 'Breast Stopping' methods. **04**
 - (c) Discuss the detailed 'Mine Development' process, including horizontal and vertical entries for a deep-seated ore body. **07**
- OR**
- Q.2**
- (c) Analyze the 'Selection of Stopping Methods' based on geological disturbances, ore grade, and distribution. **07**
- Q.3**
- (a) List the physical and mechanical characteristics of ore that influence stopping selection. **03**
 - (b) Outline the unit operations involved in 'Underhand' and 'Overhand' stopping. **04**
 - (c) Explain the layout, operational cycle, and safety precautions for the 'Shrinkage Stopping' method. **07**
- OR**
- Q.3**
- (a) Define 'Stope Preparation' and name two essential activities involved. **03**
 - (b) Explain the mechanism of 'Sub-level Caving' and its suitable conditions. **04**
 - (c) Discuss the 'Block Caving' method in detail, including its applicability, development, and mechanics of caving. **07**
- Q.4**
- (a) What is 'Dilution' and how does it affect the value of the ore? **03**
 - (b) Describe the construction and use of 'Stopes' in steeply dipping narrow veins. **04**
 - (c) Compare 'Sub-level Stopping' with 'VCR (Vertical Crater Retreat)' mining in terms of productivity and safety. **07**
- OR**
- Q.4**
- (a) Define 'Ore Grade' and 'Cut-off Grade.' **03**
 - (b) Discuss the hazards and problems associated with 'Deep Mining' operations. **04**
 - (c) Describe the various 'Special Methods' of mining, such as solution mining and sea-bed mining, and their future prospects. **07**

- Q.5** (a) What is the primary purpose of 'Square-set Stopping'? **03**
(b) Discuss the application of 'Secondary Breaking' systems in metal mining. **04**
(c) Explain the procedure for 'Rock Burst' management and other environmental problems in deep-level metal mines. **07**

OR

- Q.5** (a) What are the limitations of the 'Shrinkage Stopping' method? **03**
(b) Explain the 'Ore Handling' and transportation systems used in underground metal mines. **04**
(c) Develop a stope preparation plan for a massive, low-grade copper deposit using 'Sub-level Stopping.' **07**
