

PRACTICE SET
End Semester Examination, Spring-2026

Program: B.TECH (MINING)
Semester: VI
Subject: UNDERGROUND METAL MINING
Subject Code: 8PCCMiE310

Course Outcomes	Description
CO1	Develop the understanding of metal mining industry.
CO2	Sketch the development of a working underground metal mines.
CO3	Acquire knowledge and hands-on competence in applying the concepts in the design of metal mine.
CO4	Recommend the various support system for underground metal mine working.

UNIT I

Section I (10 marks)

1. Provide a list of major mining companies in India that are involved in the extraction of metals and coal. **CO1 – Remember**
2. Suggest practical methods to enhance working conditions in metal mining environments, considering safety and operational efficiency. **CO1 – Understand**
3. Identify and list major Indian mining companies engaged in the extraction of coal and metallic minerals. **CO1 – Remember**
4. Explain the differences between crown pillar, sill pillar, and rib pillar with the help of a **neatly labeled** diagram. **CO1 – Understand**
5. List and classify metallic and non-metallic minerals, including important industrial ores found in India, and **state** their economic significance along with major producing regions. **CO1 – Remember**
6. Compare and evaluate different types of mine openings such as shafts, adits, and inclines, discussing their design features, applications, and suitability under varying geological conditions. **CO1 – Analyze**

Section III (20 marks)

7. Discuss the scope of underground Metalliferous mining in India and examine its major limitations from economic, technical, and environmental perspectives. **CO1 – Apply**
8. Provide an overview of the sustainability issues faced by the Indian mining industry. Summarize the key challenges and suggest ways to promote sustainable practices. **CO1 – Analyze**

UNIT II

Section I (10 marks)

9. Categorize the various stoping techniques into overhand and underhand methods. Describe each type and highlight the geological or operational conditions where they are best suited. **CO2 – Apply**
10. Describe the conditions under which raise boring and open raising are suitable in underground mining. Compare their advantages and limitations in practical usage. **CO2 – Remember**
11. Assess the working of the Alimak & Jora raise climber technique for raise development. Describe its construction method, conditions of applicability, and illustrate with a detailed diagram. **CO2 – Evaluate**
12. Differentiate between a raise and a winze in underground mining operations, and illustrate their features with a neatly labeled diagram. **CO2 – Understand**
13. Explain the term stoping in underground metalliferous mining and outline the various stoping methods along with their basic working principles. **CO2 – Understand**
14. Describe the Vertical Crater Retreat (VCR) stoping method, including its working procedure, significance, and illustrate with a neat labeled diagram. **CO2 – Understand**

Section III (20 marks)

15. Discuss and evaluate Long hole & Raise boring raising methods in underground metal mining. For each method, detail the construction steps, applicability, and state their advantages and disadvantages along with appropriate diagrams. **CO2 – apply**
16. Sketch a typical underground metal mine layout with a neat labeled sketch, and define the following terms: **CO2 – Apply**
 - (a) Square set method
 - (b) Sill Pillar, Crown pillar and Rib Pillar
 - (c) Shrinkage method
 - (d) Crosscut and Level Interval

UNIT III

Section I (10 marks)

17. Illustrate and explain the block caving method, and apply your understanding to identify suitable conditions along with its merits and limitations. **CO3 – Apply**
18. Explain the classification of stoping methods in underground metalliferous mining, and discuss the basis of their grouping along with key distinguishing features. **CO3 – Understand**
19. Analyze the shrinkage stoping method, focusing on stope preparation, ventilation arrangements, and ground support practices. **CO3 – Analyze**

20. Provide an illustration and explanation of the Block Caving method. Discuss the conditions under which it is applicable, along with its merits and limitations. **CO3 – Apply**
21. Evaluate two suitable stoping methods for an underground metal deposit after conducting a roof stability assessment. Compare their applicability, stope preparation, advantages, and limitations, and justify the most appropriate choice. **CO3 – Evaluate**
22. Describe and analyze the square set stoping method, including its applicability, stope preparation, and variations with their advantages and drawbacks. **CO3 – Analyze**

Section III (20 marks)

23. Classify and compare breast stoping and cut-and-fill stoping methods, including their working features, stope preparation, advantages, and disadvantages. **CO3 – Analyze**

UNIT IV

Section I (10 marks)

24. Assess the benefits and limitations of using roof stitching and prop supports in underground excavations. **CO4 – Understand**
25. Compare the effectiveness and usage conditions of the following support systems: Timber Support, Hydraulic Props, and Friction Props. **CO4 – Understand**
26. Define and distinguish between the following ground support systems used in underground mining: **CO4 – Apply**
 - (a) Steel chocks and steel arch supports
 - (b) Safari supports and roof supports
27. Explain the concept of roof bolting, detailing its essential components, installation procedure, and methods adopted for testing and ensuring bolt performance. **CO4 – Understand**
28. Define the Pressure Arch Theory in the context of underground excavations and **outline** the various categories of support systems **CO4 – Remember**

Section III – (20 Marks Each)

29. Apply the fundamental theories governing roof behavior—Beam Theory, Suspension Theory, and Keystone Theory—to explain stress distribution and stability mechanisms in underground openings, supported by neat labeled diagrams. **CO4 – Apply**
30. **Classify** the principal support systems used in underground metal mines and analyze their suitability under different geotechnical conditions. Further, **propose** an appropriate sequence of support installation as ground conditions evolve. **CO4 – Apply**

**Summary Sheet:
CO Wise**

CO	Q. No	Marks
CO1	1,2,3,4,5,6,7,8	90
CO2	9,10,11,12,13,14,15,16,	100
CO3	17,18,19,20,21,22,23,	80
CO4	24,25,26,27,28,29,30,	80
Total		350

Unit Wise

Unit	Q. No	Marks
Unit 1	1,2,3,4,5,6,7,8	90
Unit 2	9,10,11,12,13,14,15,16,	100
Unit 3	17,18,19,20,21,22,23,	80
Unit 4	24,25,26,27,28,29,30,	80
Total		350

Blooms Taxonomy Level (BTL) Wise

BTL	Q. No	Marks
LOT	1,3,4,6,9,12,13,15,17,21,22,23,24,27,31,32,33,34,36,37	130
HOT	2,5,7,8,10,11,14,16,18,19,20,25,26,28,29,30,35,38,39,40	255
Total		385

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<p>Disclaimer: - This is a practice set. The Question in the End term examination will differ from the practice set. This practice set is meant for practice only.</p>
