

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**BACHELOR OF ENGINEERING – SEMESTER 7 – EXAMINATION – SUMMER 2026**

**Subject Code: 3172208**

**Date: 01/06/2026**

**Subject Name: Mine Planning**

**Time: 02:30 PM TO 05:00 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) Enumerate the various phases involved in the life of a mine. **03**
  - (b) Discuss the importance of technical and economic information in the mine planning process. **04**
  - (c) Three ore samples have grades of 2.5%, 3.2%, and 4.1% with equal tonnage. Compute the mean grade of the deposit. **07**
- Q.2**
- (a) What is stripping ratio? Mention its different classifications. **03**
  - (b) Describe the essential parameters considered in bench design for open pit mining. **04**
  - (c) In a surface mining project, the volume of overburden is 5 million m<sup>3</sup> and ore quantity is 2 million tonnes. Determine the stripping ratio and assess its economic implication. **07**
- OR
- Q.2**
- (c) A mine has ore reserves of 50 million tonnes. Estimate the mine life using Taylor's rule. **07**
- Q.3**
- (a) Explain the concept of cut-off grade. **03**
  - (b) Describe the principle of the Lerchs-Grossmann algorithm for pit limit optimization. **04**
  - (c) Using the following data, Determine the cut-off grade: selling price = ₹3000/tonne, mining cost = ₹1200/tonne, processing cost = ₹800/tonne, and recovery = 90%. **07**
- OR
- Q.3**
- (a) What do you understand by ore reserve estimation? **03**
  - (b) Explain the vertical cross-sectional technique used in reserve estimation. **04**
  - (c) Using the following data, estimate the ore reserve: Area<sub>1</sub> = 500 m<sup>2</sup>, Area<sub>2</sub> = 700 m<sup>2</sup>, spacing between sections = 50 m, density = 2.5 t/m<sup>3</sup>. **07**
- Q.4**
- (a) Define the term stope planning in underground mining. **03**
  - (b) Discuss the factors governing the selection of a suitable stoping method. **04**
  - (c) A mine contains 30 million tonnes of extractable reserves and produces 2 million tonnes annually. Calculate the expected mine life and comment on its optimality. **07**
- OR
- Q.4**
- (a) What is meant by mine production capacity? **03**
  - (b) Explain how production scheduling is carried out in underground mining operations. **04**
  - (c) Examine how variations in production rate influence mine life and overall project economics. **07**

- Q.5**
- (a)** Define mine closure planning. **03**
  - (b)** Describe the key elements included in a feasibility report. **04**
  - (c)** Develop a systematic feasibility assessment for a mining project considering both technical and economic aspects. **07**

OR

- Q.5**
- (a)** State the statutory provisions associated with mine closure. **03**
  - (b)** Explain the environmental factors that must be considered during mine closure planning. **04**
  - (c)** Critically evaluate the consequences of inadequate mine closure on environmental sustainability and economic conditions. **07**

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