Roll No. | | | | | | | | | | |

**ANNA UNIVERSITY (UNIVERSITY DEPARTMENTS)**

**B.E. /B.Tech / B. Arch (Full Time) - END SEMESTER EXAMINATIONS, APRIL / MAY 2024**

**MINING ENGINEERING**
**V Semester**
**MI 5501 SURFACE MINING**
(Regulation 2019)

Time:3 hrs

Max. Marks: 100

| | |
|---|---|
| CO1 | To understand various modes of opening up of deposits amenable to surface mining. |
| CO2 | To plan and design the basic components of a typical surface mine including benches and haulroads according to the deposit formation. |
| CO3 | To identify the salient points that dictate which is the safest, most efficient, and most versatile extraction method to employ classify and select the suitable surface mining methods and equipment based on site conditions. |
| CO4 | To understand the concept of waste dump formations and slope failures in surface mines. |
| CO5 | To discuss the impacts that social and environmental issues have on surface mining from the pre-exploration phase to end-of-mine issues, and how to manage these two increasingly important factors to the benefit of both the mining company and the society. |

**BL – Bloom's Taxonomy Levels**
(L1-Remembering, L2-Understanding, L3-Applying, L4-Analysing, L5-Evaluating, L6-Creating)

## PART- A ( 10x2=20 Marks)
(Answer all Questions)

| Q.No | Questions | Marks | CO | BL |
|---|---|---|---|---|
| 1. | Enlist the statutory authorities involved to provide approval for commencement of mining operations. | 2 | CO1 | L1 |
| 2. | Mention the factors to be considered for selection of mining methods. | 2 | CO1 | L2 |
| 3. | Draw the nomenclature for ultimate bench slope with neat labels and explain the basic terminologies. | 2 | CO2 | L3 |
| 4. | Illustrate the factors influence on selection of boxcut site. | 2 | CO2 | L2 |
| 5. | Depict the scope of field applicability of down-the-hole drilling method. | 2 | CO3 | L2 |
| 6. | Explain the term 'rippability'. | 2 | CO3 | L1 |
| 7. | What are the types of cutting methods of bucket wheel excavator? | 2 | CO4 | L1 |
| 8. | Distinguish between production and productivity of mining equipment. | 2 | CO4 | L2 |
| 9. | Elaborate the salient features of surface mining techniques over underground mining methods. | 2 | CO5 | L2 |
| 10. | Classify the types of dumping methods used in surface mines. | 2 | CO5 | L3 |

## PART- B (5x 13=65 Marks)

| Q.No | Questions | Marks | CO | BL |
|---|---|---|---|---|
| 11 (a) | Describe the design parameters of haul road in surface mines indicating the construction features for safe haul road system with neat sketches. | 13 | CO1 | L2 |

| | | | | |
|---|---|---|---|---|
| | **OR** | | | |
| 11 (b) | Explain in detail of various types of stripping ratio used for surface mining methods indicating its level of significance in mine economic evaluation. | **13** | CO1 | L2 |
| 12 (a) | Describe in detail of design parameters considered for stability of ultimate pit limit for a surface mine with neat diagrams | **13** | CO2 | L3 |
| | **OR** | | | |
| 12 (b) | Discuss in detail of various types of slope failures in surface mines and mention the conditions under which each type of failures occur. | **13** | CO2 | L3 |
| 13 (a) | Determine the number of drilling equipment are required for an opencast mine producing 5 million tonne per annum with stripping ratio of 1:2. Assume any missing data and conditions, if required and justify the same. | **13** | CO3 | L4 |
| | **OR** | | | |
| 13 (b) | Calculate the number of HEMM required in a surface mine to produce 2 million tonne of iron ore per annum using shovel dumper combination method and stripping ratio is 1:2.4. Assume any missing data and conditions, if required and justify the same. | 13 | CO3 | L4 |
| 14 (a) | Describe the working principles and constructional features of dragline with neat sketches and indicate the limitations and scope of application of dragline in surface mines. | **13** | CO4 | L3 |
| | **OR** | | | |
| 14 (b) | Describe the constructional features of surface miner with neat sketches and indicate the cycle of operations, limitations and scope of application of surface miner in opencast mines. | **13** | CO4 | L3 |
| 15 (a) | Explain in detail of parameters to be considered for identifying the suitable site for designing and formation of waste with neat sketches. Also, discuss the stabilization techniques for waste dump stability. | **13** | CO5 | L3 |
| | **OR** | | | |
| 15 (b) | Explain the different types of in-pit crushers used in surface mines with neat sketches. Also, discuss the applicability, advantages and limitations of in-pit crusher in surface mines. | **13** | CO5 | L3 |

## PART- C (1x 15=15 Marks)

(Q.No.16 is compulsory)

| Q.No | Questions | Marks | CO | BL |
|---|---|---|---|---|
| 16. | Design the blast parameters for a large opencast mine to remove the overburden for efficient operation of electric rope shovel of 20$m^3$ deployed in medium rock formation of 16m height bench such as (i) burden, (ii) spacing, (iii) stemming length, (iv) sub-drilling, (v) charge factor (kg/ $m^3$), (vi) types and quantity of explosives, (vii) initiation system, (viii) initiation pattern, (ix) decking, (x) powder factor. Assume any missing data and field condition, if necessary and justify the same. Also, suggest the controlled blasting techniques to control the adverse effects of blasting operations. | **15** | CO3 | L5 |