IIPM SCHOOL OF ENGINEERING & TECHNOLOGY

LESSON PLAN: 2023-24

**Sub: Th.05-UNDERGROUND METAL MINING**

# Branch : Mining

**Faculty name : Sanjay Kumar Majhi**

# Duration : 60 hours



**Semester : 5th**





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| **Unit - 1** | **Access to ore body**  Classify modes of entries – Adits , inclines and shafts ,applicability of entries. |
| **Unit – 2** | **Development in underground Metal Mine.**   * Explain formation of blocks of mineral deposit.   Explain level interval   * Describe   Open raising method  Two compartment method Jora raise lift  Long hole drilling method./Vertical Crater retreat (VCR) method. Alimak raise climber  Raise borer.  Development of Ore passe system. |
| **Unit – 3** | Give a comparative study between coal and metal Mining. |
| **Unit – 4** | **Stoping methods.**   * Classify stoping methods with application and factors affecting methods of stopping. * Preparatory arrangement for stoping. * Describe the following methods with layout including drilling, blasting, transportation and supports.   Open stoping.  Open stoping with pillar support. Shrinkage stoping.  Cut & fill stoping. Square set stoping. Block caving.  Sub-level caving.  Top slicing. |
| **Unit – 5** | **Stone Drifting**  Describe conventional methods of drifting. Find out direction gradient of drift. Describe drilling and blasting, support, transportation, drainage, ventilation and lighting arrangements, organization and supervision in mechanised method of drifting. |
| **Unit – 6** | **Rock Burst**  Explain causes and prevention of rock burst. |
| **Unit – 7** | **Face mechanization**   * Describe use of jumbo drill with air leg. * Describe various Loading & Transportation System like   L.H.D., L.P.D.T.(Low Profile Dump Truck), rocker shovel, spiral chutes and draw points, Scraper etc. |

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| Sl. No. | Title of the Book | Name of Authors |
| 1 | SME Mining Engineering Hand Book Vol.I & II-1993 edition. | |
| 2 | Metal Mining | Chacharker |
| 3 | Mining Engineering Hand Book | Peele |
| 4 | EMT Vol.II | D.J.Desmukh |
| 5 | Mining Ground control | Prof. B.S. Verma |
| 6 | Rock Mechanics | Jermic |
| 7 | Rock Mechanics | Jugger & Cook |
| 8 | Metalliferous Mining | Higam |
| 9 | Underground Mining Method | Bullock. |

**Books Suggested:**

* E.M.T Vol-02 D.jDeshmukh
* Metalliferous Mining Methods
* Explosive & Blasting Practices in Mines

Y.P Chacharker Samir Kumar Da

Objective

* Describe various methods to access an ore body.
* Explain various methods of development used in underground metal mines.
* Compare between coal & metal mining.
* Explain various stopping methods used in u/g metal mines.
* Stone Drifting.
* Explain causes & prevention of rock burst.
* Describe about face mechanization.

**Learning Outcome:** As Mining Engineer, one should have the knowledge in fundamental principles of generation in underground metal mines.

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| **Sl. No** | **Chapter** | **Proposed Week for Teaching** | **Lecture No.** | **Sub. Topic** | **Important Teaching Points** | **Content Source** |
| 01 | **I** | 1ST | 01 | U/G Metal mining | Intro. On u/g metal mining |  |
| 02 | 02 | Access to ore body | Classification and various methods | Metal Mining Chacharker |
| 03 | 03 | Access to ore body | Adits, Tunnel | Metal Mining Chacharker |
| 04 | 04 | Access to ore body | Shafts, Incline | Metal Mining Chacharker |
| 05 | 2ND | 01 | Access to ore body | Applicability and  methods of works on entries | Metal Mining Chacharker |
| 06 | 02 | Access to ore body | Doubt Clearing Class (Chapter 1) | Metal Mining Chacharker |
| 07 | 03 | Development in  U/G Metal Mines | Intro. On Development in u/g metal mining | Metal Mining Chacharker |

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| 08 |  |  | 04 | Development in U/G Metal  Mines | Diff. terms use in U/G Metal mining | Metal Mining Chacharker |
| 09 | 3RD | 01 | Development in  U/G Metal Mines | Formation of Blocks of Mineral Deposit | Metal Mining Chacharker |
| 10 | 02 | Development in  U/G Metal Mines | Dip,Strike,Level ,Level Intervals | Metal Mining Chacharker |
| 11 | 03 | Development in U/G Metal  Mines | Classification of Raising Methods | Metal Mining Chacharker |
| 12 | 04 | Development in  U/G Metal Mines | Open Raising methods | Metal Mining Chacharker |
| 13 | 4TH | 01 | Development in  U/G Metal Mines | Two compartment Raising methods | Metal Mining Chacharker |
| 14 | 02 | Development in  U/G Metal Mines | Jora Raise Lift | Metal Mining Chacharker |
| 15 | 03 | Development in  U/G Metal Mines | Long Hole Drilling Methods | Metal Mining Chacharker |
| 16 | **II** | 04 | Development in U/G Metal  Mines | Alimak Raise climber | Metal Mining Chacharker |
| 17 | 5TH | 01 | Development in  U/G Metal Mines | Raise Borer | Metal Mining Chacharker |
| 18 | 02 | Development in  U/G Metal Mines | Unit Test (Chapter 01)&(Chapter 2) | ………………. |
| 19 | 03 | Study Between Coal & Metal  Mining | Intro. On both Coal & Metal Mining | E.M.T vol=01 & 02 |
| 20 | 04 | Study Between Coal & Metal Mining | Diff. Between Coal & Metal Mining | E.M.T vol=01 & 02 & Metal  Mining Chacharker |
| 21 | 6TH | 01 | Study Between  Coal & Metal Mining | Unit Test (Chapter 1),Ch-02 & 03 | --------- |
| 22 | 02 | Stopping Methods | Intro. On Stopping Methods | Metal Mining Chacharker |
| 23 | 03 | Stopping Methods | Classification of  Stopping Methods | Metal Mining Chacharker |
| 24 | 04 | Stopping Methods | Application of Stopping Methods | Metal Mining Chacharker |
| 25 | 7TH | 01 | Stopping Methods | Factors affecting on Stopping Methods | Metal Mining Chacharker |

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| 26 |  |  | 02 | Stopping Methods | Preparatory arrangement on Stopping Methods | Metal Mining Chacharker |
| 27 | 03 | Stopping Methods | Layout,Drilling,Blasting, Transportation& Support | Explosive & Blasting  Practices in Mines |
| 28 | **III** | 04 | Stopping Methods | Doubt Clearing and class. |  |
| 29 | 8TH | 01 | Stopping Methods | Classification of methods and their description | Metal Mining Chacharker |
| 30 | 02 | Stopping Methods | Open Stopping Method | Metal Mining Chacharker |
| 31 | 03 | Stopping Methods | Overhand Stopping Method | Metal Mining Chacharker |
| 32 | 04 | Stopping Methods | Underhand Stopping Method | Metal Mining Chacharker |
| 33 | 9TH | 01 | Stopping Methods | Open Stopping Method with Pillar support | Metal Mining Chacharker |
| 34 | **IV** | 02 | Stopping Methods | Shrinkage Stopping Method | Metal Mining Chacharker |
| 35 | 03 | Stopping Methods | Cut & fill Stopping Method | Metal Mining Chacharker |
| 36 | 04 | Stopping Methods | Squre set Stopping | Metal Mining Chacharker |
| 37 | 10TH | 01 | Stopping Methods | Block Caving Method | Metal Mining Chacharker |
| 38 | 02 | Stopping Methods | Sub- Level Caving Method | Metal Mining Chacharker |
| 39 | 03 | Stopping Methods | Top Slicing Method | Metal Mining Chacharker |
| 40 | 04 | Stone Drifting | Introduction |  |
| 41 | 11TH | 01 | Stone Drifting | Method of drifting & Gradient of Drifting | Metal Mining Chacharker |
| 42 | 02 | Stone Drifting | Drilling,Blasting,Transpo rtation& Support | Explosive & Blasting  Practices in Mines |
| 43 | 03 | Stone Drifting | Drainage,Ventilation | EMT-02 |
| 44 | 04 | Stone Drifting | Lighting Arrengment | EMT-02 |

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| 45 |  | 12TH | 01 | Stone Drifting | Organization & Supervision in  Mechanized method of Drifting | EMT-02 |
| 46 | **V** | 02 | Stone Drifting | Unit Test (Chapter 4), (Chapter 5) | ------------ |
| 47 | 03 | Rock Brust | Introduction on Rock Brust | EMT-02 |
| 48 | 04 | Rock Brust | Sources of. Rock Brust | EMT-02 |
| 49 | 13TH | 01 | Rock Brust | Causes Rock Brust | EMT-02 |
| 50 | 02 | Rock Brust | Occurs & Prevention of  Rock Brust | EMT-02 |
| 51 | 03 | Rock Brust | Doubt class on Previous Topics | EMT-02 |
| 52 | 04 | Face Mechanization | Use of Machineries in diff. U/G mines | EMT-02 |
| 53 | 14TH | 01 | Face Mechanization | Jumbo Drill | EMT-01 |
| 54 | 02 | Face Mechanization | Plan Layout of Loading  & Transportation System | Metal Mining Chacharker |
| 55 | 03 | Face Mechanization | L.H.D & Scraper | Metal Mining Chacharker |
| 56 | 04 | Face Mechanization | L.P.D.T | Metal Mining Chacharker |
| 57 | 15TH | 01 | Face Mechanization | Rock Shovel | Metal Mining Chacharker |
| 58 | 02 | Face Mechanization | Diff .Types of Chutes& Draw Point | ------------ |
| 59 | 03 | Face Mechanization | Unit Test (Chapter 06) &(Chapter 07) | ----------- |
| 60 | 04 | Face Mechanization | Doubt Clearing Class | ------------- |

Signature of Lecturer

# Faculty Member HOD Principal/ Director