

## **Semester V**

### **MI501- Surface Mining**

#### **UNIT 1: Introduction to Surface Mining**

Definition of important terms, Advantages and disadvantages of surface mining, mineral deposits amenable to surface mining, Various surface mining methods, Introduction to unit operations in surface mining. Introduction to various types of machineries used in surface mining.

#### **UNIT 2: Open Pit Design and Layouts**

Classification of surface mining method mineral deposits suitable for open pit mining, Important parameters of Open pit design; Design of Benches, Ultimate pit, Stripping ratio, Break even stripping ratio, Different methods of opening up the deposits; Box cuts, internal and external box cut, Methods of driving Box cuts; Layout of open pits; Layout of waste dumps, unit operations in opencast mining.

#### **UNIT 3: Exploratory & Rock Drilling**

Theory of Rock Drilling, Different Types of Drill Machines Used in Open Pits; Rotary, Percussive and Rotary Percussive Drilling, Selection of Drill Machines on the basis of Drillability; Computation of Productivity of Drill Machines; Inclined Drilling; their Advantages and Disadvantages.

Drilling machines used for exploratory drilling viz. Rotary & Percussive, their attachments; Core Barrels; Conditions of applicability of drilling methods; Borehole Survey, Directional drilling, Underground methods of exploratory drilling

#### **UNIT 4: Pit preparation, Loading and Excavation**

Dozers, Scrapers, Front-End Loaders, Grader, Back Hoe, etc.; their Construction, Operation, Suitability and applicability; Calculation of Their Productivity Different Types of Excavators used in Open Pits; Shovel, Dragline, Hydraulic Excavators, Multi Bucket Excavators, their Construction, Specifications, Operation, Suitability and Applicability; Calculation of their Productivity.

#### **UNIT 5: Transport in open pits**

Automobile Transport, Rail Transport and Conveyors; their Suitability; Computation of their Productivity; Automation in Open Pit transport such as Truck Dispatch System.

#### **Text Books:**

1. Surface Mining: G.B. Misra
2. Surface mining equipment: Martin

#### **Reference Books:**

1. Surface Mining: Pfeider
2. Mining Equipment : Boki
3. SME handbook: Hartman
4. Surface Mining Technology: S. K. Das

## **Semester V**

### **MI502- Mining Survey -II**

#### **UNIT 1: Theodolite Surveying**

Types of Theodolites; Description of various parts of a Vernier Theodolite; Requirements of Mining type Theodolites; Measurements of height and distances of accessible and inaccessible points; Traversing with Theodolite on surface and underground; Checks on Closed and Open traverses; Balancing of traverses; Temporary & Permanent adjustments of Theodolites; Sources of errors and their prevention.

#### **UNIT 2: Tacheometry**

Principles of Stadia Methods; Determination of constants; Theory of anallactic lens; Distance and elevation formulae, Subtense and Tangential Methods; Auto- Reduction Tacheometer.

#### **UNIT 3: Setting Out**

Setting out simple curves on surface and in underground; Elementary knowledge of compound and transition curves; joint boundary survey; Equalization of boundaries; Maintenance of direction and gradient of roadways i.e. marking and checking of center line and grade line, transfer of point from roof to floor and floor to roof

#### **UNIT 4: Errors & Problems**

Computation of areas and volumes; Earthwork calculation; Problems based on Coordinates, faults, Dip-Strike and boreholes; Sources, classification and relative importance of errors, their prevention and elimination, theory of errors, adjustment of errors.

#### **UNIT 5: Plans & Sections**

General requirements of mine plans; types of plans; Symbols used in mine plans; preparation of plans & sections; Plotting of traverse; Checking accuracy of old mine plans; Planimeter and its uses; Enlargement & reduction of plans.

#### **Reference Books:**

1. Surface Mining: G.B. Misra
2. Surface mining equipment: Martin
3. Surface Mining: Pfeider
4. Mining: Boki
5. SME handbook: Hartman

**Semester V**  
**MI503- Mining Legislation & Safety-I**

1. Introduction to Acts, Rules & Regulation applicable to Mining Industry, Development of mining legislation in India.
2. Mines Act – 1952 & Mines Rules – 1955
3. Coal Mines Regulations –1957, Introduction to draft CMR-2006 & Metalliferous Mines Regulation-1961
4. Mine Crèche Rules 1966
5. Mine Vocational Training Rules- 1966

**Reference Books:**

1. Legislation in Indian Mines (A critical Appraisal) Vol. II & I, S. D. Prasad & Prof. Rakesh
2. CMR-1957 & MMR-1961 L. C. Kaku.
3. Mines Act-1952 & Mines Rules-1955 L. C. Kaku.
4. Vocational Training Rules L. C. Kaku.
5. Mine Accidents S.J. Kejeriwal

**Semester V**  
**MI504 - Mineral Processing**

**UNIT 1: Comminution**

Introduction, definition, scope and economic justification, main steps in ore dressing operations, comminution, crushing, principles of crushing , jaw crushers, gyratory crushers, cone crushers, roll crushers, gravity stamps their classifications and applications, grinding principles of grinding, application and classification of ball mills, rod mills, tube mills and pebble mills.

**UNIT 2: SIZING**

Object of sizing, scale of sizing, laboratory sizing, screening and classification , different type of screens, their mode of operations and application and limitation, **classification-** principles of classification, movement of solids through fluids, different types of classifiers, hydraulic and pneumatic classifiers, sampling-importance of sampling and methods used.

**UNIT 3: GRAVITY CONCENTRATION**

Jigging, Flowing film concentrators like spirals and shaking tables, heavy media separation, applications and limitations of methods.

**UNIT 4: FLOTATION**

Physico-chemical principles, function of various flotation reagents, important machines, their principles, and working, flotation of sulphide, oxide and non sulphide ores.

**UNIT 5: PROCESSING METHODS OF SOME COMMON MINERALS**

Electrostatic and Magnetic Separation - Principle operation and field of application, Pelletisation of low grade iron ore, Drying and dewatering - thickening, filtration and drying. Coal washing; Simplified flow sheets for beneficiation of coal and typical ores of copper, lead, zinc, iron and manganese with special reference to Indian deposits.

**Reference Books:**

1. Ore Dressing by Gaudin
2. Ore Dressing by B. A. Wills

**Semester V**  
**MI505- Mining Machinery -I**

**UNIT 1: Wire Rope**

Wire ropes used in Mines and their installation, Application of wire ropes in Mines, Testing of wire ropes, Factor of safety, Examination of Wire ropes, Care of wire ropes. Ropes splicing: Rope capels.

**UNIT 2: HAULAGE**

Different systems of rope haulage, rope haulage calculations, safety devices, tubs, haulage road and manholes, locomotive haulage and calculations based on it, track laying, mine cars.

**UNIT 3: WINDING - I**

Head gear arrangement, shaft fittings, safety devices, cages & skips, their suspension arrangements. Location of winding engine.

**UNIT 4: WINDING – II**

Electric winders, winding drums, types of construction, duty cycle, mechanical & electrical breaking, safety devices on winders, Electrical & Electronic methods of speed control, Multi level winding; automatic winding, Torque- time & power- time diagram; calculation for winding. Pit top and pit bottom arrangements.

**UNIT 5: PUMPING**

Sources of mine water, types of pumps, design calculations, characteristics, operation, maintenance and selection, pump fittings, special types of pumps used in mines.

**Reference Books:**

1. Elements of Mining Tech. Vol I & Vol III by D. J. Deshmukh
2. Mining Machinery By S. C. Walker
3. Coal Mining Practice By Stathum

**Semester V**  
**Subject: Mining Survey –II Lab Code : MI502**

**List of experiments:**

1. Study of Vernier Theodolites
2. Angle measurement by repetition methods
3. Angle measurement by reiteration methods
4. Measurement of height of accessible and inaccessible point by trigonometric surveying
5. Determination of stadia constant
6. Distance and elevation determination by Tacheometric surveying
7. Setting out of circular curve by chord and offset method
8. Setting out of circular curve by Rankine's method
9. Study of Planimeter
10. Study of Pantagraph / Ediograph.

**Semester V**  
**Subject: Mineral Processing Lab Code : MI504**

**List of Experiments:**

1. Study of Jaw crusher
2. Study of Roll crusher
3. Study of Grinding mills
4. Study of Akin's classifier
5. Study of Shaking table
6. Study of Mineral jig.
7. Study of Spiral concentrator
8. Study of Flootation cell
9. Study of Thickeners
10. Study of Washability curves

**Semester V**  
**Subject: Mining Machinery –I Lab Code : MI505**

**List of experiments:**

1. Study of Different types of Rope Capels.
2. Study of Rope Splicing.
3. Study of Clifton pulley.
4. Study of various safety devices on rope haulages
5. Study of Exhaust Conditioner on a diesel locomotive
6. Study of Cage Suspension Gear
7. Study of Detaching Safety Hook
8. Study of Lilly Controller
9. Study of Turbine Pump
10. Study of a Balancing Disc



## Semester V MI 506 - RDBMS Lab

### ME- 506- RDBMS Lab

#### UNIT-I

Introduction : Advantage of DBMS approach, various view of data, data independence, schema and sub-schema, primary concepts of data models, Database languages, transaction management, Database administrator and users, data dictionary, overall system architecture.

**ER model:** basic concepts, design issues, mapping constraint, keys, ER diagram, weak and strong entity sets, specialization and generalization, aggregation, inheritance, design of ER schema, reduction of ER schema to tables.

#### UNIT-II

**Domains, Relations and keys:** domains, relations, kind of relations, relational database, various types of keys, candidate, primary, alternate and foreign keys.

**Relational Algebra & SQL:** The structure, relational algebra with extended operations, modifications of Database, idea of relational calculus, basic structure of SQL, set operations, aggregate functions, null values, nested sub queries, derived relations, modification of Database, join relation, DDL in SQL.

#### UNIT-III

**Relational Dependencies and Normalization:** basic definitions, trivial and non trivial dependencies, closure set of dependencies and of attributes, irreducible set of dependencies, introduction to normalization, non loss decomposition, FD diagram, first second, third Normal forms, dependency preservation, BCNF, multivalued dependencies and forms normal form dependency and fifth normal forms. **Distributed Database:** basic idea, distributed data storage, data replication, data fragmentation horizontal, vertical and mixed fragmentation.

#### UNIT-IV

**Emerging Fields in DBMS :** object oriented Database-basic idea and the model, object structure, object class, inheritance, multiple inheritance, object identity, data warehousing terminology, definitions, characteristics, data mining and its overview, Database on www, multimedia Database-difference with conventional DBMS, issues, similarity based retrieved continuous media data, multimedia data formats, video servers.

#### Unit V

**Storage structure and file organizations:** Overview of physical storage media, magnetic disk performance and optimization, basic idea of RAID, organization, organization of records in files, basic concepts of indexing, ordered indices, basic idea of B-tree and B+-tree organization. **Network and hierarchical models:** basic idea, data structure diagrams, DBTG model, implementations, tree structure diagram, implementation techniques, comparison of the three models.

#### References:

1. A Silberschatz, H.F. Korth, Sudersan "Database System Concept"=, MGH Publication.
2. C.J. Date "An introduction to Database System"=6th ed.
3. Elmasri & Navathe "Foundamentals of Database system"- III ed.