

MI-501 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

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.

MI-502 Underground Metal Mining

UNIT1: Introduction

Status and scope of Underground metal mining methods; Definitions of important terms used in underground metal mining methods. Classification of mining methods; Factors affecting the choice of mining methods

UNIT 2: Development

Mode of access; Variables affecting the choice of mode of access; Crosscuts, Levels, Raises, Winzes, Ore passes; Their method of drivages with the description of various unit operations; Introduction to Raise boring and introduction to tunnel boring .

UNIT 3: Stopping Methods-I

Overhand, Underhand and Breast stopping methods; Open stopping; Vertical Crater Retreat method; Sub level stopping Room and Pillar method., Resuing method.

UNIT 4: Stopping Methods-II

Shrinkage stopping; Cut and fill stopping, Introduction to Square set stopping, Sub level caving, Block caving, Top slicing.

UNIT 5: Support Systems

Pillars; Back fill, Cable bolting, Steel Rock bolting, Grouting, Shotcreting etc. Code of timbering rules.

Reference Books:

1. Elements of Mining Tech. Vol II by D. J. Deshmukh
2. S M E Handbook
3. Underground mining methods, Hustrulid
4. Introduction to Mining, H. L. Hartman

List of experiments:

- 1) Study of Underground metal mining methods.
- 2) Study of method of drivages
- 3) Study of Underhand and Breast stopping methods
- 4) Study of Cut and fill stopping methods
- 5) Study of Steel Rock bolting

MI-503 Pollution Control Engg.

UNIT 1: environmental pollution

Introduction and classification of environmental pollution, ecological conservation. Salient features of the environmental laws in India and Occupational disease. Environmental Impact Assessment, Environmental Management Plan, Environmental Audit.

UNIT 2: air pollution

Air pollution due to various gases and suspended particulate materials, causes, consequences, preventive measures, dust measuring equipment.

UNIT 3: Noise Pollution

Pollution due to noise and its consequences, noise produced by different machinery, control and safety, measurement of noise levels.

UNIT 4: Water Pollution

Water pollution, its causes and preventive measures, acid-mine drainage, water pollution in mines and mineral beneficiation plants, water purification schemes in brief.

UNIT 5: Land Pollution

Land pollution and land reclamation, land reclamation techniques, Physical and Biological reclamation, Mine Closure Plan

Reference Books:

1. Air & Water Acts
2. Forest Conservation acts
3. Legislation in Indian Mines - A Critical appraisal by Rakesh and Prasad
4. Environmental Impact of Mining By Down and Stokes

List of experiments:

- 1) Study of Environmental Impact Assessment.
- 2) Study of suspended particulate materials
- 3) Study of measurement of noise levels
- 4) Study of acid-mine drainage
- 5) Study of land reclamation techniques

MI-504 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

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

MI 505 SURFACE MINING – I

UNIT-1 Classification and Basic Parameters:

General information and classification of surface mining methods – associated terms, determination of major dimensions and main parameters. Annual production and life of mine. Surface mining methods – Scope, applicability and limitations.

UNIT-2 Opening of Deposits:

Opening of deposits and formation of benches – trenching, non-trenching and underground methods and their combinations. Width & slope of entry trenches. Driving of opening and entry trenches.

UNIT-3 Overburden Removal:

Systems for removal and disposal of overburden – overcasting haulage and combination methods with scope and limitations. Design of waste dumps.

UNIT-4 Basic Layouts:

Layout planning for horizontal, inclined and steep deposits. Factors influencing the choice of layouts. Design of benches. Ultimate Pit Design

UNIT-5 Special Mining Situations:

Quarrying of dimensional stones, hydraulicking, dredging of placers and deep-sea mining. Mining over old underground workings. Global and Indian Status of Surface Mining

Reference Books:

- 1) Surface Mining by Bruce A. Kennedy
- 2) Elements of Mining Technology by D. J. Deshmuk
- 3) Rock Slope Engineering by Hock and Bray