RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Mining and Mineral Processing, V-Semester

MM- 501 Mining Surveying - 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: Pfleider
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.

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Mining and Mineral Processing, V-Semester

MM- 502 Introduction to Mineral Processing

UNIT 1:
Introduction to Mineral Processing, Definition of ore, mineral, gangue, tenor, scope and importance of Mineral beneficiation; liberation its importance-degree of liberation, optimum degree of liberation.

UNIT 2:
Basic unit operations and quantification of Mineral Engineering Unit Operations: Recovery, Grade, Ratio of Concentration, Enrichment Ratio and Separation efficiency etc.

UNIT 3:
Definition of sampling, need, methods of sampling (solids and slurries), Gy's law of sampling, estimation of minimum amount of sample required, BIS standard for sampling, accurate sampling of solids and slurry comminution and liberation, its importance, degree of liberation.

UNIT 4:
Basic Principles of Crushing and Grinding; Need and importance of Size Separation, Basic Principles of Separation Processes; Introduction to different Separation Processes.

UNIT 5:
Representation of Particles size analysis: Particle size distribution and quantification, different methodologies for estimating particle size distributions

Reference Books:
1. Mineral Processing Technology (B. A. Wills)
2. Principles of Mineral Dressing (A. M. Gaudin)
3. Introduction to Mineral Processing (Kelly and Spottiswood)
4. Basics in Minerals Processing (Metso)

List of Experiments:
1. Sampling – Methods
2. Sampling –Accuracy
3. Particle size analysis
4. Laboratory Sieving – Dry
5. Laboratory Sieving – Wet
6. Determination of Relative Density
7. Determination of Bulk Density
8. Settling characteristics of solids
9. Cyclosizing
10. Andreasan Pipette

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Mining and Mineral Processing, V-Semester

Departmental Elective MM 503 (A) - 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: Pfleider
2. Mining Equipment : Boki
3. SME handbook: Hartman
4. Surface Mining Technology: S. K. Das

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Mining and Mineral Processing, V-Semester

Departmental Elective MM 503 (B) Mining Legislation & Safety-I

1. Introduction to Acts, Rules and Regulations applicable to Mining Industry, Development of mining Legislation in India.
2. Mines act-1952 and Mines Rules-1955
3. Coal Mines Regulations 2017,Introduction to draft MMR 2018
4. Mines Crèche rules 1966
5. Mine Vocational Training Rules -1966
6. Pit head bath Rules

Reference Books

1 Legislation in Indian mines (A critical appraisal) Vol ii @& I S.D.Prasad & Prof.Rakesh
2 C.M.R. -2017 &M.M.R.-2012
3 Mines Act 1952 & Mines Rules -1955 L.C.Kaku.
4 Vocational Training Rules L.C.Kaku.
5 Mine Accidents S.J. Kejeriwal

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Mining and Mineral Processing, V-Semester

Open Elective MM 504 (A) Coal Preparation

UNIT 1:
Coal characteristics, Necessity, scope and application of coal preparation, washability characteristics of coal, effect of mining methods on size, quality and washability.

UNIT 2:
Crushing of coal: various types of coal size reduction process and their significance. Screening of coal: Classification of coal using various screens and their efficiency.

UNIT 3:
Coarse coal cleaning: Jigs, heavy media baths and heavy media cyclones. Use of Spirals and tables for coal processing. Performance analysis of different coal cleaning unit operations(Partition curves, misplacement, Meyers curve) and their merits and demerits.

UNIT 4:
Fine coal cleaning: Challenges in fine coal cleaning, Froth-Flotation, water-only cyclone, oil – agglomeration, selective flocculation.

UNIT 5:
Product disposal and miscellaneous methods: Non-coking coal beneficiation, coal preparation economics, coal preparation flowsheets, modern developments.

Text Reference Books:

1. The Principles of Coal Preparation (G. J. Sanders)
2. Mineral Processing Technology (B. A. Wills)
3. Principles of Mineral Dressing (A. M. Gaudin)
4. Coal Preparation (J. W. Leonard)
5. The Coal Handbook: Towards Cleaner Production (D.J. Osborne)
6. Coal preparation, Vol-1 and Vol-2, D. J.Osborne

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Mining and Mineral Processing, V-Semester

Open Elective MM 504 (B) Gravity and Magnetic Separation

UNIT-1

Basic principles, processes, Ore characteristics required for applying gravity separation techniques, main applications and related problems.

UNIT-2

Basic principles of jigging, Types of jigs and their relative merits and demerits for beneficiation of metallic and non metallic ores. Variables affecting Jigging, Jigging practice, operation and maintenance of jigs.

UNIT-3

Principles of heavy media separation, types of media solids, characteristics and specifications, stability of the media suspension, stability index, preparation, recovery and regeneration of media solids, typical media recovery circuits, Separation characteristics of different types of dynamic and static heavy media separators for beneficiation of metallic and non-metallic minerals.

UNIT-4

Introduction to flowing Film gravity separation techniques, principles involved, Separation characteristics of various units such as pinched sluice, Bucharts, slime tables and shaking tables including influence of various design of riffles. Spiral concentration, application of modern spiral concentrators for beneficiation of minerals. Reichert cones and multigravity separator.

UNIT-5

Magnetic Separation: Introduction to Magnetic separation; Dia-magnetic minerals, para-magnetic minerals, ferro-magnetic minerals, remnance, induction, intensity of magnetization, field intensity. Design of magnetic separators, Types of magnetic separators; Low intensity magnetic separator, high intensity magnetic separator, high gradient magnetic separator, Super conductivity separators, high-tension separation and their application. Principles of electrostatic separation of conductive and non-conductive materials using different electrostatic separators, its main applications in beach placer mineral industries with flow sheets as typical examples.

Text Books:

1. Introduction to Mineral Processing (Kelly and Spottiswood)
2. Mineral Processing Technology (B. A. Wills)
3. Principles of Mineral Dressing (A. M. Gaudin)
4. Introduction to Mineral Processing Design and Operation (A.Gupta and D.S.Yan)
5. Uses of Metals and Metallic Minerals- K.K. Chatterjee
6. Basics in Minerals Processing (Metso)
7. Mineral beneficiation (Subba Rao)

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Mining and Mineral Processing, V-Semester

MM- 505 Personality Development

UNIT I Personality concepts:
What is Personality – its physical and psychic aspects. How to develop a positive self image. How to aim at Excellence. How to apply the cosmic laws that govern life and personality. How to improve Memory – How to develop successful learning skills. How to develop and effectively use one's creative power. How to apply the individual MOTIVATORS that make you a self-power personality.

UNIT II Interpersonal Skills:
Leadership: Leaders who make a difference, Leadership: your idea, What do we know about leadership? If you are serious about Excellence. Concepts of leadership, Two important keys to effective leadership, Principles of leadership, Factors of leadership, Attributes. Listening: Listening skills, How to listen, Saying a lot- just by listening, The words and the music, How to talk to a disturbed person, Listening and sometimes challenging. How to win friends and influence people, How to get along with others. How to develop art of convincing others. How can one make the difference. How to deal with others particularly elders. Conflicts and cooperation.

UNIT III Attitudinal Changes:
Meaning of attitude, benefits of positive attitudes, How to develop the habit of positive thinking. Negative attitude and wining: What is FEAR and how to win it? How to win loneliness. How to win over FAILURE. How to win over PAIN. How to win over one's ANGER and others anger. What is stress and how to cope up with it? The art of self-motivation. How to acquire mental well-being. How to acquire physical well-being.

UNIT IV Decision Making:
How to make your own LUCK. How to plan goals/objectives and action plan to achieve them. How to make RIGHT DECISION and overcome problems. How to make a Decision. Decision making: A question of style. Which style, when? People decisions: The key decisions. What do we know about group decision making? General aids towards improving group decision making.

UNIT V Communication Skills:
Public Speaking: Importance of Public speaking for professionals. The art of Speaking - Forget the fear of presentation, Symptoms of stage fear, Main reason for speech failure, Stop failures by acquiring Information; Preparation & designing of speech, Skills to impress in public speaking & Conversation, Use of presentation aids & media. Study & Examination: How to tackle examination, How to develop successful study skills. Group discussions: Purpose of GD, What factors contribute to group worthiness, Roles to be played in GD.

Text Books:

1. Basic Managerial Skills for all by E. H. McGrawth, prentice Hall India Pvt. Ltd., 2006
2. 2. Basic Employability Skills by P. B. Deshmukh, BSP Books Pvt. Ltd., Hyderabad, 2014

Reference Books:

1. How to Develop a Pleasing Personality by Atul John Rego, Better Yourself Books, Mumbai, 2000
2. How to Succeed by Brain Adams, Better Yourself Books, Mumbai, 1969
3. Personality: Classic Theories & Modern Research; Friedman ; Pearson Education, 2006
4. How to Win Friends and Influence People by Dale Carnigie, A. H. Wheeler 2006

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Mining Engineering, V-Semester

MM- 506 Coal Preparation Lab

1. Comparative crushing characteristics of coal in a conventional high speed roll-crusher and a slow speed roll-crusher (sizer).
2. Sink –float test including ash analysis and plotting of washability curves.
3. Bench scale washing of coal in a static bath and calculation of probable error and imperfection in separation.
4. Effect of frother dosage on collector less flotation of coking coal.
5. Effect of frother dosage on collector aided flotation of a coking coal at a fixed diesel oil dosage.
6. Effect of diesel dosage on collector aided flotation of a coking coal at a fixed frother dosage.
7. Determination of size and density profile of stratified jig bed.
8. Demonstration on centrifugal separators such as Water-only cyclone, Heavy media Cyclone/Separator, Vorsyl separator.

Text Books:

1. Introduction to Mineral Processing (Kelly and Spottiswood)
2. Mineral Processing Technology (B. A. Wills)
3. Principles of Mineral Dressing (A. M. Gaudin)
4. Introduction to Mineral Processing Design and Operation (A.Gupta and D.S.Yan)
5. Uses of Metals and Metallic Minerals- K.K. Chatterjee
6. Basics in Minerals Processing (Metso)
7. Mineral beneficiation (Subba Rao)