RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA BHOPAL

Credit Based Grading System

Mining Engineering, V-Semester

MI- 5001 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 Engineering, V-Semester

MI- 5002 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 Engineering, V-Semester

MI- 5003 Mineral Processing

UNIT 1: Commnution
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

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 Floatation cell
9. Study of Thickners
10. Study of Washability curves

MI- 5004 Mechanics of Solids & Fluids

UNIT-1 Concept of Stress and Strain
Stress and strain at a point; Axial and shear stresses, Ultimate and working stresses; Relation between stress and strain, Poisson's Ratio; Two dimensional state of strain, Principle stresses and Principle planes, Mohr's Circle, Two state of strain, Principle strains and principle axis of strain; Determination of Principle strain from strain measurements; Calculation of Principle stresses from Principle strains; Composite bars in tension and compression; Thermal stresses in composite bars.

UNIT-2 Bending Stresses in Beams and plates
Pure bending, Bending Stresses, Section Modulus of rolled and built up sections, Composite beams, Distribution of normal and shear stresses across the section of a simple beam with vertical section of symmetry; Theory of plates.

UNIT-3 Deflection of beams
Slope and deflection of beams by deflection methods; Area moment and conjugate beam methods, propped cantilever and fixed beams.

UNIT-4 Introduction to Fluid Mechanics
Physical properties of fluids; Compressible and Incompressible fluids; Newtonian and Non-Newtonian fluids.

UNIT-5 (A) Fluid Statics
Pressure, density and height relationships; manometer pressure on curved and plane surfaces; Centre of Pressure; Buoyancy; Stability of Immersed and Floating bodies; Fluids in relative equilibrium.

UNIT-5 (B) Fluid Kinematics
Classification of flow: Uniform and Non-Uniform; Steady and Non- Steady; Laminar and Turbulent; One, Two, Three dimensional flows; Stream lines; Streak lines; Path lines; Stream Tubes; Elementary Explanation of stream function and velocity potential; Basic idea of flow nets.

Text Books:
1. Strength of material by B.S. Punmiya
2. Strength of material by Ramamurtham
3. Fluid Mechanics by Bansal
Reference Books:
1. Fluid Mechanics, F. M. White

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Mining Engineering, V-Semester

Elective-I MI- 5005 (1) 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

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Mining Engineering, V-Semester

Elective-I MI- 5005 (2) Electronic Instrumentation

Unit-1
Diode Characteristics: V-I characteristics & their temperature dependence, static & dynamic resistances, C_T , C_D, switching times. Special diodes – breakdown, photodiodes, LEDs, Introduction to BJT, FET, UJT & SCR. Diode Applications: Load Line concept, clippers, clampers, comparators, samplers, rectifiers & filters, voltage doublers, peak detectors. Power Supply Regulators (723, 78 XX, 79 XX)

Unit-2
Transistors Characteristics: The junction transistors, BJT, current components, transistors as amplifier, CB, CE & CC configurations, static & dynamic transistors characteristics, analytical expression of characteristics, transistor rating, photo transistors, logic circuits (SSI, MSI & Basic system Tc is)P.L.C.

Unit-3
Transistors Biasing & Thermal Stabilization : The Q point , bias stability, different biasing techniques, Stabilization against variation of Ico, V_{BE} & β, bias compensation, biasing in linear ICs, thermal compensation, thermal runway & stability.

Unit-4
Transistors at low frequency: Graphical analysis, hybrid model, h-parameter conversions, analysis using h-parameters, classification of amplifier, (Class A., B,C). Emitter follower, comparison of CB, CE, CC simplified model, common emitter with emitter resister, high i/p impedance circuits, Darlington pair, bootstrapping.

Unit-5
Field effect transistors : The JFET, pinch off, V/I Characteristics, small signal model, MOSFET, the CS & CD amplifiers, Biasing techniques for JFET & MOSFET, FET as VDR. Introduction about sensor and transducer and their interfacing . A basic instrumentation system, transducers, controllers, microprocessors & peripherals.

Books & References Recommended:
1. Millman & Halkias, Integrated Electronics
2. Robert Boylested, Electronic devices & circuits.

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Mining Engineering, V-Semester

MI- 5006 RDBMS

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 dependeny and fifth normal forms. **Distributed Database:** basic idea, distributed data storage, data replication, data fragmentationhorizontal, vertical and mixed frangmentation.

UNIT-IV
Emerging Fields in DBMS : object oriented Database-basic idea and the model, object structure, object class, inheritance, multiple inheritance, object identity, data warehousingterminology, definitions, characteristics, data mining and it's overview, Database on www, multimedia Database-difference with conventional DBMS, issues, similarity based retrived continuous media data, multimedia data formats, video servers.

Unit V
Storage structure and file organizations: Overview of physical storage media, magnetic disksperformance 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, comparision 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.