

Strata Control

[6th Semester, Third Year]



Course Description

Offered by Department
Mining Engineering

Credits
3-1-o, (4)

Status
PC

Code
MI106101MI

[Pre-requisites: Underground Coal Mining Method, Underground Metal Mining]

Course Objectives

The course is designed for the student to understand the different types of support systems used for various places in mines under different ground conditions. The student will also be introduced to strata control, subsidence, and Strata Control Management Plan.

Course Content

UNIT 1: Theories of Ground Movement

Objectives of strata control, Rock support interaction, Theories of ground movement, Rock pressure due to Narrow and Wide excavation, Failure of roof and floor, rock burst and coal bumps.

UNIT 2: Strata Management

Strata Control and Monitoring Plan, Examination of roof, Instrumentation in strata control, measurements and its analysis, Support loads, design of support system.

UNIT 3: Types of Supports

Timber & steel supports, Withdrawal of supports, Roof bolting, roof stitching, Hydraulic support, Powered supports - their principles of operation, Classification, Designation, Constructional features and applications.

UNIT 4: Caving and Stowing

Cavability index and its determination, induced caving, Methods of stowing, their relative merits and applicability, Hydraulic stowing, Pneumatic stowing, Mechanical stowing, stowing materials such as sand, fly ash, crushed overburden, and paste back fill.

UNIT 5: Subsidence

Theories of subsidence, trough subsidence and Pot holes subsidence, impact of subsidence, factors affecting subsidence, subsidence control, prediction and measurement of subsidence.

Course Materials

Required Text: Text books

1. Coal mines ground control by S. Peng (2008)
2. Winning and Working of Coal by R. T. Deshmukh & D. J. Deshmukh
3. Principles and Practices of Modern Coal Mining, New Age International, 2005, R.D.Singh
4. Strata Control in Mineral Engineering by Z. T., Bieniawski, 1987
5. Fundamentals and Applications of Rock Mechanics, 2016 by Deb Debasis, Verma Abhiram Kumar
6. Engineering Rock Mass Classification by Z.T. Bieniawski, 1976
7. Longwall mining theory and practice by S S Peng and H S Chiang,

Optional Materials: Reference Books

1. Comprehensive Rock Engineering by J. A. Hudson, 1983
2. Strata Mechanics in Coal Mining 1st Edition, by Michael L. Jeremic

Mining Legislation & Safety-I

[6th Semester, Third Year]



Course Description

Offered by Department

Mining Engineering

Credits

3-1-o, (4)

Status

PC

Code

MI106102MI

[Pre-requisites: Underground Coal Mining Method, Underground Metal Mining, Surface Mining.]

Course Objectives

The course is designed for the students to understand the different statutory provisions of mines Acts, Rules, Regulations and D.G.M.S. Circulars & Byelaws applicable for coal and metal mines to maintain safe working conditions.

Course Content

Introduction to Acts, Rules & Regulations applicable to Mining Industry, Development of mining legislation in India. Important provisions of The Mines Act, 1952 or the relevant legislation in vogue, and rules and regulations made there under. Amendments and Updates.

Occupational hazards of mining; Mine Accident, Basic causes of accident occurrence; Measures for improving safety in mines. Accident statistics; Rates of accidents; Accident reports; Cost of accidents; Accident Investigation, Preparation of Accident report, Court of Enquiry.

Course Materials

Required Text: Text books

1. Mines Act, 1952 or the relevant legislation in vogue, rules, and regulation
2. DGMS Circulars

Optional Materials: Reference Books

1. Legislation in Indian Mines: A critical Appraisal, Vol. I & II by S. D. Prasad & Rakesh.
2. Safety in Mines by Kejriwal, B. K. (2002)

Underground Mining Machinery - II

[6th Semester, Third Year]



Course Description

Offered by Department
Mining Engineering

Credits
3-1-o, (4)

Status
PC

Code
MI106103MI

[Pre-requisites: Underground Mining Machinery - I]

Course Objectives

The objective of the course is to familiarize the students with various types of drilling, loading and transportation machines used for face mechanization in underground coal and metal mines.

Course Content

UNIT 1: Electrical Power Transmissions

Flame proof enclosures & intrinsically safe apparatus, underground cables, drill panel, gate end box, circuit breakers, remote control (pilot circuit), earth leakage protection, Different types of Electrical Cables, their construction and uses in mines, installation of underground substation and electrical power transmission in mines.

UNIT 2: Hydraulic and Compressed Air Power Transmissions

Fundamental of hydraulic transmission, hydraulic fluids, hydraulic pumps, motors, cylinders and accumulators, different types of valves, hydraulic circuits, hydraulic coupling and torque converters.

Fundamentals of compression process, working and constructional features of single stage and multistage compressor, layout of pipelines, transmission of compressed air.

UNIT 3: Transportation in Underground Mines

Different types of conveyors – belt and cable belt conveyors, their construction, installation, maintenance, design, and calculations. Tension arrangements and sequence control of conveyor. Different types of Chain conveyors, AFC, High angle conveyors, pipe conveyor, Low Profile Dump Trucks, shuttle car, etc.

UNIT 4: Drills and Loading machines

Coal and rock Drilling machines, their constructional details, their applications, operation and maintenance, jumbo drill machines, rock bolting machines, LHD, SDL, Rocker shovel, gathering arm loader, and their construction, operation, applicability and maintenance.

UNIT 5: Cutting-Loading Machines

Mechanics of rock cutting, rock cutting tools and their performance; Different types of cutter loaders suitable for longwall faces such as shearers and coal plough, road headers, continuous miner, their suitability, construction and operation.

Course Materials

Required Text: Text books

1. Elements of Mining Technology Vol. 1 & 3–2016. by D. J. Deshmukh
2. Mine Winding and Transport by S. C. Walker, 2012

Optional Materials: Reference Books

1. SME Mining Engineering Handbook 2nd Edition by Howard L. Hartman

Advanced Coal Mine Planning

[6th Semester, Third Year]



Course Description

Offered by Department
Mining Engineering

Credits
3-0-0, (3)

Status
PE

Code
MI106201MI

[Pre-requisites:No]

Course Objectives

The course is designed for the student to understand the intricacies involved in planning of underground coal mines.

Course Content

UNIT 1: Coal reserves and their estimation, Geological and technological data needed for mine planning, Preparation of project and feasibility reports, project monitoring.

UNIT 2: Division of mine area into units and sub units, Area, Reserve, Life and Capacity of mine, Design of Panel, Design of long wall face.

UNIT 3: Cost of various mining operations, Optimum size of mines, Mode of opening up of deposits, Choice of opening, Location and size of Development openings.

UNIT 4: Design of mine services viz. ventilation planning, railway siding, pit top and pit bottom layouts, drainage system.

UNIT 5: Introduction to computer aided mine planning and design, concepts and approaches.

Required Text: Text books & Reference Books

1. SME Mining Engineering Handbook 2nd Edition Howard L. Hartman
2. Mine Planning for coal by S. P. Mathur, 1993
3. Underground Coal Mining Methods – J.G. SINGH

Mine Acquisition and Operationalization

[6th Semester, Third Year]



Course Description

Offered by Department
Mining Engineering

Credits
3-o-o, (3)

Status
PE

Code
MI106202MI

[Pre-requisites: No]

Course Objectives

The course is designed for the students to understand the different statutory provisions of coal ownerships, auction, coal acquisition, and Operationalization of the mines.

Course Content

UNIT 1: Procedure for obtaining non-exclusive reconnaissance permits (NREP), mining lease or composite license (prospecting licence-cum-mining lease) of coal and non-coal mineral, Salient provisions of Mineral Auction Rules, 2015

UNIT 2: Introduction of UNFC classification, Mineral (Evidence of Mineral Content) Rules 2015, Preparation of geological study report, prefeasibility report, and feasibility report.

UNIT 3: Mining plan, Mining scheme, progressive mine closure plan and final mine closure plan for coal/non-coal mine as per the guidelines issued by Ministry of Coal/IBM. Case studies.

UNIT 4: Provisions for obtaining prior Environment clearances under EIA Notification 2006, Forest clearance under Forest Conservation Act, Recommendations of the Standing Committee of National Board for Wild Life under the Wild Life (Protection) Act 1972, Consent to establish under Water and Air Act, Consent to operate under Water and Air Act, etc . Study of EIA report and EMP of mining projects. Case Studies.

UNIT 5: Salient provisions of Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act 2013 (LARR Act), The Coal Bearing Areas (Acquisition and Development) Act, 1957.

Course Materials

Text books & Reference Books:

1. Mines And Minerals (Development And Regulation) Act, 1957
2. Mineral Conservation and Development Rules, 2017
3. The Coal Bearing Areas (Acquisition and Development) Act, 1957
4. The Mineral Concession Rules, 2016
5. Coal Mines Special Provisions Act, 2015
6. Mineral Auction Rules, 2015
7. Minerals (Evidence of Mineral Contents) Rules, 2015
8. Land Acquisition Act, 1894
9. Land Acquisition, Rehabilitation & Resettlement Act 2013
10. National resettlement and Rehabilitation Policy (NRRP) 2007
11. Guidelines issued by IBM for preparation of Mine plan and mine closure plan
12. Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Order, 2015
13. The Environment (Protection) Act, 1986
14. Forest Conservation Act, 1980
15. The Wild Life Protection Act, 1972
16. Water (Prevention and Control of Pollution) Act, 1974
17. Air (Prevention and Control of Pollution) Act, 1981

Mineral Processing

[6th Semester, Third Year]



Course Description

Offered by Department
Mining Engineering

Credits
3-o-o, (3)

Status
OE

Code
MI106301MI

[Pre-requisites: No]

Course Objectives

Course Objectives (CO): The course is designed for the student to understand the fundamental operations in mineral processing, machines and devices used.

Course Content

UNIT 1: Comminution

Introduction, definition, scope and economic justification, main steps in mineral processing, comminution, crushing, principles of crushing , jaw crushers, gyratory crushers, cone crushers, roll crushers, Impact/ Hammer Crusher, Mobile Crushers, grinding principles of grinding, application and classification of grinding mills.

UNIT 2: Sizing

Objectives of sizing, scale of sizing, laboratory sizing, screening and classification , different type of screens, their mode of operations and application and limitation, Special Screens like Banana Screen, Flip-flow Screen etc. principles of classification, movement of solids through fluids, different types of classifiers, hydraulic and pneumatic classifiers.

UNIT 3: Gravity Concentration

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

UNIT 4: Flotation and separation methods

Physio-chemical principles, function of various flotation reagents and machines, floatation circuits.

Electrostatic and Magnetic Separation - Principle operation and field of application. Oil Agglomeration

UNIT 5: Miscellaneous operations in mineral processing

Palletization & Direct Reduction of Iron ore, Dewatering - thickening, filtration and drying, Coal washing and coal washeries, Flow sheets for beneficiation of coal and other minerals, sampling in Processing & Loading Plant..

Course Materials

Required Text: Text books

1. Principles of Mineral Dressing, by A. M. Gaudin, 1940
2. Mineral processing technology by B. A. Wills
3. B. A. Wills' Mineral Processing Technology: An Introduction to the Practical Aspects of Ore Treatment and Mineral Recovery 7th Edition
4. Ore Deposits of India by Gokhale & Rao

Optional Materials: Reference Books

1. Handbook of Mineral Dressing; Ores and Industrial Minerals 1945, by Arthur F. Taggart
2. Mineral Processing – Recent advances and future trends by S. P. Mehrotra & P. Sarkar
3. Laboratory Experiments in Mineral Processing by S. Venkatachalam & Degaleeson

Strata Control Lab

[6th Semester, Third Year]

Course Description

Offered by Department

Mining Engineering

Credits

0-0-2, (1)

Status

PC

Code

MI106401MI



[Pre-requisites: NO]

Course Objectives

The course is to develop an understanding of support designing by using various materials for an underground mine. The student will also be introduced to measure the subsidence for any underground mines, ground movement and its controlling techniques.

Course Content

List of Practical:

1. Study of Conventional support systems.
2. Study of constructional features and working of Friction props.
3. Study of constructional features and working of hydraulic props.
4. Study of methods to support roof by cable bolts and roof bolts.
5. Study of withdrawal of supports by Sylvester prop withdrawer.
6. Designing of support system for development gallery.
7. Designing of support system at junctions and faulted area.
8. Designing of support system for depillaring area.
9. Designing of support system for Long wall face and gate roadways.
10. Study of various instruments used for monitoring of stratabehaviour in underground mines.
11. Study of Hydraulic stowing System.

Course Materials

Required Text: Text books

1. Strata Control in Mineral Engineering. Front Cover. Z. T. Bieniawski. Wiley, 1987
2. Longwall mining theory and practices by S. S. Peng and H S Chiang
3. Coal mines ground control by S. Peng (2008)
4. Department Laboratory Manual

Underground Mining Machinery - II Lab

[6th Semester, Third Year]



Course Description

Offered by Department

Mining Engineering

Credits

0-0-2, (1)

Status

PC

Code

MI106402MI

[Pre-requisites: Underground Mining Machinery - I]

Course Objectives

The course is designed to develop an understanding of mine electrical engineering and face mechanization in both underground coal and metal mines.

Course Content

List of Practical:

1. Study of layout of an underground substation
2. Study of construction of underground cables
3. Study of hydraulic pumps
4. Study of hydraulic motors
5. Study of construction of belt conveyors
6. Study of SDL and LHD
7. Study of different rock and coal drill machines
8. Study of Shearer and coal plough
9. Study of Road header and continuous miner
10. Design of FLP apparatus.

Course Materials

Required Text: Text books

1. Elements of Mining Technology Vol. 1 & 3–2016. by D. J. Deshmukh
2. Mine Winding and Transport by S. C. Walker, 2012
3. Department Laboratory Manual