



# SARDAR PATEL UNIVERSITY, BALAGHAT (MP)

School of Engineering and Technology

## Syllabus

**Course:** B.Tech

**Semester:** VI

**Branch:** Mining Engineering

**Academic Session:** 2024-25

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## **SUBJECT – MINE ENVIRONMENT – II**

SUBJECT CODE – BMI061

### **Course Objective**

This course focuses on the design, analysis, and management of ventilation systems in underground mines. It covers mechanical ventilation, ventilation surveys, and mine dust management to ensure safe and effective mine environments.

#### **Unit 1: Ventilation Systems and Planning**

Calculation of pressure and quantity requirements, network problems, hardy-cross method, ventilation planning and economic analysis, central and boundary ventilation, accessional and descensional ventilation, antitropical and homotropical ventilation.

#### **Unit 2: Mechanical Ventilation – I**

Theory of mine fans, types of mine fans, their characteristics & suitability, process for selection of mine fans

#### **Unit 3: Mechanical Ventilation – II**

Auxiliary and booster fans, series and parallel operation of fans, fan drift and evasee, forcing and exhaust ventilation, fan reversal, ventilation in long headings.

#### **Unit 4: Ventilation Survey**

Object of ventilation survey, instruments for the measurement of pressure, velocity, and quantity of air.

#### **Unit 5: Mine Dust**

Classification, physiological effects, measurement of dust concentration, dynamics of small particles, sampling of air borne dust, prevention and suppression of dust.



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## Syllabus

**Course:** B.Tech

**Semester:** VI

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**Academic Session:** 2024-25

---

### Course Outcomes

- CO1** Plan and calculate ventilation requirements using advanced methods like Hardy-Cross and evaluate different ventilation systems.
- CO2** Understand the theory, types, and selection process of mine fans.
- CO3** Analyze the use of auxiliary and booster fans, and apply advanced ventilation techniques in long headings.
- CO4** Conduct ventilation surveys using instruments to measure air pressure, velocity, and quantity.
- CO5** Classify mine dust, understand its physiological effects, and apply methods for dust measurement, prevention, and suppression.

### Textbooks:

1. Mine Environment - G.B.Mishra
2. Elements of Mining Technology, Vol.2, D. J.Deshmukh
3. Underground Mine Environment, M.McPherson
4. Subsurface Mine Ventilation, H.L.Hartman



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---

## SUBJECT – MINING MACHINERY – II

SUBJECT CODE – BMI062

### Course Objective

This course aims to provide a detailed understanding of advanced material handling systems such as aerial ropeways, conveyors, skip and Koepe winding systems, and hydraulic transmissions. The focus is on their construction, installation, operation, and design.

#### Unit 1: Aerial Ropeways

Different types, their constructions & installation, operation & maintenance, design calculation, their layout including rope-tensioning arrangements.

#### Unit 2: Conveyors – I

Different types of belt conveyors, their construction, installation, maintenance & design.

#### Unit 3: Conveyors – II

Shaker conveyor, scraper chain conveyor and armored chain conveyor, their installation & construction maintenance, safety devices, pit top and pit bottom arrangements.

#### Unit 4: Skip and Koepe Winding

Skip types & construction, pit top & pit bottom arrangements, advantages and disadvantages, types of koepe winder, koepe wheel, floating platforms, two winders working in the same shaft, winding with side by side and up and down sheaves, advantages and disadvantages, multi-rope winding, calculation of h.p.

#### Unit 5: Hydraulic Transmissions

Fundamental of hydrostatic compression, hydraulic fluids, hydraulic pumps, motors, cylinders and accumulators, different types of valves, hydraulic coupling and torque converters, application in mines, advantages of hydraulic transmission.



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**Semester:** VI

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**Academic Session:** 2024-25

---

### Course Outcomes

- CO1** Understand the types, construction, and maintenance of aerial ropeways, including their design calculations and rope-tensioning systems.
- CO2** Analyze different types of belt conveyors, focusing on their construction, installation, maintenance, and design.
- CO3** Understand and apply the principles of shaker, scraper chain, and armored chain conveyors, including safety devices and pit arrangements.
- CO4** Evaluate skip and Koepe winding systems, including types, construction, pit arrangements, and calculation of horsepower.
- CO5** Understand hydraulic transmissions and their components, and assess their applications and advantages in mining operations.

### Textbooks:

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 Statham



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---

## SUBJECT – MINE LEGISLATION AND SAFETY – II

SUBJECT CODE – BMI063

### Course Objective

This course aims to provide a comprehensive understanding of the legal framework governing mining operations in India, focusing on key regulations, safety measures, and accident prevention strategies.

#### Unit 1:

Principal Provisions of Mines & Minerals (Regulation & Development) Act -1957.

#### Unit 2:

Coal Mines Conservation & Development Act. -1960.

#### Unit 3:

Mineral Concession Rules, Indian Electricity Rules related to mining activity.

#### Unit 4:

Byelaws & D.G.M.S. Circulars.

#### Unit 5:

Mine Accident, their classification and analysis, Causes & preventive measures, Cost of accident, Preparation of Accident report, Court of Enquiry.

#### Unit 6:

Safety Campaign, Causes of major mining accidents which occurred in India & Suggested remedial measures, National Safety Conferences.



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---

### Course Outcomes

- CO1** Understand the principal provisions of the Mines & Minerals (Regulation & Development) Act, 1957 and its impact on mining operations.
- CO2** Analyze the Coal Mines Conservation & Development Act, 1960 and its implications for coal mining practices.
- CO3** Familiarize with Mineral Concession Rules and Indian Electricity Rules relevant to mining activities.
- CO4** Evaluate the byelaws and directives from D.G.M.S. (Directorate General of Mines Safety) to ensure compliance in mining operations.
- CO5** Analyze mine accidents, their classification, causes, preventive measures, and the process of preparing accident reports for court inquiries
- CO6** Assess safety campaigns and the causes of major mining accidents in India, along with suggested remedial measures and the role of national safety conferences.

### Reference Books:

1. Legislation in Indian Mines (A critical Appraisal) Vol. I & II, S. D. Prasad & Prof.Rakesh
2. Coal Mines Conservation & Development Act Mines & Minerals (Development and Regulation) Act
3. Vocational Training Rules
4. Mine Accidents: B. K. Kejriwal
5. Mines Rescue Rules
6. Indian Electricity Rules
7. Mineral Concession Rules.
8. D.G.M.S. Circulars and Bylaws



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---

## **SUBJECT – UNDERGROUND METAL MINING – I**

SUBJECT CODE – BMI064

### **Course Objective**

This course aims to equip students with a thorough understanding of various underground metal mining methods, focusing on their classification, development techniques, stopping methods, and support systems.

#### **Unit 1: General**

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.



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---

### Course Outcomes

- CO1** Understand the status, scope, and classification of underground metal mining methods and factors influencing their selection.
- CO2** Analyze the different modes of access in underground mining and the methods for drivage of various openings, including raise boring and tunnel boring.
- CO3** Evaluate various stopping methods, including overhand, underhand, and breast stopping, as well as techniques such as vertical crater retreat and room and pillar methods.
- CO4** Examine additional stopping methods such as shrinkage stopping, cut and fill stopping, and methods like square set stopping and block caving.
- CO5** Assess support systems in underground mining, including the use of pillars, backfill, cable bolting, and other reinforcement techniques, along with relevant timbering codes.

### Textbooks:

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



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---

## SUBJECT – POLLUTION CONTROL ENGINEERING

SUBJECT CODE – BMI065

### Course Objective

This course aims to provide students with a comprehensive understanding of various types of environmental pollution, their causes and effects, and the legal and management frameworks in place to mitigate these impacts.

#### 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



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**Semester:** VI

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**Academic Session:** 2024-25

---

### Course Outcomes

- CO1** Understand the classification of environmental pollution, salient features of environmental laws in India, and the importance of environmental assessments and audits.
- CO2** Analyze the causes and consequences of air pollution, including sources of air pollutants and preventive measures.
- CO3** Evaluate noise pollution, its sources from machinery, and effective control measures and noise level measurement techniques.
- CO4** Examine water pollution, its causes—particularly in mining and mineral processing—and outline preventive measures and water purification strategies.
- CO5** Assess land pollution and reclamation techniques, focusing on physical and biological methods and the formulation of mine closure plans.

### Textbooks:

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



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---

## SUBJECT – MINE ENVIRONMENT – II LAB

SUBJECT CODE – BMI061P

S. No.	List of Experiments
1	Study of installation of axial flow fan.
2	Study of installation of centrifugal flow fan.
3	Study of installation and positioning of booster fan.
4	Study of characteristic curve of different fans and their comparison
5	Study of principal and working of vane anemometer
6	Study of principal and working of velometer.
7	Study of principal and working of pitot tube.
8	Study of central and boundary ventilation system.
9	Study of gravimetric dust sampler
10	Study of thermal precipitator dust sampler



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---

## SUBJECT – MINING MACHINERY – II LAB

SUBJECT CODE – BMI062P

S. No.	List of Experiments
1	Study of Mono-cable aerial Ropeway.
2	Study of Bi-cable aerial Ropeway.
3	Study of Loop take-up and tensioning arrangement of a belt conveyor.
4	Study of pit top and pit bottom arrangements for a belt conveyor.
5	Study of Belt Conveyor.
6	Study of Armoured faces Conveyor.
7	Study of Various Koepe Arrangements.
8	Study of various types of skips.
9	Study of pit top and pit bottom arrangements for a Skip.
10	Study of hydraulic Couplings and Torque Converters.



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**SUBJECT – MANAGERIAL SKILLS LAB**

SUBJECT CODE – BMI066P

<b>S. No.</b>	<b>List of Experiments</b>
1	Managerial Communication Skills: Importance of Business Writing: writing business letters, memorandum, minutes, and reports- informal and formal, legal aspects of business communication, oral communication- presentation, conversation skills, negotiations, and listening skills, how to structure speech and presentation, body language.
2	Managerial skills - Leadership: Characteristics of leader, how to develop leadership; ethics and values of leadership, leaders who make difference, conduct of meetings, small group communications and Brain storming, Decision making, How to make right decision, Conflicts and cooperation, Dissatisfaction: Making them productive.
3	Proactive Manager: How to become the real you: The journey of self-discovery, the path of selfdiscovery, Assertiveness: A skill to develop, Hero or developer, Difference between manager and leader, Managerial skill check list, team development, How to teach and train, time management, Stress management, Self-assessment.
4	Attitudinal Change: Concept of attitude through example, benefits of right attitude, how to develop habit of positive thinking, what is fear? How to win it? How to win over failure? How to overcome criticism? How to become real you? How to Motivate? How to build up self confidence?
5	Creativity: Creativity as a managerial skill, Trying to get a grip on creativity. Overview of Management Concepts: Function of Management: Planning, organizing, staffing, controlling.

**Textbooks:**

1. Basic Managerial Skills for all by E.H. Mc Grawth, Prentice Hall India Pvt Ltd, 2006
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, 2006
2. The powerful Personality by Dr. Ujjawal Patni & Dr. Pratap Deshmukh, Fusion Books, 2006
3. How to Success by Brian Adams, Better Yourself books, Mumbai, 1969



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