

| National Institute of Technology, Raipur (C.G.) | | | | | | | | | | | | | |
|---|------------------|-------------|------------------------------------|--------------|---|----|---------------------|----|----|--------|-----|----------------------|----------------------|
| Course of Study & Scheme of Examination | | | | | | | B.Tech. IV Semester | | | | | Branch: Mining Engg. | |
| S.No. | Board of Studies | Sub. Code | Subject Name | Periods/week | | | Examination Scheme | | | | | Total Marks | Credits L+(T+P)/2 |
| | | | | L | T | P | TA | FE | SE | T.C.A. | ESE | | |
| 1 | Mining Engg. | MI20411(MI) | Mining Environment-I | 3 | 1 | - | 20 | 15 | 15 | 50 | 70 | 120 | 4 |
| 2 | Mining Engg. | MI20412(MI) | Engg. Materials | 3 | 1 | - | 20 | 15 | 15 | 50 | 70 | 120 | 4 |
| 3 | Electrical Engg. | EL20413(MI) | Basic Electrical and Electronics | 3 | 1 | - | 20 | 15 | 15 | 50 | 70 | 120 | 4 |
| 4 | Applied Geology | AG20414(MI) | Geology-II | 3 | 1 | - | 20 | 15 | 15 | 50 | 70 | 120 | 4 |
| 5 | Mining Engg. | MI20415(MI) | Underground Coal Mining | 3 | 1 | - | 20 | 15 | 15 | 50 | 70 | 120 | 4 |
| 6 | Mining Engg. | MI20416(MI) | Surface Mining-I | 4 | 1 | - | 20 | 15 | 15 | 50 | 70 | 120 | 5 |
| 7 | Applied Geology | AG20421(MI) | Geology-II Lab | - | - | 3 | 30 | - | - | 30 | 20 | 50 | 2 |
| 8 | Mining Engg. | MI20422(MI) | Mining Environment I Lab | - | - | 3 | 30 | - | - | 30 | 20 | 50 | 2 |
| 9 | Electrical Engg. | EL20423(MI) | Basic Electrical & Electronics Lab | - | - | 3 | 30 | - | - | 30 | 20 | 50 | 2 |
| 10 | Humanities | HS20424(MI) | Value Education | - | - | 2 | 25 | - | - | 25 | - | 25 | 1 |
| 11 | Mining Engg. | MI20425(MI) | Discipline | - | - | - | 25 | - | - | 25 | - | 25 | 1 |
| | | | Total | 19 | 6 | 11 | 260 | 90 | 90 | 440 | 480 | 920 | 33 |

Note :1) For attendance of a student in every theory and practical class, the teachers are supposed to keep records ultimately in the following format which will be included in the semester mark-sheets.

2) The students of B.Tech IV th Sem have to undergo 4 weeks practical training at Mines.

| Format for attendance | | | | |
|-----------------------|--|--|--------|--------------|
| Attendance | | | | Category |
| > 85 | | | -----> | High "H" |
| > 70 & < 85 | | | -----> | Medium "M" |
| > 60 & < 70 | | | -----> | Low "L" |
| < 60 | | | -----> | Detained "D" |

DEPARTMENT OF MINING ENGINEERING
SYLLABUS

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|----------------------|-----------------------|------------------------|--------------|
| Name of Subject: | Mining Environment-I | Subject Code: | MI20411(MI) |
| Semester: | B.Tech. IV Sem. | Board of Studies: | Mining Engg. |
| Maximum Marks: | 70 | Minimum Marks: | 25 |
| Lecture Periods/Week | Tutorial Periods/Week | Practical Periods/Week | Credits |
| 3 | 1 | 0 | 4 |

Unit 1: Mine Atmosphere

Pollution in Mine Atmosphere, Mine Gases, Their Origin, Occurrence, Physiological effects and Detection, Calibration of Detectors, Methane Drainage. System for Monitoring of Mine Environment by Tube bundle apparatus and Telemonitoring systems. Analysis of Mine air by Haldane Apparatus, Gas Chromatograph.

Unit 2: Heat And Humidity

Heat and Humidity in Mine Atmosphere, their Sources and Effects, Cooling Power of Mine Air, Assessment of Comfort Conditions, Air Conditioning of Mines, Surface, Underground and Divided Installations, Spot Coolers.

Unit 3: Theory Of Ventilation

Objects and Standards of Ventilation, Flow of Air in Ducts and Mine Roadways, Resistance of Air Ways, Laws of Ventilation, Chezy's and Atkinson's Equations, Equivalent Resistance and Equivalent Orifice of Mine.

Unit 4: Mine Ventilation And Ventilation Devices

Natural Ventilation Pressure and its Measurements, Thermodynamics of Natural Ventilation, Distribution and Control of Air Current, Doors, Regulators, Stoppings and their Types, Air Crossings, Air Locks.

Unit 5: Flame Safety Lamps And Mine Illumination

Constructional details of Flame Safety Lamp, Gas Testing by Flame Safety Lamp, Types of Portable Lamps, their Maintenance and Examination, Lamp Room Design and Organization, Lighting from Mains, Photometry and Illumination Surveys, Standards of Illumination for Underground and Open Cast Working

Text Books:

1. Elements of Mining Technology by D.J. Deshmukh, Vol.II
2. Mine Environment & Ventilation by G.B. Misra

Reference Books:

1. Mine Ventilation, UMS
2. Subsurface Mine Ventilation, M. J. McPherson

DEPARTMENT OF MINING ENGINEERING
SYLLABUS

| | | | |
|----------------------|-----------------------|------------------------|--------------|
| Name of Subject: | Engineering Materials | Subject Code: | MI20412(MI) |
| Semester: | B.Tech. IV Sem. | Board of Studies: | Mining Engg. |
| Maximum Marks: | 70 | Minimum Marks: | 25 |
| Lecture Periods/Week | Tutorial Periods/Week | Practical Periods/Week | Credits |
| 3 | 1 | 0 | 4 |

UNIT 1: General

Introduction, Classification of Engg. Materials, Structure of Metals and Alloys, Iron-carbon phase diagram.

UNIT 2: Heat Treatment of Iron & Steel

Different Types Of Steels, their Properties and Uses, Different Types of Heat Treatment Techniques viz. Hardening, Annealing, Normalizing & Tempering and their Uses in Mining Industry.

UNIT 3: Wire Rope

Types and Construction, Wire Rope Lays, Non- Stranded Ropes, Selection of Wire Ropes, Ropes used for different purpose, Mass & Strength of Wire Ropes.

UNIT 4: Constructional Materials

Cements – Classification & Properties, Quick Setting Cement, Resin Capsule, R.C.C., Shot Encapsulization, Shotcreting, Brick & Stone Masonries, Hollow blocks , Application of Fly Ash in Mining - mine filling.

UNIT 5: Engineering Behavior of Some Materials

Stress-Strain Curves of typical Engg. Materials, Elastic and Plastic Deformation, Fracture, Fatigue and Creep.

Text Books:

1. Introduction to Engineering Materials by B.K. Agrawal
2. Elements of Mining Technology by D.J. Deshmukh, Vol.I

Reference Books:

1. Engineering Materials by Surendra Singh
2. Concrete Technology by M.L.Gambhir.

DEPARTMENT OF MINING ENGINEERING
SYLLABUS

| | | | |
|----------------------|--------------------------------|------------------------|------------------|
| Name of Subject: | Basic Electrical & Electronics | Subject Code: | EL20413(MI) |
| Semester: | B.Tech. IV Sem. | Board of Studies: | Electrical Engg. |
| Maximum Marks: | 70 | Minimum Marks: | 25 |
| Lecture Periods/Week | Tutorial Periods/Week | Practical Periods/Week | Credits |
| 3 | 1 | 0 | 4 |

Unit-1 D.C. Machines & A.C. Machines

Introduction types & Characteristics of DC machine, speed control of DC motor, general principle and construction of alternators, induction motor and type, Synchronous motor, Equivalent circuits, torque slip characteristics, starting and speed control, synchronous condenser.

Unit-2 Cables and Switchgear Protection

Relay and its operating principle, Types Circuit breaker and its types, over current, earth fault protection, simplified connection diagram of AC switch board, DC 2 and 3 wire system, AC 3 & 4 wire system types of cables, underground distribution scheme.

Unit-3 Semiconductor Diodes

Rectifiers: Half wave, full wave and bridge-circuit and operation, Zener diode: construction, Characteristics, specification, voltage regulator circuit using Zener diode, SCR: switching characteristics, application and thyristor for speed control.

Unit-4 Amplifier & FETs

Introduction of transistor, FET: construction, principle of operation, characteristics of JFET, construction, principle of operation, characteristics of MOSFET, enhancement and depletion of MOSFET, applications of JFET & MOSFET.

Op amp: Terminal characteristics, ideal characteristics OP amp as inverting amplifier, non-inverting amplifier, adder, difference amplifier, differentiator, comparator, instrumentation amplifier.

Unit-5 Basic of transducer and signal conditioning circuits

Active and passive transducers, analog and digital transducer, classification of transducer according to application, selection of a transducer, construction principle of operation and application of wire wound potentiometer, strain gauge, LVDT, thermistor, solar cell transducer, piezoelectric crystals. Introduction to DAS

Text books:

1. Electronic instrumentation (2nd edition) – H.S. Kalsi, TMH
2. Power system protection-Badri Ram
3. Electrical Machinery-Dr. P.S. Bimbhra, Khanna Pbs.
4. Electrical devices and circuits-A.P. Godse & U.A. Bakshi
5. Power Electronics-Dr. P.S. Bimbhra

Reference Books:

1. Electrical and Electronic measurements & Instrumentation-A.K. Sawhney, Dhanpat Rai Pbs.
2. Electrical Instrumentation & measurement techniques-copper & Helfrick, PHI
3. Electrical Power system-C.L. Wadhwa, New age international Pbs.
4. Principle of Electronics-V.K. Mehta, S. Chand Pbs.

DEPARTMENT OF MINING ENGINEERING

SYLLABUS

| | | | |
|----------------------|-----------------------|------------------------|-----------------|
| Name of Subject: | Geology-II | Subject Code: | AG20414(MI) |
| Semester: | B.Tech. IV Sem. | Board of Studies: | Applied Geology |
| Maximum Marks: | 70 | Minimum Marks: | 25 |
| Lecture Periods/Week | Tutorial Periods/Week | Practical Periods/Week | Credits |
| 3 | 1 | 0 | 4 |

UNIT 1: Stratigraphy & Palaeontology

Introduction, Definitions and Basic Principles Of Stratigraphy; Units of Stratigraphy; Criteria for Stratigraphic Classification and Correlation; Standard Geological Time Scale; Fossils-Elementary Idea about Their Conditions, Modes of Their Preservation and Uses; Brief Palaeontological Study of Gondwana Fields.

UNIT 2: Indian Geology

Major Geomorphic Divisions of India; General Review of Indian Stratigraphy; Descriptions of important Indian Geological formations- Archeans, Cuddapahs, Vindhyan, Gondwanas and Tertiaries.

UNIT 3: Economic Geology-I

Introduction and Scope of the subject; Fundamental Terms and Their Definitions; Brief Review of the Processes of Mineral Formation and the Genetic Classification of Mineral Deposits. Occurrence, Origin & Distribution of Coal and Petroleum Deposits.

UNIT 4: Economic Geology-II

Mode of Occurrence, Origin, Distribution, Association and Industrial Uses of Important Metallic (Au, Al, Cu, Fe, Mn, Sn, Pb And Zn) and Non-Metallic (Diamond, Mica, Radioactive Minerals, Gypsum, Dolomites, Fire-Clay, Magnesite, Talc, Asbestos, Graphite, Kyanite, Sillimanite, Corundum, Fluorite, Phosphorite, Precious and Semi Precious Stones)

UNIT 5: Prospecting and Exploration

Prospecting and Exploration -Their Definitions and Classification of Methods; Elementary Methods of Geological, Geophysical, Geochemical Prospecting; Ringed Targets, Intersection Loci, Ore Guides- Physiographical, Mineralogical, Stratigraphical and Structural.

Text Books:

1. Fundamentals of Historical Geology and Stratigraphy of India: Ravindra Kumar
2. Geology Of India and Burma :M.S. Krishnan
3. Economic Mineral Deposits :M.S. Krishnan & A. Batem:M.L.Jensenan

Reference Books:

1. Courses in Mining Geology Arogyaswamy
2. Applied Geology: D.V. Reddy
3. Engineering Geology: D.V. Reddy
4. Geology of India (Vol I&II) R. Vaidyanadhan & M. Ramakrishnan

DEPARTMENT OF MINING ENGINEERING
SYLLABUS

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|----------------------|-------------------------|------------------------|--------------|
| Name of Subject: | Underground Coal Mining | Subject Code: | MI20415(MI) |
| Semester: | B.Tech. IV Sem. | Board of Studies: | Mining Engg. |
| Maximum Marks: | 70 | Minimum Marks: | 25 |
| Lecture Periods/Week | Tutorial Periods/Week | Practical Periods/Week | Credits |
| 3 | 1 | 0 | 4 |

UNIT 1: INTRODUCTION

Origin of Coal, Theories of Coal Formation, Classification of Coal, Coking Coal, Coal Seam and its Classification, Coal Seam Structures and abnormalities like Faults, Joints, Cleats, Folds etc., Coal Measuring Rocks and their Characteristics, Distribution of Coal in India, Indian Coal Mining Industry; Choice of Coal Mining Methods.

UNIT 2: BORD AND PILLAR METHOD

Important Terminology, Development Size and Shape of the Pillar, Galleries, Panel System and without Panel System of Development, Size of Panel, Cycle of Operation, Depillaring, Problems in Depillaring, Preparatory arrangements, Depillaring by Stowing, Depillaring by Caving Methods, Pillar Extraction techniques, Dangers associated with Depillaring.

UNIT 3: LONGWALL MINING

Important Terminology, Types of Longwall Faces and their choice, Merits and Demerits of Longwall mining, Development of Longwall Panels and Faces, Longwall Advancing Method, Longwall Retreating Method, Length of Longwall Faces, Rate of Face Advance, Double Unit Longwall Faces, Face Organization, Variants of longwall Mining.

UNIT 4: THICK SEAM MINING

Problem in Mining of Thick Seams, Choice of Thick Seam Mining Methods, Inclined Slicing, Horizontal Slicing, Diagonal Slicing, Transverse Slicing, Sublevel Caving, Blasting Gallery Method, Cable-Bolting Method of Thick Seam extraction.

UNIT 5: SPECIAL METHODS OF MINING

Room and Pillar Mining, Short wall Mining, Mass production technology in Coal mines, Hydraulic Mining, Underground gasification of Coal, Introduction to CBM recovery.

Text Books:

1. Principle and practices of modern Coal Mining – R.D. Singh
2. Coal Mining in India – S.P. Mathur

Reference Books:

1. Mining & working coal – R.T. Deshmukh
2. U/G winning of Coal – T.N. Singh

DEPARTMENT OF MINING ENGINEERING
SYLLABUS

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|----------------------|-----------------------|------------------------|--------------|
| Name of Subject: | Surface Mining - I | Subject Code: | MI20416(MI) |
| Semester: | B.Tech. IV Sem. | Board of Studies: | Mining Engg. |
| Maximum Marks: | 70 | Minimum Marks: | 25 |
| Lecture Periods/Week | Tutorial Periods/Week | Practical Periods/Week | Credits |
| 4 | 1 | 0 | 5 |

UNIT 1: 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 2: 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.

UNIT 3: Pit preparation

Dozers, Scrapers, Front-End Loaders, Grader, Back Hoe, etc.; their Construction, Operation, Suitability and applicability; Calculation of Their Productivity

UNIT 4: Loading and Excavation

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: Pfeider
2. Mining Equipment : Boki
3. SME handbook: Hartman
4. Surface Mining Technology: S. K. Das

DEPARTMENT OF MINING ENGINEERING
SYLLABUS

| | | | |
|----------------------|-----------------------|------------------------|-----------------|
| Name of Subject: | Geology-II Lab | Subject Code: | AG20421(MI) |
| Semester: | B.Tech. IV Sem. | Board of Studies: | Applied Geology |
| Maximum Marks: | 20 | Minimum Marks: | 10 |
| Lecture Periods/Week | Tutorial Periods/Week | Practical Periods/Week | Credits |
| 0 | 0 | 3 | 2 |

List of Experiments:

- Experiment 1.** Megascopic Description and Distribution of Ore Forming Minerals and industrial Minerals.
- Experiment 2.** Study of plan Fossils.
- Experiment 3.** Study of Advance Geological Maps and preparation of Cross Sections.
- Experiment 4.** Plotting of important mine-locations on map of India.

Text Books:

1. Fundamentals of Historical Geology and Stratigraphy of India: Ravindra Kumar
2. Geology Of India and Burma :M.S. Krishnan
3. Economic Mineral Deposits :M.S. Krishnan & A. Batem:M.L.Jensenan

Reference Books:

1. Courses in Mining Geology Arogyaswamy
2. Geology of India (Vol I&II) R. Vaidyanadhan & M. Ramakrishnan

DEPARTMENT OF MINING ENGINEERING
SYLLABUS

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|----------------------|---------------------------|------------------------|--------------|
| Name of Subject: | Mining Environment- I Lab | Subject Code: | MI20422(MI) |
| Semester: | B.Tech. IV Sem. | Board of Studies: | Mining Engg. |
| Maximum Marks: | 20 | Minimum Marks: | 10 |
| Lecture Periods/Week | Tutorial Periods/Week | Practical Periods/Week | Credits |
| 0 | 0 | 3 | 2 |

List of Experiments:

Experiment 1.

Detection of presence and accumulation of Firedamp in mine atmosphere.

Experiment 2.

Detection of presence and accumulation of CO in mine atmosphere.

Experiment 3.

Study of various techniques of methane drainage

Experiment 4.

Study of surface air conditioning plant.

Experiment 5.

Study of underground air conditioning plant .

Experiment 6.

Study of different types of ventilation devices.

Experiment 7.

Study of cap lamps used in underground mine.

Experiment 8.

Study of Flame safety lamps used in underground mine.

Experiment 9.

Design of a cap lamp room for a large underground coal mine.

Text Books:

3. Elements of Mining Technology by D.J. Deshmukh, Vol.II
4. Mine Environment & Ventilation by G.B. Misra

Reference Books:

3. Mine Ventilation, UMS
4. Subsurface Mine Ventilation, M. J. McPherson

DEPARTMENT OF MINING ENGINEERING
SYLLABUS

| | | | |
|----------------------|------------------------------------|------------------------|------------------|
| Name of Subject: | Basic Electrical & Electronics Lab | Subject Code: | EL20423 (MI) |
| Semester: | B.Tech. IV Sem. | Board of Studies: | Electrical Engg. |
| Maximum Marks: | 20 | Minimum Marks: | 10 |
| Lecture Periods/Week | Tutorial Periods/Week | Practical Periods/Week | Credits |
| 0 | 0 | 3 | 2 |

List of Experiments:

- | | |
|-----------------------|---|
| Experiment 1. | Magnetisation Characteristics of a separately excited DC Machine |
| Experiment 2. | Speed Control of a DC Shunt Motor. |
| Experiment 3. | Load Test on a DC Shunt/Compound Motor. |
| Experiment 4. | Load test on a DC Shunt / Compound Generator. |
| Experiment 5. | Connection, Starting Reversing and load Test on a 3 phase Induction motor. |
| Experiment 6. | Study of Electromagnetic Induction Disc Relay. |
| Experiment 7. | Study of Star- Delta Starter. |
| Experiment 8. | Measurement of 3 phase power by 2wattmeter method. . |
| Experiment 9. | Open Circuit and short circuit Test single phase Transformer and prediction of performance. |
| Experiment 10. | Load Test on single phase Transformer and calculation of performance. |

Text books:

1. Electronic instrumentation (2nd edition) – H.S. Kalsi, TMH
2. Power system protection-Badri Ram
3. Electrical Machinery-Dr. P.S. Bimbhra, Khanna Pbs.

Reference Books:

1. Electrical and Electronic measurements & Instrumentation-A.K. Sawhney, Dhanpat Rai Pbs.