

MATS School of Engineering & Technology

MATS University

Raipur



Syllabus Scheme
(VIIth Semester)
For
Bachelor of Technology
Mining Engineering

Subject Code for School of Engineering & I.T. Deptt.

VIIth Semester (Mining)

S. No.	Subject Code	Subject Name
1.	BT760	Mine Economics
2.	BT761	Rock Mechanics
3.	BT762	Mine Environment-II
4.	BT763	Mine Planning & Development
5.	BT764x	Professional Elective – II
6.	BT765	Mine Environment-II Laboratory
7.	BT766	Rock Mechanics Laboratory
8.	BT767	Vocational & Industrial Training Evaluation & Presentation
9.	BT768	Computer Application in Mining Laboratory

Professional Elective – II

Subject Code	Subject Name
BT7641	Computer Applications in Mining
BT7642	Advance Surface Mining
BT7643	Mine Health and Safety
BT7644	Advanced Mining Geology
BT7645	Advance Mine Machinery



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Scheme of Teaching & Examination

VII - Semester

S.N.	code	Subject	Periods per week			Scheme of marks		Total Credit
			L	T	P	ESE	IM	
1.	BT760	Mine Economics	4	0	-	70	30	4
2.	BT761	Rock Mechanics	4	0	-	70	30	4
3.	BT762	Mine Environment-II	4	0	-	70	30	4
4.	BT763	Mine Planning & Development	4	0	-	70	30	4
5.	BT764x	Professional Elective – II	4	0	-	70	30	4
6.	BT765	Mine Environment-II Laboratory	-	-	2	30	20	1
7.	BT766	Rock Mechanics Laboratory	-	-	2	30	20	1
8.	BT767	Vocational & Industrial Training Evaluation & Presentation	-	-	2	30	20	1
9.	BT768	Computer Application in Mining Laboratory	-	-	2	30	20	1
		Total	20	0	8	470	230	24

L – Lecture, T – Tutorial, ESE – End Semester Examination,
P – Practical, IM – Internal Marks (Include Class Test & Teacher's Assessments)

Subject Code	Subject Name
BT7641	Computer Applications in Mining
BT7642	Advance Surface Mining
BT7643	Mine Health and Safety
BT7644	Advanced Mining Geology
BT7645	Advance Mine Machinery

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Semester: B.Tech. VIIth Sem.

Subject: - Mine Economics

Total Lecture Periods/Week : 4

Total marks in end semester Exam: 100

Minimum Number of Class test to be conducted: 02

Branch: - Mining Engineering

Code : - BT 760

Total Tutorial Periods/Week: 00

Total Practical Periods/Week: 00

Course Objective

To choose proper method of sampling for different ore bodies and mineral heaps.

To estimate grade and reserves.

To choose proper method of mine valuation for valuation of any mine and also able to determine the NPV of any mine.

To perform various financial management aspects related with the mine.

Course outcomes:

Apply knowledge of mine economics for understanding, formulating and solving problems related with the mine economics.

Identify analyze and solve financial management problems.

Acquire knowledge and hands-on competence in applying the concepts of management in the development of mine economics

UNIT I

Sampling- Methods of sampling, errors in sampling, analysis of samples, estimation grade and reserves, salting and precautions against salting. Different types of reserves.

UNIT II

Mine Valuation - Different methods, depreciation, amortization and redemption of capital, life and present value of a mine.

UNIT III

Financial Management - Methods of framing and financing industrial enterprises , memorandum and articles of association, shares, debentures, dividends and interest .Break even chart and inventory control.

UNIT IV

Investment Decisions - discounted cash flow methods, non-discounted cash flow methods, advantages and disadvantages of them, Internal rate of return, Net Present Value.

UNIT V

Book Keeping, Preparation of Balance sheet, Profit and Loss Account.

Reference Books :-

1. Mineral Economics by R.T. Deshmukh
2. SME Handbook Vol. I
3. Mineral Economics by Sinha and Sharma

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Semester: B.Tech. VIIth Sem.

Subject: - Rock Mechanics

Total Lecture Periods/Week : **4**

Total marks in end semester Exam: **100**

Minimum Number of Class test to be conducted: **02**

Branch: - Mining Engineering

Code : - BT 761

Total Tutorial Periods/Week: **00**

Total Practical Periods/Week: **02**

Course Objective

To learn various physico mechanical & rheological properties of rock and the rock mass classification.

To determine the RMR of any mine

To measure the insitu stress in the underground mines. Course outcomes:

Course outcome

Apply knowledge of rock mechanics for understanding, formulating and solving strata control problem in any underground mine.

Identify, analyze and solve rock mechanics problems.

Acquire knowledge and hands-on competence in applying the concepts in the development of rock mechanics.

UNIT I:

Application of rock mechanics in mining, Definition of important terms used in Rockmechanics, Classification of rock mass, Parameters of rock mass classification, Importance of rock mass classification, RQD, Q –system and C- factor , Bieniskiwi's Geomechanics classification of rock mass.

UNIT II:

Physico-mechanical properties of rock as per ISRM standard testing procedures, Preparation and testing of specimen in the laboratory, ISRM standards, Determination of σ_c , Strength indices and their importance. Point load, Protodyaknov, Impact and Cone Indenter strength Index.

UNIT III:

Rock as an elastic medium, Principle of elastic analysis, Rheological properties of rock, Importance of rheological models, Different types of rheological models, Dynamic properties of rocks, Anisotropy and Creep.

UNIT IV:

Principal stress and Principal plane, Analytical method of determining the magnitudes and directions of normal and shear stress on failure plane, Mohr's circle, Theories of failure of rock, Coulomb-Navier theory, Mohr's theory, Griffith's theory, Empirical theories of failure of rock, Different modes of failure of rock.

UNIT V:

Earth stresses, Importance of measurements of in situ stress, measurements of insitu stress by Flat jack, Overcoring and Hydraulic fracturing technique. Design of circular and elliptical openings. Determination of safe span of roof.

Text Books

1. Rock Mechanics By Obertabd Duvall
2. Rock Mechanics By Goodman
3. Rock Mechanics By Jager& Cook
4. Rock Mechanics by B.S. Verma

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Semester: B.Tech. VIIth Sem.

Subject: - Mine Environment II

Total Lecture Periods/Week : 4

Total marks in end semester Exam:100

Minimum Number of Class test to be conducted: 02

Branch: - Mining Engineering

Code : - BT 762

Total Tutorial Periods/Week: 00

Total Practical Periods/Week: 02

Course Objective

- To learn the sampling of dust and physiological effect of the dust to the miner.
- To learn about the various miner occupational diseases and its preventive measures
- To prepare the enquiry report of a mine accident.
- To know the major accident occurred in Indian mines and their causes.

Course outcomes:

- Apply knowledge of Health, Safety and Environmental Engg. to the miners for keeping them safe and improving their efficiency and productivity.
- Demonstrate creativeness in designing new systems components and processes in the field of engineering in general and mining engineering in particular.
- Make awareness among the miner to avoid any accident and health hazard

UNIT I : MINE FIRES

Mine fires, fires in quarries and surface storage systems, control of fires and fires extinguishers, study of atmosphere behind sealed off areas, conditions and procedure of reopening a sealed off area, fire fighting organisations.

UNIT II: SPONTANEOUS HEATING

Causes, detection and preventive measures in underground and surface coal mines, stacks and dumps, control of spontaneous heating, fire stopping and sealing off an area.

UNIT III: EXPLOSION

Fire damp and coal dust explosions, their causes and prevention, stone dust and waterbarriers, investigations after explosion.

UNIT IV: RESCUE AND RECOVERY

Types of rescue equipment and their use, rescue stations, first aid appliances, training of personnel, and organisation of rescue and recovery work during mine fires, explosion, inundation.

UNIT V: MINE INNUNDATION

Causes and precautionary measures, bulk head doors, barriers, dams, precautions to be taken while approaching old workings, recovery of flooded mines and de watering of old workings.

Text Books:

1. Mine Env. By G.B. Mishra
2. Elements of Mining Tech. Vol.2 by D. J. Deshmukh
3. U/G Mine Env. by Mcpherson
4. Mine fires by Dr. Ramlu

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Semester: B.Tech. VIIth Sem.

Subject: - Mine Planning & Development

Total Lecture Periods/Week : 3

Total marks in end semester Exam: 100

Minimum Number of Class test to be conducted: 02

Branch: - Mining Engineering

Code : - BT 763

Total Tutorial Periods/Week: 00

Total Practical Periods/Week: 00

Course Objective

To prepare feasibility report and detailed project report for any mine.

To work out planning and scheduling for any mine.

To choose proper mode of opening and method of underground mine for any coal seam / mineral deposit

To design a mine and mine openings.

Course outcomes:

Apply knowledge of mine planning for understanding, formulating and solving mine planning & scheduling problems.

Identify, analyze and solve mining problems.

Acquire knowledge and hands-on competence in applying the concepts in the development of mine planning

UNIT I:

Coal reserves and their estimation, Geological and technological data needed for mine planning, Preparation of project and feasibility reports, Planning and scheduling of various mining operations.

UNIT II:

Planning and scheduling of various mining operations, linear programming, Simplex methods and transportation problem. Operation Research - Scope of application in mining, Linear programming, formulation and solution, Network planning with special reference to CPM/PERT, System approach for project scheduling.

UNIT III:

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

UNIT IV:

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 V: Mine Services

Design of haulage, hoisting and drainage systems, Design of pit top and pit bottom, Coal handling plants, Railway siding etc.

Books Recommended.

1. Advance Coal Mining by R.T. Deshmukh and V.S. Vorobjev
2. Mine Planning by S.P. Mathur
3. Mine Planning by J. Bhattacharya

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Semester: B.Tech. VIIth Sem.
Subject: - Computer application in Mining

Branch: - Mining Engineering
Code : - BT 7641

Unit 1-Introduction to Software Packages Applicable to Mining

Unit 2-Development of Algorithms Slope stability.

Unit3 - Pillar design. Open pit configuration. Design of mine ventilation system. Optimisation of cycle of operations.

Unit4 -Blast design. Simplex technique for mining. Rock reinforcement design

Unit 5-. Modelling of mining pollution phenomena. Management information systems. Development of Programs Simple computer programs based on the above algorithms.

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Semester: B.Tech. VIIth Sem.

Subject: - Mine Health and Safety.

Total Lecture Periods/Week : **3**

Total marks in end semester Exam: **100**

Minimum Number of Class test to be conducted: **02**

Branch: - Mining Engineering

Code : - BT7643

Total Tutorial Periods/Week: **00**

Total Practical Periods/Week: **00**

Course Objective

To choose proper fire fighting method for different types of fire.

To be able to perform reopening a sealed off area.

To investigate accidents caused by various types of explosions, fires strata fall and inundation in an underground coal mines.

To perform rescue and recovery works during any accident in the mine.

Course outcomes:

Apply knowledge of mine environment for understanding, and solving problems related with mine accidents.

Mine accidents. Planning for safety. Safety analysis. Safety prevention. Information system and safety audits. Hazard Control - engineering approach, systems approach. Hazard analysis. Safety management. Economics of safety and cost-effectiveness. Occupational hazards in mines- occupational hygiene, occupational diseases.

References:

Ridley, J & Channing, J.; Safety at Work; Butterworth-Heinemann, Oxford, 2001. Rodgers, W.P.; Introduction to System Safety Engineering; John Wiley & Sons Inc., New York, 1971. Green, A.R.; Safety in Mines Research; A.A. Balkema; Rotterdam; 1985.

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**Department of Mining Engineering
List of Experiment**

Subject: Rock Mechanics Lab
Code: BT766
Maximum Marks: 50

List of Practical to be Performed

1. Determination of moisture content of rock sample by ISRM standard method
2. Determination of density and porosity of rock samples using saturation and caliper techniques.
3. Determination of slake durability strength index of rock sample by ISRM standard method
4. Determination of point load strength index of rock sample
5. Determination of Proto-dyakonov strength index of rock sample
6. Determination of Uni-axial Compressive strength of rock sample by ISRM standard method
7. Determination of Tensile strength of rock sample by Brazalian method
8. Determination of Single Shear and Double Shear strength of rock sample
9. Determination of Tri-axial Compressive strength of rock sample by ISRM standard method
10. Determination of Young' Modulus of rock sample by ISRM standard method

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**Department of Mining Engineering
List of Experiment**

Subject: Mine Environment- II Lab

Code: BT765

Maximum Marks: 50

List of Practical's to be Performed

1. Study of erection of sand bag fire stopping
2. Study of working of soda acid fire extinguishers.
3. Study of working of foam extinguishers.
4. Study of erection of German type stone dust barriers
5. Study of erection of Polish type stone dust barriers
6. Study of erection of Double brick fire stopping
7. Study of principal and working of self contained breathing apparatus Dragger 174-A
8. Study of principal and working of Aero lox Liquid oxygen apparatus.
9. Study of principal and working of self rescuers.
10. Study of various types of water dam constructed in U/G mines

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**Department of Mining Engineering
List of Experiment**

Subject: Advance surface mining

Code: BT-7642

Maximum Marks: 50

Unit 1- Classification and Basic Parameters

General information and classification of surface mining methods – associated terms, determination of major dimensions and main parameters. Annual production and life of mine. Surface mining methods – Scope, applicability and limitations.

Unit 2- Opening of Deposits

Opening of deposits and formation of benches – trenching, non-trenching and underground methods and their combinations. Width & slope of entry trenches. Driving of opening and entry trenches.

Unit 3-Overburden Removal

Systems for removal and disposal of overburden – overcasting haulage and combination methods with scope and limitations. Design of waste dumps.

Unit 4- Basic Layouts

Layout planning for horizontal, inclined and steep deposits. Factors influencing the choice of layouts. Design of benches.

Unit 5-Special Mining Situations

Quarrying of dimensional stones, hydraulicking, dredging of placers and deep-sea mining. Mining over old underground workings. Ultimate Pit Design Global and

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List of Experiment**

Subject: Advance mining geology

Code: BT-7644

Maximum Marks: 50

Unit 1- Geological Time Scale

Petrology Definition and scope, main classes of rocks forming minerals. Igneous, sedimentary and metamorphic rocks – origin, characteristics, classification, uses and mining importance. Significance of texture and structure of rocks on geomechanical properties of rock mass.

Unit 2-Stratigraphy

Definition and scope. Stratigraphic correlation. Standard stratigraphic scale. Fossils – conditions, mode of preservation and uses. Major geological formations of India – Dharwar, Cuddapah, Vindhyan, Gondwana, Tertiary & Quaternary systems and their economic significance.

Unit 3- Fuel Geology

Coal and lignite - origin, occurrences, petrography. Structural features of coal-seam. Grades of coal. Occurrences in India. Petroleum and natural gas – formation of gas and oil basins, traps and reservoirs, occurrences in India. Coal bed methane.

Unit 4- Geohydrology

Sources of water in mines. Classification of rocks based on porosity and permeability. Water table and types of ground water. Geological controls on ground water movement in mines.

Unit 5- Environmental Geology

Geological hazards and their management. Weathering of ore and overburden – environmental complications.

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List of Experiment**

Subject: Advance Mining Machinery

Code: BT-7645

Maximum Marks: 50

Unit 1-Surface and Underground Layout

Pit top and pit bottom circuits. Surface structures. Surface handling systems – coal and ore handling plants. Storage bunkers. Railway siding. Pit bottom layouts.

Unit 2-Winding

Drum and friction winding, headgears, headgear pulleys, cages and skips, suspension gear, keps and guides. Steam and electric winders, safety devices in winders, duty cycle. Automatic winding. Multilevel winding.

Unit 3-Trackless Haulage

Types of conveyors and their sequence control. High angle conveyor. Free steered vehicles - shuttle cars, LHD, SDL and low profile dump trucks (LPDT).

Unit 4- Aerial Ropeways Types, construction and installation. Loading, unloading and angle stations,

Unit 5- Man-riding Systems , Statutory Provisions