

## JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

IV Year B.Tech. Mining Engg.-II Sem

L	T/P/D	C
4	-/-	4

### (A82536) MINE GROUND CONTROL

**Objective:** Aims at detailed explanation of ground control practices in both underground and open cast mines for extraction of coal and metal ore deposit.

#### Unit-I

[www.universityupdates.in](http://www.universityupdates.in)

Definition and concept of ground control in Mines.

Ground control practice in Mines. Constraints on ground control design; characteristics of coal measure strata.

#### Unit-II

Modern concept of strata pressure redistribution. Manifestation of strata pressure, convergence, load on prop, creep, heave, roof fall and failure systems due to mining. In situ stress measurement, instrumentation.

#### Unit-III

Roof support: Timber and steel supports, friction and hydraulic prop Arches, shotcret, roof truss, roof bolts.

Powered supports stowing caving strip packing pump packing rock reinforcement.

#### Unit-IV

Design of structures in rock; design of underground openings. Design of pillars, design of open pit slopes, waste dumps and embankments. Design of stopes.

#### Unit-V

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Subsidence: Theories of subsidence, factors affecting subsidence, prediction and measurement of subsidence. Damage and prevention of damage due to subsidence.

Bumps and rock bursts-causes, occurrence and control.

#### TEXT / REFERENCE BOOKS:

1. Obert & Duvall "Rock Mechanics and Design of structures in rock"
2. Jaeger and Cook "Fundamental of Rock Mechanics"
3. V. Singh & B.P. Khare "Rock Mechanics and Ground Control"
4. Richard "Rock Mechanics"
5. Peng "Coal Mining Ground Control".

**Outcomes: Students** aspiring for more detailed knowledge on ground control issues related to underground and open cast mines can get adequate exposure to design of stable structures for safe mining in the future complex geomining situations as out come



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**(A82539) PLANNING OF UNDERGROUND COAL MINING PROJECT****(Elective –III)**

**Objective:** Aimed at specialized knowledge on planning of underground coal mining project including recent extraction methods, economics and strata control measures.

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**Unit-I**

Mining industry in comparison with other industries, Principles of Planning, Features and Mine Planning, Master Plan, Feasibility Report.

**Unit-II**

Geological factors replacing Mine Planning, Estimation of optional prediction Life. Coal extraction, different methods applicability advantages and disadvantages

**Unit-III**

Pillar extraction by continuous miner

Pillar extraction by Blasting Gallery Methods.

Pillar extraction by deploying LHDS/SDLS

**Unit-IV**

Economics of different methods extraction.

Gate Road devices and supports and extraction by longwall Advancing and retreating Methods.

**Unit-V**

Surface subsidence, measures for subsidence control, subsidence monitoring, Roof convergence measurements.

**TEXT /REFERENCE BOOKS:**

[www.universityupdates.in](http://www.universityupdates.in)

1. Peng SS – Longwall Mining.
2. R.D. Singh – Principles and Practices of Modern Coal Mining.
3. Mathur S.P. – Coal Mining in India.
4. Das S.K. Modern Coal Mining Technology.
5. BB Dhar, Singh T.N. – Thick Séance Mining Problems and Issues.

**Outcome:** In future, underground mining is supposed to produce 80% of coal demand and the student can get opportunity to be specialist in planning for such underground coal mining projects as outcome of this course.



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**(A82540) PLANNING OF UNDERGROUND METAL MINING PROJECT****(Elective -III)**

**Objectives:** To familiarize the student with specialized knowledge on underground metal mining project planning including stope designs, production planning, scheduling etc.

[www.universityupdates.in](http://www.universityupdates.in)

**Unit-I**

**Introduction:** Status of Metalliferous Mining Industry in India, Scope and limitations of Underground Mining.

**Development:** Classification and choice of stoping methods, Choice of level interval and block length- shape, size, position

**Unit-II**

Excavation and equipping of shaft station, grizzly, ore/waste bin, main ore pass system, underground crushing and loading stations, underground chambers, sump and other subsidiary excavations, arrangements for dumping into main ore pass

**Unit-III**

**Methods:** Techno-economic analysis on choice of stoping methods, high productivity methods, blast hole stoping vertical retreat method of mining, block caving raise stoping, underground bench blasting.

Stope design and production planning in the various methods of stoping, Stop layouts, access development, shift/hosting haulages cross cuts, inclined developments.

**Unit-IV**

Stope and development support, mining cycles, efficiency, utilization and estimating equipments requirements.

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**Unit -V**

**Division of Mining Area:** Division of the mining area into working units on district and level pattern. Dimensions of panels and blocks.

Production and Cycle time estimates, Production Planning and Scheduling

**TEXT BOOKS:**

1. Y.P. Chacharkar, A Study of Metalliferous Mining, Methods, Lovely Prakashan, Dhanbad, 1994.
2. B.C. Arthur, SME Mining Engineers Hand Book, American Institute of Mining, Metallurgical and Petroleum Engineers, New York, 1973.

[www.universityupdates.in](http://www.universityupdates.in)

### REFERENCE BOOKS:

- 1 D.J. Deshmukh, Elements of Mining Technology, Vol.-II, Central Techno Publications, Nagapur, 2001.
- 2 Metal Mines Regulations -1961, Lovely Prakashan
- 3 Introductory Mining Engineering, Howard L. Hatman.

**Outcome:** Student can be able to plan extraction methods for metal mining by underground techniques as outcome of this course.

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**(A82521) MINE ELECTRICAL ENGINEERING****(Elective-III)**

**Objectives:** To introduce basic knowledge on application of various electrical equipment, power supply, safety and protection of electrical equipment for opencast and underground mines.

**Unit-I**[www.universityupdates.in](http://www.universityupdates.in)

Types of electrical power supply systems for underground coal mines – solidly earthed, restricted neutral and insulated – neutral systems of electrical power supply; their comparisons.

**Unit-II**

Earth fault protection techniques for mine power supply systems, sensitive and fail-safe earth fault relays. On-line insulation monitoring for insulated-neutral electrical distribution system.

Earthing practice in mines – earth pits, earthing of mobile electrical equipment in mines. Mining cables – types, constructional details; layout of cables through shaft and other locations.

**Unit-III**

Mining type circuit breakers – Air circuit breaker, vacuum and Hexa Sulfa Fluoride (Sf<sub>6</sub>) circuit breakers, Field switch, Transwitch Unit, Gate End Box, Drill Panel.<sup>6)</sup>

**Unit-IV**

Electrical power planning for mechanized longwall faces – general scheme of electrical power distribution, voltage drop problems and remedial measures; Inbye substation capacity selection. General scheme of electrical power distribution in opencast projects, Quarry substation capacity selection. Choice of restricted-neutral and insulated-neutral systems in open cast mines.

**Unit-V**[www.universityupdates.in](http://www.universityupdates.in)

Illumination planning for mines – underground roadway lighting system; intrinsically-safe lighting system for longwall faces, opencast mine lighting. Principles of flame proof enclosures. Intrinsically safe circuit methods, zeener safety barriers and their applications. Indian electricity rules as applied to mines.

**TEXT BOOKS:**

1. A Text Book on Power Systems Engineering – Soni Gupta, Bhatnagar, Chakrabarti, Dhanpat Rai & Sons.

2. Electrical Equipment in mines- H. Cotton.

**REFERENCE BOOKS:**

[www.universityupdates.in](http://www.universityupdates.in)

1. Universal Mining School Series (UK)
2. Coal Mining Practice- J.C. F Statharm Vol III, Heart Series.
3. Electrical Power Systems – C.L. Wadhwa, New Age International Publishers
4. Switchgear and Protection- S.S. Rao Khanna Publications.
5. Indian Electricity Rules.
6. Principles of Mine Planning J. Bhattacharya, Allied Publications.

**Outcomes:** Students gets awareness on various issues related to planning of electrical systems in mines with special emphasis on problems and remedial measures to be implemented for safe and efficient working, maintenance of electrical equipment in mines.

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**(A82534) GEOLOGICAL & TECHNOLOGICAL FACTORS OF COAL GASIFICATION CBM, SHALE GAB****(Elective –IV)**

**Objective:** To specialize the students with additional knowledge on geological and technological factors of coal gasification industry mining methods of underground coal gasification, linkage techniques etc.

**Unit-I**[www.universityupdates.in](http://www.universityupdates.in)

Underground Coal Gasification (UCG) Concept; Chemistry, conditions suitable for UCG, Principles of UCG., Merits and Demerits.

**Unit-II**

UCG Process Component factors: Technology of UCG, opening up of coal seam for UCG.

**Unit-III**

Mining methods of UCG: Chamber method, Stream method, Borehole procedure method, Blind bore hole method.

**Unit-IV**

Non-Mining methods of UCG: Level seams, Inclined seams.

**Unit-V**

Linkage Techniques : Precolation linkage, Electro linkage, Boring linkage, compressed-air-linkage, Hydraulic fracture linkage. Future Scope and Development: Innovations.

**TEXT BOOKS:**

1. Underground Coal Mining Methods – J.G. SINGH
2. Winning and Working Coal in India Vol.II- R.T. Deshmukh and D.J.Deshmukh.

[www.universityupdates.in](http://www.universityupdates.in)**REFERENCE BOOK:**

1. Principles and Practices of Modern Coal Mining – R.D. SINGH

**Outcome;** Student can get specialized in the underground coal gasification concepts, application and future scope in various geomining conditions.



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### (A82537) MINE HEALTH & SAFETY ENGINEERING

(Elective -IV)

**Objective:** To specialise the mining professionals in health & safety engineering concepts, causes of accident, training, human behavioral approach in safety etc.

[www.universityupdates.in](http://www.universityupdates.in)

#### Unit-I

Introduction to accidents, prevention, health and safety in industry : Terminology, reason for preventing accidents – moral, cost, legal.

Safety scenario in Indian mines, Accidents in Indian mines, Measurement of safety performance, Statistical analysis of mine accidents.

#### Unit-II

Causes of Accidents in opencast and underground mines, accident report, accident analysis and control; cost of accidents, statistical and economical analysis of accident data.

#### Unit-III

System Engineering approach to safety, Techniques used in safety analysis, Generic approach to loss control with in mining operations.

#### Unit-IV

Safety management and organization, Risk management, Risk identification, Risk estimation and evaluation, Risk minimization techniques in mines. Risk analysis using FTA, HAZOP, ETA etc; Risk analysis softwares; health risk assessment and epidemiological studied.

#### Unit-V

Training, Human Behavioral approach in Safety, safety polices, safety audit and safety management & disaster management in mines.

#### TEXT BOOKS:

[www.universityupdates.in](http://www.universityupdates.in)

1. B.K. Kejriwal, Safety in Mines, Lovely Prakashan, Dhanbad, 2002
2. Occupational Safety and Health in Industries and Mines by C.P. Singh

#### REFERENCE BOOKS:

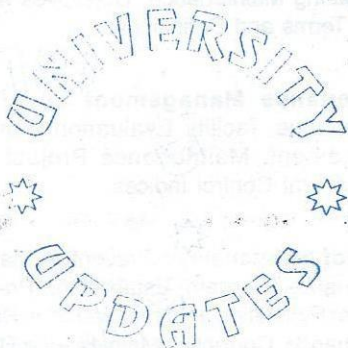
1. S.K. Das, Mine Safety and Legislation. Lovely Prakashan, Dhanbad, 2002
2. N.J. Bahr, System Safety Engineering and Risk Assessment: A Practical Approach, Taylor and Francis, NY, 1997.
3. DGMS CIRCULARS: MINES ACT

[www.universityupdates.in](http://www.universityupdates.in)

4. Indian Mining Legislation – A Critical Appraisal by Rakesh & Prasad.
5. Ramulu M.A, Mine Disasters and Mine Resoue Uniiversity Press Pvt.Lte, Hyderabad,2007.

**Outcome:** prevention student will be able to work better as safety officials in mining projects with detailed knowledge in safety management, accident approaches.

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### (A82535) MAINTENANCE AND RELIABILITY ENGINEERING

(Elective – IV) [www.universityupdates.in](http://www.universityupdates.in)

**Objective:** To specialize the student in optimum utilization of available mining machinery with details on maintenance management, concept of reliability.

#### Unit - I

**Introduction:** Need for Maintenance, Facts and Figures, Modern Maintenance, Problem and Maintenance Strategy for the 21<sup>st</sup> Century, Engineering Maintenance, Objectives and Maintenance in Equipment Life Cycle, Terms and Definitions.

#### Unit-II

**Maintenance Management and Control:** Maintenance Manual, Maintenance, facility Evaluation, Functions of Effective Maintenance Management, Maintenance Project Control Methods, Maintenance Management Control Indices.

#### Unit-III

**Types of maintenance:** Preventive Maintenance, Elements of Preventive, maintenance Program, Establishing Preventive Maintenance, Program PM Program Evaluation and Improvement, PM Measures, PM Models, Corrective Maintenance, Corrective Maintenance Types, Corrective Maintenance Steps and Downtime Components, Corrective Maintenance Measures, Corrective Maintenance Models.

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#### Unit-IV

**Basic concepts of reliability:** Introduction, Reliability and quality, Failures and failure modes, Causes of failures and reliability, Maintainability and availability, History of reliability, reliability literature.

#### Unit-V

**Component reliability and hazard models:** Introduction, Component reliability from test data, Mean time to failure, Time – dependent hazard models, Stress- Dependent hazard models, Derivation of reliability function using Markov, Treatment of field data.

#### TEXT BOOKS ;

1. Reliability, Maintenance and Safety Engineering - Dr. A.K. Gupta/  
Laxmi Publications
2. Reliability Engineering – Balaguruswamy- TMH

[www.universityupdates.in](http://www.universityupdates.in)

### REFERENCE BOOKS:

1. Maintenance Engineering & Management – RC Misra/ PHI
2. Reliability Engineering by Elsayed/Pearson.
3. Engineering Maintenance a Modern Approach, B.S.Dhillon,2002 CRR Publications
4. Reliability Engineering- Patrick DTO-Wiley Conor-India.
5. Reliability Engineering and life testing –Naikan-PHI
6. Industrial Safety Engineering – by L.M. Deshmukh/TMH
7. Reliability Engineering- L.S.Srinath

**Outcome:** In the ever-increasing mechanization in mining industry, students can plan for high production and productivity levels with clear understanding of maintenance management, reliability etc as outcome of this course

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### (A82533) DEEP SEAM MINING

(Elective – IV)

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**Objective :** To give very highly specialized knowledge to the upcoming mining professionals with future demand of deep seam mining for coal extraction.

#### UNIT-I

**Exploration:** Modern Exploration Techniques to Identify the Complex Coal Deposits

**Classification:** Classification of Coal Deposits Lying under Typical Geomining conditions.

#### UNIT-II

**Challenges:** Challenges to Improve production and productivity from Deep Seated Deposits.

Challenges in Liquidation of Locked-up Pillars

**Experimental Trials:** Innovative Technologies for Stability Analysis.

#### UNIT-III

Design and Development of Deep, Seated Deposits.

#### UNIT-IV

**Modern Techniques:** Application of Numerical Modeling Techniques to Control Ground Problems of Complex Deposits.

#### UNIT-V

Use of Modern Instruments for Strata Control of deep seated deposits.

In-situ Gasification and Mineral Biotechnology for Complex Coal Deposits.

#### TEXT BOOKS:

1. R.D. Singh, Principles & Practices of Modern Coal Mining, New age international New Delhi, 1997
2. T.N. Singh, Underground winning of Coal, Oxford and IBH New Delhi, 1992

[www.universityupdates.in](http://www.universityupdates.in)

#### REFERENCE BOOKS:

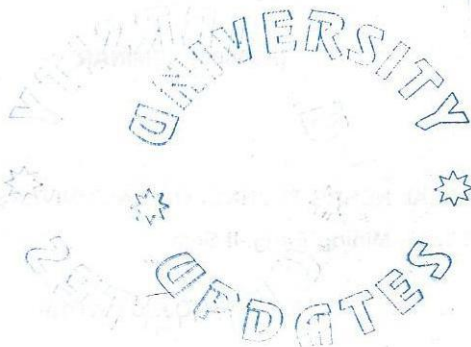
1. Peng S S and Chiang H S. Longwall mining, Wiley, New York, 708p
2. S.K. Das, Modern Coal Mining Technology, Lovely prakashan Dhanbad, 1992

[www.universityupdates.in](http://www.universityupdates.in)

3. Prasad D. and rakesh S, Legislation in Indian Mines-Acritical Appraisal, Niskam Press, New Delhi, 1883p
4. S.P. Mathur, Coal Mining in India, M.S. Enterprises Bilaspur, 1999

**Outcome:** Future coal production lying depends on deep seam mining associated with complex geomining conditions, and have the students in this course gets an opportunity to understand the challenges of deep seam mining alternative methods of safe extraction of coal.

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**(A80087) INDUSTRIAL TRAINING**

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**(A80089) SEMINAR**

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**(A80088) PROJECT WORK**

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**(A80090) COMPREHENSIVE VIVA**