

SCHOOL OF ENGINEERING
SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES
Outcome based Curriculum for Undergraduate Degree Courses in Engineering & Technology
Department of Mining Engineering

MIA-501 MINING SURVEYING II

MIA-501	MINING SURVEYING-II	2L:1T:0P	3 credits	3Hrs/Week
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Course objectives:

- Knowledge of distance and elevation using optical means, area and volume of underground and opencast mine, network of triangles, baseline in underground and surface, the duties and responsibilities of surveyor.
- Application of the network of triangles, setting of curve in mine survey, transfer reduced level from surface to underground.
- To evaluate the accuracy of the survey.

Course outcomes:

At the end of the course the student will be able to:

- Ability to use optical means determine distance, elevation, area and volume. To set out baseline according to the rules and responsibilities of surveyor.
- To set out a curve and to locate the underground features through survey.
- Determination of the reduced level in underground.
- Ability to determine the accuracy of the surveyed area..

UNIT 1: THEODOLITE SURVEYING (10 Hours)

Types of Theodolites; Description of various parts of a Vernier Theodolite; Requirements of Mining type Theodolites; Measurements of height and distances of accessible and inaccessible points; Traversing with Theodolite on surface and underground; Checks on Closed and Open traverses; Balancing of traverses; Temporary & Permanent adjustments of Theodolites; Sources of errors and their prevention.

UNIT 2: TACHEOMETRY (6 Hours)

Principles of Stadia Methods; Determination of constants; Theory of anallactic lens; Distance and elevation formulae, Sub tense and Tangential Methods; Auto- Reduction Tacheometer.

UNIT 3: SETTING OUT (8 Hours)

Setting out simple curves on surface and in underground; Elementary knowledge of compound and transition curves; joint boundary survey; Equalization of boundaries; Maintenance of direction and radiant of roadways i.e. marking and checking of center line and grade line, transfer of point from roof to floor and floor to roof.

UNIT 4: ERRORS & PROBLEMS (10 Hours)

Computation of areas and volumes; Earthwork calculation; Problems based on Coordinates, faults, Dip- Strike and boreholes; Sources, classification and relative importance of errors, their prevention and elimination, theory of errors, adjustment of errors.

UNIT 5: PLANS & SECTIONS (8 Hours)

General requirements of mine plans; types of plans; Symbols used in mine plans; preparation of plans & sections; Plotting of traverse; Checking accuracy of old mine plans; Plan meter and its uses; Enlargement & reduction of plans.

REFERENCE BOOKS

1. Surface Mining: G.B. Misra
2. Surface mining equipment: Martin
3. Surface Mining: Pfeleider
4. Mining: Boki
5. SME handbook: Hartman

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MIA-501	Mining Surveying- II	0L:0T:2P	1 Credits	2 Hrs/week
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Course objectives: To Understand different equipment and compare accuracy levels and to study several experiments and conversant with it. To find the importance of latest technology through total station. To be familiar with conventional symbols used in mines. it enables the student to attain good practical knowledge.

Course outcomes: At the end of the course the student will be able to:

- An ability to measure distance and elevation using optical instruments.
- An ability to set out an curve in underground and surface.
- An ability to connect the baseline from surface to underground.

List of Experiments

1. Triangulation survey by theodolite
2. Measure horizontal and vertical angles by theodolite
3. Measure horizontal angles by method of repetition and reiteration using theodolite
4. Trigonometric Leveling - Heights and distance problem
5. Signs and conventions used by GSI, MMR, CMR
6. Finding heights and distance using Principles of tachometric surveying
7. Curve setting – different methods by total station
8. Setting out works for buildings & pipe lines.
9. Determine area using total station
10. Traversing using total station
11. contouring using total station
12. Determination of remote height using total station
13. Coordinate measurement by total station and GPS
14. Traversing and recording position of points by GPS
15. Distance, gradient, Difference, height between two inaccessible points using total stations.

EQUIPMENT TO BE USED:

1. Theodolites, and leveling staffs.
 2. Tachometers.
 3. Total Station.
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MIA-502 MINERAL PROCESSING

MIA-502	MINERAL PROCESSING	2L:1T:0P	3 Credits	3Hrs/Week
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Course objectives:

- To review all unit operations in mineral processing and fuel technology.
- To understand the importance and principles of materials handling in the mineral processing plant.
- To explain the methods of analysis of comminution theory, selection criteria for crushing, grinding and screening equipment, selection principles for mineral concentration techniques, criteria for mineral concentration equipment selection.

Course outcomes:

At the end of the course the student will be able to:

- Ability to understand the importance and principles of materials handling in the mineral processing plant.
- Ability to explain the methods of analysis of comminution theories, selection criteria for crushing, grinding and screening equipment, selection principles for mineral concentration techniques, criteria for mineral concentration equipment selection.

UNIT 1: COMMINATION (10 Hours)

Introduction, definition, scope and economic justification, main steps in ore dressing operations, comminution, crushing, principles of crushing, jaw crushers, gyratory crushers, cone crushers, roll crushers, gravity stamps their classifications and applications, grinding principles of grinding, application and classification of ball mills, rod mills, tube mills and Pebble mills.

UNIT 2: SIZING (10 Hours)

Object of sizing, scale of sizing, laboratory sizing, screening and classification, different type of screens, their mode of operations and application and limitation, classification principles of classification, movement of solids through fluids, different types of classifiers, hydraulic and pneumatic classifiers, sampling-importance of sampling and methods used.

UNIT 3: GRAVITY CONCENTRATION (6 Hours)

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

UNIT 4: FLOTATION (6 Hours)

Physico-chemical principles, function of various flotation reagents, important machines, their principles, and working, flotation of sulphide, oxide and non-sulphide ores.

UNIT 5: PROCESSING METHODS OF SOME COMMON MINERALS (10 Hours)

Electrostatic and Magnetic Separation - Principle operation and field of application, Pelletisation of low grade iron ore, Drying and dewatering - thickening, filtration and drying. Coal washing; Simplified flow sheets for beneficiation of coal and typical ores of copper, lead, zinc, iron and manganese with special reference to Indian deposits.

REFERENCE BOOKS:

1. Ore Dressing by Gaudin
2. Ore Dressing by B. A. Willstion, 1991.
3. Ore Processing S.K.Jain, Oxford IBH, 2nd Edition, 1990
4. Fuels and Combustion, Dr. Samir Sarkar, Published by Orient Longman Ltd., 1990.

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MIA-502	MINERAL PROCESSING	0L:0T:2P	1 Credits	2 Hrs/week
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Course objectives:

- To study the different types of sampling methods
- To study the laboratory sizing and separation of particles.
- To study the process of comminution
- To study the settling of solids in fluids
- To study the different types of concentration process.

Course outcomes: At the end of the course the student will be able to:

- An ability to identify different types of sampling methods, comminution methods and concentration methods.
- An ability to explain laboratory sizing, comminution and concentration methods.
- An ability to interpret laboratory sizing, comminution and concentration methods.

LIST OF EXPERIMENTS:

1. Study of Jaw crusher
2. Study of Roll crusher
3. Study of Grinding mills
4. Study of Akin's classifier
5. Study of Shaking table
6. Study of Mineral jig.
7. Study of Spiral concentrator
8. Study of Flootation cell
9. Study of Thickeners
10. Study of Washability curves

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MIA-503 MINE MACHINERY- II

MIA-503	MINE MACHINERY- II	2L:1T:0P	3 Credits	3Hrs/Week
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Course Objective:

The students completing this course are expected to understand the nature and role of the kinematics of machinery, the mechanisms and machines.

To understand the functioning of winding engines and other winding accessories.

The course includes velocity and acceleration diagrams, analysis of mechanisms joints, Cams and their applications. It exposes the students to various kinds of power transmission devices like belt, rope, chain and gear drives and their working principles and their merits and demerits.

Course Outcome:

The students will have basic knowledge on motive power used in mines, pumping, rope haulage and face haulage & conveying transport systems.

UNIT 1: AERIAL ROPEWAYS (10 Hours)

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

UNIT 2: CONVEYORS – I (6 Hours)

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

UNIT 3: CONVEYOR – II (10 Hours)

Shaker conveyor, scraper chain conveyor and armored chain conveyor, their installation & construction maintenance. Safety Devices; Pit top and pit bottom arrangements.

UNIT 4: SKIP & KOEPE WINDING (10 Hours)

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. Multirope winding. Calculation of H.P.

UNIT 5: HYDRAULIC TRANSMISSIONS (6 Hours)

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.

REFERENCE BOOKS:

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 Stathum

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MIA-503	MINE MACHINERY- II	0L:0T:2P	1 Credits	2 Hrs/week
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LIST OF EXPERIMENTS:

1. Study of Monocable aerial Ropeway.
2. Study of Bicable 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 an Armoured face Conveyor.
7. Study of Various Koepe Arrangements

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Program Elective - I

MIA -504(A) POLLUTION CONTROL ENGINEERING

MIA - 504(A)	POLLUTION CONTROL ENGINEERING	3L:1T:0P	4 Credits	4Hrs/Week
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UNIT 1: ENVIRONMENTAL POLLUTION (10 Hours)

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 (8 Hours)

Air pollution due to various gases and suspended particulate materials, causes, consequences, preventive measures, dust measuring equipment.

UNIT 3: NOISE POLLUTION (8 Hours)

Pollution due to noise and its consequences, noise produced by different machinery, control and safety, measurement of noise levels.

UNIT 4: WATER POLLUTION (10 Hours)

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 (6 Hours)

Land pollution and land reclamation, land reclamation techniques, Physical and Biological reclamation, Mine Closure Plan

Reference Books:

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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MIA-504(B) COMPUTER APPLICATION IN MINING

MIA-504(B)	COMPUTER APPLICATION IN MINING	3L:1T:0P	4 Credits	4Hrs/Week
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Course objectives:

- To make students conversant with importance of computers in mining engineering
- To make aware about the various software and its application to mine planning and design
- To demonstrate and impart initial training to use the software.

Course outcomes: At the end of the course the student will be able to:

- Students will have knowledge about various software application worldwide in the field of mining engineering
- Students will develop some skill to use the software with cases.

UNIT 1: INTRODUCTION TO SOFTWARE PACKAGES APPLICABLE TO MINING (10 Hours)

Computational systems inspired by natural evolution; natural and artificial evolution, evolutionary; chromosome representations; search operators;

UNIT 2: CO-EVOLUTION (8 Hours)

Constraint handling techniques; niching and speciation; genetic programming; classifier systems and theoretical foundations; implementation of selected algorithms.

UNIT 3: DEVELOPMENT OF ALGORITHMS (8 Hours)

Slope stability. Pillar design. Open pit configuration. Design of mine ventilation system. Optimisation of cycle of operations. Blast design.

UNIT 4 : SIMPLEX TECHNIQUE (8 Hours)

Simplex technique for mining. Rock reinforcement design. Modelling of mining pollution phenomena. Management information systems.

UNIT5: DEVELOPMENT OF PROGRAMS (8 Hours)

Simple computer programs based on the above algorithms.

REFERENCE BOOKS:

1. Fundamental of Database Systems by Elmasri & Navathe
2. Introduction to operations research by Hillier/Lieberman
3. CAD/CAM : Computer Aided Design and Manufacturing, Mikell P. Groover, Emory W. Zimmers, Jr. PHI Inida, 1989.

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Open Core Elective-I
MIA-505(A) MINE LEGISLATION

MIA-505(A)	MINE LEGISLATION	3L:1T:0P	4 Credits	4Hrs/Week
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Course Objectives:

It is very important to all mining engineering students because, it provides an insight to various laws, rules and Acts related to Mines Safety and mining legislation. A separate paper on the above subject is one of the requirements for the DGMS certification for qualifying in the exam of Mines Manager.

Course Outcome:

The student will be benefitted with this course paper as it covers all the mining legislation and statutory Ruls, Acts and amendments made from time to time. This paper is one of the qualifying papers for DGMS exams.

UNIT-1 (10 Hours)

Introduction to Acts, Rules & Regulation applicable to Mining Industry, Development of mining legislation in India.

UNIT-2 (6 Hours)

Mines Act – 1952 & Mines Rules – 1955

UNIT-3 (10 Hours)

Coal Mines Regulations –1957, Ventilation, Standard of ventilation, main mechanical ventilator, Installations & Restrictions, Splits and Airways, Introduction to draft CMR-2006 &
Metalliferous Mines Regulation-1961 Ventilation, Explosives, Official Duties

UNIT-4 (6 Hours)

Mine Crèche Rules 1966

UNIT-5 (10Hours)

Mine Vocational Training Rules- 1966 Application of Rules, General vocational training (scope and standard), training centres, and arrangements for training

Reference Books:

1. Legislation in Indian Mines (A critical Appraisal) Vol. II & I, - S. D. Prasad & Prof. Rakesh
2. CMR-1957 & MMR-1961 - L. C. Kaku
3. Mines Act-1952 & Mines Rules-1955 - L. C. Kaku
4. Vocational Training Rules- L. C. Kaku
5. Mine Accidents - S.J. Kejeriwal
6. CMR-2017- L C Kaku

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MIA-505(B) MINE MANAGEMENT

MIA-505(B)	MINE MANAGEMENT	3L:1T:0P	4 Credits	4Hrs/Week
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Course objectives:

- To understand the selection, prioritization and initiation of individual projects and strategic role of project management.
- To understand the work breakdown structure by integrating it with organization.

Course outcomes: At the end of the course the student will be able to:

- Understand the selection, prioritization and initiation of individual projects and strategic role of project management.
- Understand the work breakdown structure by integrating it with organization.
- Understand the scheduling and uncertainty in projects.

UNIT 1: EVOLUTION OF MANAGEMENT THEORY (10 Hours)

Principle of Scientific management, Elements of management functions, Planning, Organizing and Control, Levels of Management. Structure and design of organization for mining enterprises.

UNIT 2: PERSONNEL MANAGEMENT (8 Hours)

Selection, training and development of human resources, Job evaluation, job analysis, incentive and theories of motivation, Productivity, its concept and measurement, Leadership and Communication.

UNIT 3: PRODUCTION MANAGEMENT (6 Hours)

Determination of norms and standards of operations by work study, work measurements, production planning, Scheduling and control, Queuing theory, short and long term planning, Quality control, introduction to MIS, Material Management

UNIT 4: INDUSTRIAL PSYCHOLOGY (8 Hours)

Its relation with other branches of knowledge, studies of physical factors and their effect on man, Industrial relations, Human relations, trade union movements in India.

UNIT 5: INDUSTRIAL ACT AND LAWS (10 Hours)

Industrial Dispute Act, Industrial Trade Union Act, Analysis of industrial disputes, Prevention and settlement of industrial disputes, Payment of wages act, Workmen's compensation act, Contract labour laws.

REFERENCE BOOKS:

1. Mine Management : V. N. Singh
2. Management & Administration : S.K.Gupta
3. Introduction to Management: O.P. Khanna
4. Mine Management, Legislation and General Safety ,S. Ghatak Coal Field Publishers ,Asansol 1999.
5. Management Harold Koontz and Heinz Weihrich, Mc Graw Hill Company 1990.
6. Modern Production Management Buffa John Wiley and Sons, 1998.

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Department of Mining Engineering
MIA-506 Industrial Training-II

MIA-506	Industrial Training-I	0L:0T:4P	1 credits	4Hrs/Week
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Course Preamble:

1. To expose the students to actual working environment of Mining engineering and enhance their knowledge and skill from what they have learned in the classes.
2. Another purpose of this program is to instill the good qualities of integrity, responsibility and self-confidence.
3. To pursue students with the Mining field ethics and rules in terms of the society.

Course Outcomes:

Ability to communicate efficiently. Acquired to be a multi-skilled engineer with good technical knowledge of Mining Engineering Field and their processing, management, leadership and entrepreneurship skills. Ability to identify, formulate and model problems and find engineering solution based on a systems approach.

Students must observe following points to enrich their learning in Mining engineering during industrial training:

- Industrial environment and work culture.
- Organizational structure and inter personal communication.
- Machines/ equipment/ instruments - their working and specifications.
- Product development procedures and phases.
- Project planning, monitoring and control.
- Quality control and assurance.
- Maintenance system.
- Costing system.
- Stores and purchase systems.
- Roles and responsibilities of different categories of personnel.
- Customer services.
- Problems related to various areas of Work etc.
- Layout if any

To be submitted :The students has to submit the power point presentation of minimum15 slides of the training performed(comprising of points stated above) along with the original certificate of training performed with proper seal and signature of the authorized person.

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Scheme of Studies:

Duration: Minimum 2 weeks in summer break after IV semester, assessment to be done in V Semester

Scheme of Examination:

For the assessment of industrial training undertaken by the students, following components are considered with their weightage.

(a) Term Work in Industry Marks Allotted

Attendance and General Discipline 20

Daily diary Maintenance 20

Initiative and participative attitude during training 30

Assessment of training by Industrial Supervisor 30

Total 100*

(b) Practical/Oral Examination (Viva-Voce) in Institution Marks Allotted

1. Training Report 50

2. Seminar and cross questioning (defense) 100

Total 150

*** - Marks of various components in industry should be awarded by the I/c of training in Industry but in special circumstances if not awarded by the industry then faculty in charge /T.P.O. will give the marks.**

During training students will prepare a first draft of training report in consultation with section In charge. After training they will prepare final draft with the help of T.P.O. /Faculty of the Institute. Then they will present a seminar on their training and they will face viva-voce on training in the Institute.