SCHOOL OF ENGINEERING
SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES

MIA-801 MINING SURVEYING-III

MIA-801	**MINING SURVEYING-III**	**3L:0T:0P**	**3 credits**	**3Hrs/Week**

Course Preambles:
To impart the knowledge of measurements of distances and angles, determination of different levels and level difference and computation of areas, volumes which includes determination of capacity of reservoirs, volumes of barrow pits. The knowledge of modern instruments like Theodolite surveying and tachometric surveying, designing & setup of curves and global positioning systems.
To Understand correlation and stope survey methods and know and limitations of photogrammetry and modern survey methods. To be Familiar with dip and strike problems and surveyor responsibility in underground .

UNIT 1: TRIANGULATION (8 Hours)

Principles of forming network of triangles; Selection of sites of triangulation stations; Base and Check base lines; Measurement and adjustment of angles by simple methods; Calculation of Co-ordinates.

UNIT 2: CORRELATION SURVEY (10 Hours)

Methods of correlation of surface and underground surveys through adits, inclines, and shafts; Use of magnetic needle and Gyro theodolites; Different methods of Stope surveying and open pit surveying.

UNIT 3: ASTRONOMICAL SURVEY (6 Hours)
Definitions of important terms; Determination of azimuth by astronomical observations.

UNIT 4: PHOTOGRAPHIC SURVEYING (8 Hours)

Terrestrial photogrammetry, General Principles; Phototheodolite; Stereo photographic Surveying; Aerial Surveying - Field of application; Vertical and oblique photographs; Aerial photography; Preparation of photographical maps by simplemethods.

UNIT 5: MODERN SURVEYING TECHNIQUES (10 Hours)

Electronic distance measuring equipment; Geodimeter, Tellurometer, Distomat, Total station, Surveying software with plotting system, GPS, principle, method and its application in mining.

Reference Books:

1. Mine surveying by S. Ghatak
2. Surveying & Levelling by B. C. Punamia
3. Surveying & Levelling by Kanetkar & Kulkarni
4. Mine surveying by Winniberg

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MIA-801	**MINING SURVEYING-III**	**0L:0T:1P**	**1 credits**	**2Hrs/Week**

Course Preambles:
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 outcome:
Familiar with equipment and capable to do work independently at any time if you get chance

List Of Experiment:

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. Signs and conventions used by GSI, MMR, CMR
5. Curve setting – different methods by total station
6. Determine area using total station
7. Traversing using total station
8. contouring using total station
9 . Determination of remote height using total station
10. Coordinate measurement by total station and GPS
11. Traversing and recording position of points by GPS
12. Distance, gradient, Difference, height between two inaccessible points using total stations.

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Program Elective-V

MIA-802 (A) MINING ENVIRONMENT – III

MIA-802 (A)	**MINING ENVIRONMENT – III**	**3L:0T:0P**	**3 credits**	**3Hrs/Week**

Course Preambles:
- To understand the causes of mine fire and spontaneous heating.
- To know how to tackle the mine disasters like mine fire and inundation.
- To understand the lighting in underground and open cast mine.
- To understand the rescue and recovery operation in a mine.

Course outcomes: At the end of the course the student will be able to:
- An ability to know the causes of mine fire and spontaneous heating.
- An ability to tackle the mine disasters like mine fire and inundation.
- An ability to design the lighting in underground and open cast mine.
- An ability to carry out the rescue and recovery operation in a mine.

UNIT 1 : SPONTANEOUS HEATING (8 Hours)

Causes, detection and preventive measures in underground and surface coal mines, control of spontaneous heating in stacks and dumps.

UNIT 2: MINE FIRES (10 Hours)

Mine fires, control of fires and fires extinguishers, study of atmosphere behind sealed off areas, fire stopping and sealing off an area, pressure balancing, conditions and procedure of reopening a sealed off area, fire fighting organization. Fires in opencast mines and surface storage systems, emergency organization in mines.

UNIT 3: EXPLOSION (6 Hours)

Fire damp and coal dust explosions, their causes and prevention, stone dust and water barriers, investigations of explosion.

UNIT 4: MINE INNUNDATION (8 Hours)

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

UNIT 5: RESCUE AND RECOVERY (10 Hours)

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

Reference Books:

1. Mine Environment By G.B. Mishra
2. Elements of Mining Tech. Vol.2 by D. J. Deshmukh
3. Subsurface Mine Ventilation. by Mcpherson
4. Mine fires by Dr. Ramlu

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MIA-802(B) ROCK SLOPE ENGINEERING

MIA-802(B)	**ROCK SLOPE ENGINEERING**	**3L:0T:0P**	**3 credits**	**3Hrs/Week**

Course Preambles:
To introduce the basic mechanics of rock slope failures To learn the types of rock failure and its influencing parameters.

Course Outcome:
The students will know the fundamental mechanics of rock slope failure, types of failure and its influencing parameters.

UNIT 1:Basic Concepts: (8 Hours)

Engineering issues of Slope stability, Basic terminology, Slope failure causes and process, basic mechanism of slope failure Rock mass properties: various properties, data collection, stereographic projections

UNIT 2:Ground Water: (9 Hours)

Role of ground water flow, influence of ground water on slope stability, evaluation of ground water conditions in slopes

UNIT 3:Plane Failure : **(8 Hours)**

general conditions and failure analysis

UNIT 4:WedgeFailure: (9 Hours)

generalconditionsandfailureanalysis .**Circular Failure:** general conditions and failure analysis

UNIT 5:Toppling Failure: (8 Hours)

general conditions and failure analysis Rock slope stabilization techniques, Geotechnical Instrumentation and Monitoring Aspect of Waste dump stability analysis

Reference Books :

1. Rock Slope Stability, Charles A Kliche (SME publication)
2. Rock Slope Engineering, Hoek & Brown SME
3. Slope Stability in Surface mining, WA Hustrulid, SME

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Open Core Elective-IV

MIA-803(A) MINE PLANNING)

MIA-803(A)	**MINE PLANNING**	**3L:0T:0P**	**3 credits**	**3Hrs/Week**

Course Preambles:

- Understand the basic principles of mining law in India and role and influence of government onmining industries. To identify software for mine planning and designing.
- Explain the process of strategic mine planning and its impact on decision-making during project development and the factors considered in underground coal mine planning. Explain novel mining methods.
- Illustrate surface layouts, pit bottom and pit top layouts for different transport systems.
- Analyze and select suitable mine development and working methods.

Course outcomes:

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

- Knowledge of Mining laws in India and role and influence of government on mining industries and software for mine planning and designing.
- Ability to explain Process of strategic mine planning, Factors considered in underg ound coal mine planning and Novel mining methods.
- Ability to apply Surface layouts, pit bottom and pit top layouts for different transport systems.
- Ability to analyze and select suita le mine development and working methods.

UNIT 1: (8 Hours)

Coal reserves and their estimation, Geological and technological data needed for mine planning, Preparation of project and feasibility reports, project monitoring.

UNIT 2: (10 Hours)

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 3: (6 Hours)

Division of minearea intounits andsub units, Area, Reserve, Lifeand Capacity of mine, Panel size, Design of long wall face.

UNIT 4: (8 Hours)

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 5: (8 Hours)

MINESERVICESDesignofhaulage, hoistinganddrainagesystems,Designofpittopandpitbottom, Coalhandling plants, Railway siding , design of rapid loading system etc

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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 BJ.Bhattacharya
4. Modern Coal Mining Technology S.K.Das, Lovely Prakashan, Dhanbad, 1996

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MIA-803(B) ROCK EXCAVATION ENGINEERING

MIA-803(B)	**ROCK EXCAVATION ENGINEERING**	**3L:0T:0P**	**3 credits**	**3Hrs/Week**

Course Preambles:

- To make students aware about the concept of excavation engineering and its relevance to mining
- To expose the students to various excavation techniques and their design aspects.

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

- Students will acquire knowledge about excavation techniques and their selection.

UNIT 1:Introduction: (10 Hours)

Scope and importance of rock excavation engineering in mining and construction industries; physico-mechanical and geotechnical properties of rocks vis-a-vis excavation method; selection of excavation method.

UNIT 2:Drilling : (10 Hours)

Mechanics of rock drilling; design and operating parameters of surface and underground drilling; evaluation of drill performance; drillability of rocks; mechanism of bit wear; bit selection; problemsof drilling; economics of drilling.

UNIT 3:Blasting: (8 Hours)

Mechanics of rock fragmentation by explosives; advancement in explosives and blasting technique; their selection criteria for rock excavation; blast design for surface excavations and optimization;

UNIT 4:Advanced Blasting Techniques: (8 Hours)

blast performance evaluation; cast blasting; techno-economic and safety aspects of surface and underground blasting; advances in blast design for underground excavations; control blasting; computer aided blast designs; review of tunnel blasting techniques, recent advances and novel techniques ofblasting

UNIT 5:Rock Cutting: (6 Hours)

Theories of rocktool interactionforsurfaceexcavationmachinery; designofcutterhead - rippers, dozers, scrapers, BWE. Continuous surface miners, auger drills;

Reference Books:

1. Blasting Practices : G.K.Pradhan
2. Explosives and Blasting Practices in Mines : Dr. Sameer KumarDas
3. Drilling : G. Chugh
4. SME – Mining Engineers Handbook
5. Surface Mining – SME . Introduction to Mining : Hartman

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MIA 804 Projects –II (Major)

MIA- 804	**Projects –II (Major)**	**0L:0T:6P**	**16 credits**	**12Hrs/Week**

Preambles:

The object of Project Work II & Dissertation is to enable the student to extend further the investigative study taken up under EC P1, either fully theoretical/practical or involving both theoretical and practical work, under the guidance of a Supervisor from the Department alone orjointly with a Supervisor drawn from R&D laboratory/Industry. This is expected to provide a good training for the student(s) in R&D work and technical leadership. The assignment to normally include:

1. In depth study of the topic assigned in the light of the Report prepared under EEP1;

2. Review and finalization of the Approach to the Problem relating to the assigned topic;

3. Preparing an Action Plan for conducting the investigation, including team work;

4. Detailed Analysis/Modelling/Simulation/Design/Problem Solving/Experiment as needed;

5. Final development of product/process, testing, results, conclusions and future directions;

6. Preparing a paper for Conference presentation/Publication in Journals, if possible;

7. Preparing a Dissertation in the standard format for being evaluated by the Department.

8. Final Seminar Presentation before a Departmental Committee