

MIC-801 MINING SURVEYING – III

UNIT 1: TRIANGULATION

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

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

Definitions of important terms; Determination of azimuth by astronomical observations.

UNIT 4: PHOTOGRAPHIC SURVEYING

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

UNIT 5: MODERN SURVEYING TECHNIQUES

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

List Of Experiment:

1. Study of Triangulation Survey.
2. Study of Correlation Survey
3. Study of Astronomical Survey.

MIC-802 MINING ENVIRONMENT – III

UNIT 1 : SPONTANEOUS HEATING

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

UNIT 2: MINE FIRES

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

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

UNIT 4: MINE INNUNDATION

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

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

List Of Experiments:

1. Study of Spontaneous Heating
2. Study of Fire Damp
3. Study of Rescue Equipments

MIC-803(A) MINING LEGISLATION & SAFETY-II

UNIT -1

Principal Provisions of Mines & Minerals (Regulation & Development) Act – 1957
Coal Mines Conservation & Development Act. – 1960

UNIT -2

Mineral Concession Rules, Indian Electricity Rules related to mining activity

UNIT -3

Byelaws & D.G.M.S. Circulars.
Mines Rescue Rules – 1985

UNIT-4

Mine Accident, their classification and analysis, Causes & preventive measures, Cost of accident, Preparation of Accident report, Court of Enquiry

UNIT-5

Safety Campaign, Causes of major mining accidents which occurred in India & Suggested remedial measures. National Safety Conferences.

Reference Books:

1. Legislation in Indian Mines (A critical Appraisal) Vol. I & II, S. D. Prasad & Prof. Rakesh
2. Coal Mines Conservation & Development Act Mines & Minerals (Development and Regulation) Act Vocational Training Rules
3. Mine Accidents : B. K. Kejariwal
4. Mines Rescue Rules
5. Indian Electricity Rules
6. Mineral Concession Rules
7. D.G.M.S. Circulars and Bylaws

MIC-803(B) COMPUTER APPLICATIONS IN MINING

UNIT 1

Introduction to Software Packages Applicable to Mining Development of Algorithms Slope stability. Pillar design. Open pit configuration.

UNIT 2

Design of mine ventilation system. Optimisation of cycle of operations.

UNIT -3

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

UNIT -4

Modelling of mining pollution phenomena. Management information systems.

UNIT -5

Development of Programs Simple computer programs based on the above algorithms.

Reference Books:

- 1.Computer Applications In Mining- S.P. Mathur
- 2.Computer Applications In Mining- BJ. Bhattacharya

MIC-803(C) MINE AUTOMATION

UNIT 1

Scope and role of automation in mining operation and human related factors. System engineering approach and use of operational data from mining equipment and its use the mining process.

UNIT 2

Data communication and modern computerised control systems Data formats and IREDES, mine process data, AGV technology

UNIT 3

Basic foundations for automation of mining equipment. Navigation, surface navigation and GNSS (satellite navigation), mine planning tools, etc

UNIT 4

Automation of drilling and drill rig, drilling process. Automation of underground loading and transportation systems. Automation in tunnelling projects.

UNIT 5

Automation in monitoring of environments in longwall and continuous mining system Automation of transportation system in surface mining. Use of robotics in mining for production and disaster management purpose

Reference Books:

1. Society of Mining Engineering Handbooks –Vol. I and II
2. Introductory Mining Engineering: Hartman
3. Underground Mining Methods Handbook: Hustrulid (SME NY, 1994)

MIC-804(A) MINE PLANNING

UNIT 1

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

UNIT 2

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

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

UNIT 4

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

MINE SERVICES Design of haulage, hoisting and drainage systems, Design of pit top and pit bottom, Coal handling plants, Railway siding , design of rapid loading system etc

Books Recommended :

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

MIC-804(B) GEOSTATISTICS

UNIT 1

Introduction to Classical statistics, Histograms, mean, median, mode, skewness, Kurtosis, standard deviation, variance, confidence interval, normal and lognormal distribution.

UNIT 2

Different types of mineral reserves, estimation of grade and reserves, Different techniques of grade estimation, rule of nearest point, constant distance weighting technique and inverse distance weighting technique, method of triangles and polygonal method, bench compositing.

UNIT 3

Introduction to Geostatistics, theory of regionalised variable, application of Geostatistics in mining, Covariogram and semivariogram, definitions and their estimation, Parameters of semivariogram, sill variance, nugget effect, range of influence, zonal and directional anisotropy.

UNIT 4

Mathematical representation of semivariogram and covariogram, Semivariogram models and their characteristics, calculation, plotting and fitting of experimental semivariogram.

UNIT 5

Volume-Variance relationship, Extension variance and estimation variance, optimal valuation and kriging, Kriging estimator and kriging error, Kriging of a square block valued by two samples, Grade tonnage relationship.

Reference Books:

1. Geostatistics: Runge
2. Basic Geostatistics: Liu
3. Application of Geostatistics: Isobel Clark

MIC-804(C) ROCK SLOPE ENGINEERING

UNIT 1

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

UNIT 3

Plane Failure : general conditions and failure analysis

UNIT 4

Wedge Failure: general conditions and failure analysis

Circular Failure: general conditions and failure analysis

UNIT 5

Toppling Failure: 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

MIC-805(A) MINING MANAGEMENT

UNIT 1

Evolution Of Management Theory - 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 - 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 - 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 - 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 - 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

MIC-805(B) FUNDAMENTALS OF ROCK MECHANICS INSTRUMENTATION

UNIT 1

Basic Concepts - Sensitivity, range, reproducibility and accuracy, drift, absolute and relative measurements, error, environmental factors and planning for instrumentation.

UNIT 2

Operating Principles -Mechanical, pneumatic, optical, vibrating wire, piezoelectric, electrical and thermal.

UNIT 3

Field Instruments - Load cells, MPBX, tape extensor meters, convergence recorders.

UNIT 4

Laboratory Instruments -Load, stress, deformation, strain measuring instruments.

UNIT 5

Applications In Mining -Coal mining – bord and pillar development, depillaring and Longwall. Metal mining applications

Reference Books:

- 1_Fundamentals Of Rock Mechanics Instrumentation. - [J.C. Jaeger](#).
- 2 Fundamentals Of Rock Mechanics Instrumentation. -[N.G.W. Cook](#) .
3. Fundamentals Of Rock Mechanics Instrumentation. - [R.W. Zimmerman](#) .

MIC-805(C) ROCK EXCAVATION ENGINEERING

UNIT 1

Introduction: 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 : 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; problems of drilling; economics of drilling.

UNIT 3

Blasting: 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; 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 of blasting

UNIT 5

Rock Cutting: Theories of rock tool interaction for surface excavation machinery; design of cutter head - 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 Kumar Das
3. Drilling : G. Chugh
4. SME – Mining Engineers Handbook
5. Surface Mining – SME . Introduction to Mining : Hartman

MIC-806 Industrial Training Project - II **Objectives of the course Industrial Training Project - II**

To provide students with a comprehensive experience for applying the knowledge gained so far by studying various courses. To develop an inquiring aptitude and build confidence among students by working on solutions of small industrial problems. To give students an opportunity to do something creative and to assimilate real life work situation in institution. To adapt students for latest development and to handle independently new situations. To develop good expressions power and presentation abilities in students.

The focus of the Major Project is on preparing a working system or some design or understanding of a complex system using system analysis tools and submit it the same in the form of a write up i.e. detail project report. The student should select some real life problems for their project and maintain proper documentation of different stages of project such as need analysis market analysis, concept evaluation, requirement specification, objectives, work plan, analysis, design, implementation and test plan. Each student is required to prepare a project report and present the same at the final examination with a demonstration of the working system (if any)

Working schedule The faculty and student should work according to following schedule:

Each student undertakes substantial and individual project in an approved area of the subject and supervised by a member of staff. The student must submit outline and action plan for the project execution (time schedule) and the same be approved by the concerned faculty.

Action plan for Major Project work and its evaluation scheme #(Suggestive)

Task/Process	Week	Evaluation	Marks For Term Work#
Orientation of students by HOD/Project Guide	1 st	-	-
Literature survey and resource collection	2 nd	-	-
Selection and finalization of topic before a committee*	3 rd	Seminar-I	10
Detailing and preparation of Project (Modeling, Analysis and Design of Project Work	4th to 5th	-	10
Development stage			
Testing, improvements, quality control of Project	6th to 10th 11 th	-	25
Acceptance testing	12 th	-	10

Report Writing	13th to 15th	-	15
Presentation before a committee (including user manual, if any)	16th	- Seminar-II	30

* Committee comprises of HOD, all project supervisions including external guide from industry (if any)

The above marking scheme is suggestive, it can be changed to alternative scheme depending on the type of project, but the alternative scheme should be prepared in advance while finalizing the topic of project before a committee and explained to the concerned student as well.

NOTE: At every stage of action plan, students must submit a write up to the concerned guide.

MIC - 807 General Proficiency

Objective of GD and seminar- is to improve the MASSCOMMUNICATION and CONVINCING / understanding skills of students and it is to give student an opportunity to exercise their rights to express themselves.

Evaluation will be done by assigned faculty based on group discussion and power point presentation.