Semester VIII

Subject: Mining Surveying - III Code : MI 801

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

Semester VIII

Subject: Mining Machinery - III Code : MI 802

UNIT 1: FACE MACHINERY
Coal and rock Drilling, their constructional details, their applications, operation and maintenance, jumbo drill machines, introduction to coal cutting machine.

UNIT 2: LOADING AND TRANSPORTATION
Rocker shovel, gathering arms loaders, LHD and SDL machines- their construction and operation and maintenance, cavo loader, shuttle car and underground trucks, its construction, operation and application.

UNIT 3: CUTTER LOADERS
Different types of cutter loaders suitable for long wall and short wall faces, their constructions, operation and maintenance, winning methods different types of continuous miner & road headers their suitability, construction, operation and maintenance , mechanics of rock cutting, rock cutting tools and their performance.

UNIT 4: COMPRESSED AIR
Basic concept, compression process, working and constructional features of single stage and multistage compressor, unloading arrangement of compressor, layout of pipelines, transmission of compressed air, testing of compressor, safety features of compressor

UNIT 5: USE OF ELECTRICITY IN MINES
Flame proof enclosures & intrinsically safe apparatus, underground cables, drill panel, gate end box, circuit breakers, remote control (pilot circuit), installation of underground substation, earth leakage protection, cable joining, Electrical signaling provisions of IER related to mines

Reference books:
1. Elements of Mining Vol. III by D. J. Deshmukh
2. UMS Booklet
3. Winning and Working of Coal : R. T. Deshmukh & D. J. Deshmukh
4. Modern Coal Mining Practices : R. D. Singh
5. Longwall Mining : Syd. S. Chaing & Peng
6. Mine Winding & Transport by S.C.Walker

Semester VIII

Subject: Mining Environment - III Code : MI 803

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

Semester VIII

Subject: Elective-II (Mining Planning) Code : MI 8201

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. deshmukh and V.S. Vorobjev
2. Mine Planning by S.P. Mathur
3. Mine Planning by BJ. Bhattacharya

Semester VIII

Subject: Professional Elective-II (Geostatistics) Code : MI 8202

UNIT 1 Introduction to Classical statistics, Histrograms, 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 Geostastistics, theory of reigonalised variable, application of Geostastistics 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 characterics, 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

Semester VIII

Subject: Mining Surveying – III Lab Code : MI 801

List of Practical:

1. Baseline measurement
2. Baseline extension
3. To connect the baseline to main triangulation network
4. Reduction to centre
5. Angle adjustments in triangulation network
6. Plotting the survey by co-ordinate methods
7. Correlation survey by Weisbach triangle method
8. Study of EDM
9. Study of Total station
10. Study of modern Surveying instruments

Semester VIII

Subject: Mining Environment – III Lab Code : MI 803

List of Practical:

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 - Drager 174-A
8. Study of principal and working of Aerolox 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