RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA BHOPAL

Credit Based Grading System

Mining Engineering, VII-Semester

MI7001 - Advanced Surveying

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; Photo theodolite; 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 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

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Mining Engineering, VII-Semester

MI7002 - Strata Control

UNIT 1: SUPPORTS

Timber & steel supports, Examination of roof, Roof bolting, roof stitching, method of supporting roadways. Supporting under different conditions viz. Pit bottom, crossing, junctions, faulted area, longwall faces, depillaring areas and stoping areas, support loads .SSR, CTR, Support plan, Support withdrawal.

UNIT 2: POWERED SUPPORTS

Powered supports - their principles of operation, Classification, designation, constructional features and applications, Hydraulic fluids.

UNIT 3 : STOWING

Principal methods of stowing, their relative merits and applicability, Hydraulic stowing, Pneumatic stowing, Mechanical stowing, Hand packing, face arrangements, pipe wear, pipe jams.

UNIT 4: STRATA CONTROL

Theories of ground movement, Rock pressure due to Narrow and Wide excavation, Front abutment and back abutment, Failure of roof and floor, measurement of strata movement, rock burst, bumps, gas outbursts, pot holes.

UNIT 5: SUBSIDENCE

Theories of subsidence, damage and loss due to subsidence, vertical and lateral movements and their estimation, angle of fracture and angle of draw, factors affecting subsidence, subsidence control, protection of surface structures, design of protection pillars including shaft pillars. Pot holes.

Reference Books:

1. Strata control in mines Chaing & Peng
2. Winning and Working of Coal R. T. Deshmukh & D. J. Deshmukh
3. Modern Coal Mining Practices R. D. Singh
4. D.G.M.S. Circulars (Tech.) 1995 onwards
5. Longwall Mining Syd. S. Chaing & Peng

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Mining Engineering, VII-Semester

MI7003 - Mine Environmental Engineering

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 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

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Mining Engineering, VII-Semester

Elective –III MI7004 (1) - Mine Management

MINE MANAGEMENT

Evolution of management thought. Classical theory. Scientific management Administrative theory, behavioral approach.Neo classical theory. Modern theory. Systems approach. Total quality management.

Management Process

Planning, organizing, directing, motivating, controlling, coordinating and communicating, staffing, manpower planning and recruitment. Performance appraisal, human resource development and planning.

Organizations

Principles of organization .Departmentation.Levels of management and organizational chart.

Management information systems ,human resource development, workers participation in management, trade unionism, inventory control and materials management.

Industrial Relations : Industrial disputes –definitions and causes ,industrial discipline grievance causes and grievance procedure

Reference Books:

1.Mine Management : V.N. Singh
2. Management & Administration : S.K. Gupta
3. Introduction to Management : O.P. Khanna

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Mining Engineering, VII-Semester

Elective –III MI7004 (2) – Surface Mine Planning

Unit I: Dragline, Stripping Shovel Layouts of open pit mines, Methods of sidecasting, Sidecasting by Stripping Shovel and Dragline, Range/ Balancing Diagram, calculation of operating radius. Layouts of waste dumps. Design of Haul roads.

Unit II: Introduction to continuous surface mining equipment, Bucket wheel excavators, constructional features, basic operation and productivity, Continuous surface miner, their construction, basic operation and productivity. Face Layouts.

Unit III: Ultimate pit design, Factors affecting ultimate pit limits; Significance of ultimate pit limits; Manual methods of developing ultimate pit limits. Floating cone technique, Production planning, some basic mine life and plant size concepts, Mine and Mill plant sizing

Unit IV: Introduction to rock slope engineering, Slopes in surface mines and their formation, Pit slopes and their influence on mine economics, Slope/Dump stability, Factors influencing slope/dump stability, various types of slope failure and their geometrical conditions.

Unit V: Determination of factor of safety of a slope under plane and circular failure, planning of slope stability investigations, Stabilization and protection methods for stability of slopes. Waste dump stability parameters

Reference Books:

1. Surface Mining : G.B. Misra
2. Surface mining equipment : Martin
3. Surface Mining : Pfleider
4. Rock slope Engg. : Hoek & Bray
5. SME handbook : Hartman
6. Surface Mine Planning & Design : Hustrulid & Kuchha

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Mining Engineering, VII-Semester

Elective –IV MI7005 (1) – Mine Economics

Mineral Economics

Special features of mineral and mining industry, statistics of important and strategic minerals of India. Grading and pricing of coal ,limestone, bauxite and iron ore. Pricing of metals ,Concentrates and ores .Conservation of minerals. National mineral policy .Global mineral marketing.

Sampling and Estimation of Reserves

Methods of sampling during exploration ,mining and dispatch. Records and analysis of core sampling data. Tenor ,grade and specification. Classification of reserves Estimation of reserves. Application of geostatistics.

Economic evaluation

Break even analysis .Economic appraisal of capital investments by NPV and IRR methods. Comparison of investment alternatives. Feasibility studies. Critical variables, Price forecasting and sensitivity analysis.

Organizational and Financial Management

Forms of business organizations .Sources of finance. Winding up of companies. Wage systems and incentives .Cost accounting and budgetary control.

Reference Books:

1 Mineral Economics: R.T.DESHMUKH
2 SME Hand book:VOL I
3 Mineral Economics :Sinha and Sharma

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Mining Engineering, VII-Semester

Elective –IV MI7005 (2) – Mine Safety Engineering

CONTENTS

Safety management systems in Indian mining industry; engineering aspects of safety management Basic concept of risk, reliability and hazard potential; elements of risk management ;statiscal methods; control charts; appraisal of advanced techniques –fault tree analysis ,failure mode and effect analysis, quantitative structure activity relationship analysis ;fuzzy model for risk management .

Measurement of safety efficiency; safety audit methods; safety record management.

Safety legislations, Safety meetings, constitution of safety committees, functions, pit safety committee

Ergonomics, Safety practices in various operations, blasting, drilling, equipment and machine handling, site specific safety, ground control, ventilation and gases; safety codes, implementation and monitoring of safety programmes Recent Trends of development of Safety engineering approaches. Safety training.

Reference Books:

1 Mine safety by Prof. Kejriwal
2 occupational Safety and Health in Industries and Mines by C.P. Singh
3 Indian Mining Legislation – A Critical Appraisal by Rakesh & Prasad