MI-801(1)

Safety Engineering

UNIT I Introduction to accidents prevention and safety in industry

Terminology, reason for preventing accidents – moral, cost, legal. Safety scenario in Indian mines, Accidents in Indian mines, Measurement of safety performance, Statistical analysis of mine accidents. Causes of Accidents, accident report, accident analysis and control, cost of accidents, statistical and economical analysis of accident data.

UNIT II System Engineering Approach to Safety

Techniques used in safety analysis, Generic approach to loss control with in mining operations. Safety management and organization, Risk management, Risk identification, Risk estimation and evaluation, Risk minimization techniques in mines. Risk analysis using FTA, HAZOP, ETA etc; Risk analysis softwares; health risk assessment and epidemiological studied.

UNIT III Human Behavioral

Training, Human Behavioral approach in Safety, safety polices safety audit and safety management. Mines emergency organization for disaster management.

UNIT IV Prevention Accidents

Common causes and measures for prevention Accidents due to ground movement: Falls of roof and sides in underground coal mines Accidents due to rope haulage: Common causes and measures for prevention.

UNIT V Measures for Prevention

Common causes and measures for prevention. Accidents due to electricity: Common causes and measures for prevention. Inundations: Dangers from surface and underground water

TEXT BOOKS:

1. Mine Safety and Legislation, Samir Kumar Das, Lovely Prakashan.
2. Safety in Mines, B.K. Kejriwal, Lovely Prakashan.
3. System Safety Engineering and Risk Assessment: A Practical Approach, N.J. Bahr, Taylor and Francis, NY, 1997.

REFERENCE BOOKS:

1. DGMS CIRCULARS: MINES ACT
2. Occupational Safety and Health in Industries and Mines by C.P. Singh, Black Diamond Publishers
3. Indian Mining Legislation – A Critical Appraisal by Rakesh & Prasad, Tara Book Agency.

MI-801(2)

GIS & Remote Sensing in Mining

Unit I Introduction to Remote Sensing

Terminology In Remote Sensing, Types Of Remote Sensing, Advantages and Disadvantages Of Remote Sensing Data, Electromagnetic Radiation, Atmospheric Windows, Remote Sensing Platforms and Sensors Systems, Path-Row Referencing System, Remote Sensing Data Product, Procedure for Obtaining Satellite Data. Hardware and Software related to Remote Sensing.

Unit II Image Interpretation And Analysis

Elements of Visual Image Interpretation, Digital Image Pre-Processing, Radiometric Correction, Geometric Correction, Resolution Of Remote Sensing Data, Image Enhancement, Contract Enhancement, Spatial Filtering, Band Ratioing Image Classification, Supervised And Unsupervised Classification. Remote Sensing Applications in Forestry, Geology, Hydrogeology, Land use and Land Cover Mapping.

Unit III Fundamentals of GIS

Basic Concepts including Definition and History of GIS, Essential Elements of GIS, Uses and Users of GIS, General GIS Applications, Advantages of GIS. Geodesy, Grids, Datum's and Projection Systems, GIS Data Formats, GIS Layers and Digitization. Overview of GPS and its Applications. Hardwares and Softwares related to GIS.

Unit IV Raster and Vector Based GIS

Raster based GIS, Definition and Concept of Raster Based GIS, Spatial referencing, Definition and Representation of Raster Data. Vector based GIS, Definition and Concept of Vector Based GIS, Data Structures, Data Capture and Basic Operations of Spatial Analysis, Advantages and Disadvantages in Raster and Vector Based GIS, Introduction to Networks in GIS. GIS-Project lanning, Management and Implementation.

Unit V

Application of computers in mining

Reference Books

1. Digital Image Processing - R.C. Gonzalez & R.E. Woods Pearson Edu. Asia
2. Principles of Geographical Information Systems- P.A. Burrough & R.A. McDonnell Oxford
3. Text Book of Remote Sensing - C.S.Agawal & P.K.Garg Wheeler
4. Remote Sensing of The Environment - J.R. Jensen Pearson Education
5. Dictionary of Remote Sensing - S. M. Rashid
6. Introduction to GIS - I. Heywood, S. Cornelius & S. Carver Pearson Edu. Asia
7. Introduction to GIS – Demers

MI-801(3)

Ecology and sustainable development

UNIT I INTRODUCTION

Sustainable development, environmental carrying capacity - concepts & principles; Environmental impacts of mining and associated activities. Ecology: Introduction to ecology, ecosystem structures and functions.

UNIT II AIR POLLUTION

Atmospheric composition and meteorology; Sources of air pollution – point and non-point; Emission factors; Control measures – extraction, suppression and consolidation of dust. Noise and vibration: Basic concepts, sources, monitoring and control measures.

UNIT III WATER POLLUTION

Global hydrological cycle; Self purification mechanism, sources of water pollution, important parameters–pH, turbidity, oil & grease, nitrates, DO, BOD, COD; Eutrophication, deoxygenating, acid mine drainage and heavy metal pollution– preventive and control measures.

UNIT IV LAND ENVIRONMENT

Land degradation due to mining; Physical and biological reclamation. Environmental administration: Laws related to mining environment; EIA of mining projects.

UNIT V LAND ACQUISITION & REVENUE:

Concepts: Related laws and regulations. Corporate Social Responsibility: Concepts and principles. Mine closure: Concepts and principles.

TEXT BOOKS:

1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
2. Environmental Studies by R. Rajagopalan, Oxford University Press.

REFERENCE BOOKS:

1. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela .2008 PHI Learning Pvt. Ltd.
3. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha Kaushik, 4th Edition, New age international publishers.
5. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications

MI-802

Disaster Management

UNIT I Understanding Disasters

Understanding the Concepts and definitions of Disaster, Hazard, Vulnerability, Risk, Capacity – Disaster and Development, and disaster management

UNIT II Types, Trends, Causes, Consequences and Control of Disasters

Geological Disasters (earthquakes, landslides, tsunami, mining);Hydro- meteorological Disasters (floods, cyclones, lightning, thunder-storms, hail storms, avalanches, droughts, cold and heat waves) Biological Disasters (epidemics, pest attacks, forest fire); Technological Disasters (chemical, industrial, radiological, nuclear) and Manmade Disasters (building collapse, rural and urban fire, road and rail accidents, nuclear, radiological, chemicals and biological disasters) Global Disaster Trends – Emerging Risks of Disasters – Climate Change and Urban Disasters

UNIT III Disaster Management Cycle and Framework

Disaster Management Cycle – Paradigm Shift in Disaster Management Pre-Disaster – Risk assessment and Analysis, Risk Mapping, zonation and Microzonation, Prevention and Mitigation of Disasters, Early Warning System; Preparedness, Capacity Development; Awareness During Disaster – Evacuation – Disaster Communication – Search and Rescue – Emergency Operation Centre – Incident Command System – Relief and Rehabilitation – Post-disaster – Damage and Needs Assessment, Restoration of Critical Infrastructure – Early Recovery – Reconstruction and Redevelopment; IDNDR,Yokohama Stretegy, Hyogo Framework of Action

UNIT IV Disaster Management in India

Disaster Profile of India – Mega Disasters of India and Lessons Learnt Disaster Management Act 2005 – Institutional and Financial Mechanism National Policy on Disaster Management,

National Guidelines and Plans on Disaster Management; Role of Government (local, state and national), Non-Government and Inter Governmental Agencies

UNIT V Applications of Science and Technology for Disaster Management

Geo-informatics in Disaster Management (RS, GIS, GPS and RS) Disaster Communication System (Early Warning and Its Dissemination) Land Use Planning and Development Regulations Disaster Safe Designs and Constructions Structural and Non Structural Mitigation of Disasters S&T Institutions for Disaster Management in India

TEXT BOOK

1. Natural Hazards and Disaster Management: Vulnerability and Mitigation" by R. B. Singh "Disaster Management and Mitigation" by Prof. R.B. Singh
2. Disaster Management: Disaster Management and Mitigation approaches in india" by Paritosh Srivastava"
3. Disaster Management at Health Care Settings Comprehensive Assessment and Effective Mitigation" by Shreen Gaber

MI-803

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, Frame support, Chock support, shield support & chock shield support: Classification, designation, constructional features, merits demerits and applications, Hydraulic fluids, power pack.

UNIT 3 : STOWING

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

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, Causes and preventive measures against Rock burst, Bumps& Gas outbursts.

UNIT 5: SUBSIDENCE

Theories of subsidence, Types 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 protective pillars including shaft pillars. Pot holes.

REFERENCES:

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

LIST OF PRACTICAL TO BE PERFORMED:

1. Study of Conventional support systems.
2. Study of constructional features and working of Friction props
3. Study of constructional features and working of Hydraulic props
4. Study of methods to support roof by roof bolts, roof stitching and cable bolts
5. Study of withdrawal of supports by Sylvester prop withdrawer
6. Study of methods to support junctions and faulted area
7. Study of constructional features and working of Powered Supports
8. Study of Hydraulic stowing System and the arrangement required for it
9. Study of pneumatic stowing System and the arrangement required for it
10. Study of Subsidence measurement technique

MI-804

Mining Machinery III

UNIT 1: FACE MACHINERY

Drills for coal and stone: their constructional details, Drill jumbos: their applications, operation and maintenance, Introduction to coal cutting machine.

UNIT 2: LOADER AND TRANSPORTING MACHINE

Rocker shovel, gathering arms loaders, LHD and SDL machines: their construction, operation and maintenance, Cavo loader, shuttle car and underground trucks: their 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, different types of road headers: their construction, operation and conditions of applicability, 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, In bye compressors.

UNIT 5: USE OF ELECTRICITY IN MINES

Flame proof apparatus, intrinsically safe circuits, underground cables, drill panel, gate end box, circuit breakers, remote control (pilot circuit), 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

LIST OF PRACTICAL TO BE PERFORMED:

1.Study of working and construction of Rotary Coal Drill Machine used in U/G Coal Mine.
2. Study of working and construction of Jack hammers drill used in Metal Mine.
3. Study of working and construction of Long Wall Coal Cutting Machine
4. Study of working and construction of Side dump loader.
5. Study of working and construction of a LHD
6. Study of Double ended ranging drum shearer.
7. Study of drill panel and gate end box.
8. Study of working and construction of Gathering Arm Loader.
9. Study of working and construction of Coal Plough.
10. Study of working and construction of Torque Convertor.
11. Study of working and construction of Reciprocating Compressors.

MI-805

Major Project

The objective of the project work is to enable the students in convenient groups of not more than 4 members on a project involving theoretical and experimental studies related to the Mining engineering branch of study. Every project work shall have a guide who is the assigned faculty member of the institution. Each student shall finally produce a comprehensive report covering background information, literature survey, problem statement, project work details and conclusion. This final report shall be typewritten form as specified in the guidelines. The continuous assessment shall be made as prescribed by the regulation.

MI-806

Geovia Insite

LIST OF PRACTICAL TO BE PERFORMED:

1. Tracks the quality and quantity of materials across operations
2. Provides accounting of material flows to manage product inventory
3. Supports Material Reconciliation at all stages of the process and accounts for production variances
4. Streamlines daily, weekly and monthly Production Reporting
5. Enabling in-shift control and support of material reconciliation across the mining value chain