MI-701(A)

Mine Legislation & Safety-II

Unit -1 Principal Provisions of Mines & Minerals (Regulation & Development) Act – 1957

Unit – 2 Coal Mines Conservation & Development Act. - 1960

Unit-3.Mineral Concession Rules, Indian Electricity Rules related to mining activity.

Unit-4.Byelaws & D.G.M.S. Circulars. ,Mines Rescue Rules - 1985

Unit-5.Mine Accident, their classification and analysis, Causes & preventive measures, Cost of accident, Preparation of Accident report, Court of Enquiry.

Unit-6.Safety Campaign, Causes of major mining accidents which occurred in India & Suggested remedial measures. National Safety Conferences

Refrence Book

1 Legislation In Indian Mines.Vol.1 ,Vol.2 S.D.Prasad & Prof. Rakesh.

2 Mine Accidents: B.K.Kejriwal

3 Mine Rescue Rules.

4 Indian Electric Rules.

5 D.G.M.S. Circular & Bylaws.

MI-701(B)

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. Hardwares and Softwares related to Remote Sensing.

UNIT II

Image Interpretation And Analysis: Elements of Visual Image Interpretation, Digital Image PreProcessing, Radiometric Correction, Geometric Correction, Resolution Of Remote Sensing Data, Image Enhancement, Contract Enhancement, Spatial Filtering, Band Ratioing Image Classification, SupervisedAnd Unsupervised Classification. Remote Sensing Applications in Forestry, Geology, Hydrogeology, Landuse 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 ofVector 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 Planning, Management and Implementation.

UNIT V

Application of computers in mining

REFERENCE BOOKS

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

MI-701(C)

Sri Satya Sai University Of Technology & Medical Science Sehore (M.P)

Ecology and sustainable development

UNIT I

Nature of ecology and sustainable development Definition, scope of ecology an sustainable development, geomorphology, oceanography, climatology and biogeography.

UNIT II

Energy and environment Introduction of energy environment, use of solar cells for heating and operated drills, methane gas digesters, environmentally friendly method of energy conservation, difference between conventional and non-conventional energy sources, future trends of energy systems.

UNIT III

Theory of isostasy Concept of isostasy for sustainable development, discovery of the concept, concept of Hayford and Bowie, Joly, and Holmes, Global isostatic adjustment.

UNIT IV

Physical geography and man human impact on the natural environment Modification of land forms, direct alternation of land forms, wind deflation, coastal erosion and deposition, modification of the atmosphere, ultration process in eco and energy systems.

UNIT V

Obstacles in sustainable development Pollution growth, species extinction, restriction of bat lands, desertification, soil erosion, soil pollution, characterisation of contaminated soil, global warming and ozone depletion etc.

TEXT BOOKS

- Energy and environment – Fowler (McGraw Hill, New Delhi) Restoration Ecology and sustainable development –
- Krystyna M. Urbanska et.al. (Cambridge University Press, U.K.)

REFERENCE BOOKS

- Reuniting Economy and Ecology in Sustainable Development – Russ Beaton et.al.
- Theory and implementation of economic models for sustainable development – Jeroen C.J.M. Van Den Bergh
- Economy and Ecology: Towards sustainable development – F. Archibugi et.al.
- Evaluating Sustainable Development: Giving People a voice in their destiny – OkechukwuUkaga et.al

MI -702

Mine Planning & Development

UNIT I

Coal reserves and their estimation, Geological and technological data needed for mineplanning, Preparation of project and feasibility reports, Planning and scheduling of variousmining operations.

UNIT II

Planning and scheduling of various mining operations, linear programming, Simplexmethods and transportation problem. Operation Research - Scope of application in mining,Linear programming, formulation and solution, Network planning with special reference toCPM/PERT, System approach for project scheduling.

UNIT III

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

UNIT IV

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 V

Mine Services Design of haulage, hoisting and drainage systems, Design of pit top and pit bottom, Coalhandling plants, Railway siding etc.

TEXT BOOKS

- Advance Coal Mining by R.T. deshmukh and V.S. Vorobjev
- Mine Planning by S.P. Mathur
- Mine Planning by BJ. Bhattacharya

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MI-703

Rock mechanics

UNIT I

Application of rock mechanics in mining, Definition of important terms used in Rock mechanics, Classification of rock mass, Parameters of rock mass classification, Importance of rock mass classification, RQD, Q –system and Bieniskiwi's Geomechanics classification of rock mass.

UNIT II

Rock properties, Physico-mechanical properties of rock, Preparation and testing ofspecimen in the laboratory, ISRM standards, Determination of Physico-mechanical properties of rock as per ISRM standard testing procedures, Strength indices and their importance. Point load, Protodyaknov, Impact and Cone Indenter strength Index.

UNIT III

Rock as an elastic medium, Principle of elastic analysis, Rheological properties of rock, Importance of rheological models, Different types of rheological models, Dynamic properties of rocks, Anisotropy and Creep.

UNIT IV

Principal stress and Principal plane, Analytical method of determining the magnitudes and directions of normal and shear stress on failure plane, Mohr's circle, Theories of failure of rock, CoulombNavier theory, Mohr's theory, Griffith's theory, Empirical theories of failure ofrock, Different modes of failure of rock.

UNIT V

Earth stresses, Importance of measurements of in situ stress, measurements of insitu stress by Flat jack, Overcoring and Hydraulic fracturing technique. Design of circular and elliptical openings. Determination of safe span of roof.

TEXT BOOKS

- Rock Mechanics By Obertabd Duvall
- Rock Mechanics By Goodman
- Rock Mechanics By Jager& Cook
- Rock Mechanics by B.S. Verma

LIST OF PRACTICAL TO BE PERFORMED

- Determination of moisture content of rock sample by ISRM standard method
- Determination of porosity of rock sample by ISRM standard method
- Determination of Density of rock sample by ISRM standard method
- Determination of slake durability strength index of rock sample by ISRM standard method
- Determination of point load strength index of rock sample
- Determination of Proto-dyakonov strength index of rock sample

MI -704

Mineral Dressing

UNIT I CRUSHING & GRINDING

Introduction, definition, scope and economic justification, main steps in ore dressing operations, general preliminary mineralogical investigations, comminuation-crushing-principles of crushing, reduction jaw crushers, gyratory crushers, cone crushers, rolled crushers, gravity stamps their classifications and applications, grinding-principles of grinding units, application andclassification of ball mills, rod mills, tube mills and pebble mills.

UNIT II SIZING

Object of sizing, scale of sizing, laboratory sizing, screening and classification , different type of screens, their mode of operations and application and limitation, classification-principles of classification, movement of solids through fluids, Stoke's law, Reynold's Number, different types of classifiers, hydraulic and pneumatic classifiers, sampling-importance of sampling and methods used.

UNIT III GRAVITY CONCENTRATION

Jigging, Flowing film concentrators like spirals and shaking tables, heavy media separationtheory, applications and limitations of methods.

UNIT IV FLOATATION

Physico-chemical principles, function of various floatation reagents, important machines, their principles, and working, floatation of sulphide, oxide and non sulphide ores.

UNIT V ELECTROSTATIC AND MAGNETIC SEPARATION

Principle and operation and field of application, Pelletisation of low grade iron ore, Drying and dewatering - thickening, filtration and drying. Coal washing- Simplified flow sheets forbeneficiation of coal and typical ores of copper, lead, zinc, iron and manganese ores withspecial reference to Indian deposits.

TEXT BOOKS

- Ore Dressing by Gaudin
- Ore Dressing by B. A. Wills

LIST OF EXPERIMENTS TO BE PERFORMED

- Study of Jaw crusher
- Study of roll crusher
- Study of grinding mills
- Study of Akin's classifier
- Study of shaking table
- Study of Mineral jig.
- Study of spiral concentrator

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MI -705

Underground Coal Mining

UNIT I INTRODUCTION

Origin of Coal, Theories of Coal Formation, Classification of Coal, Coaking Coal, Coal Seam and its Classification, Coal Seam Structures and Abnormalities like Faults, Joints, Cleats, Folds etc., Coal Measuring Rocks and Their Characteristics, Distribution of Coal in India, Indian Coal Mining Industry; Choice of Coal Mining Methods.

UNIT II BOARD AND PILLAR METHOD

Important Terminology, Development Size and Shape of The Pillar, Galleries, Panel System and Without Panel System of Development, Size of Panel, Cycle Of Operation, Depillaring, Problems in Depillaring, Preparatory Arrangements, Depillaring by Stowing, Depillaring by Caving Methods, Pillar Extraction Techniques, Dangers Associated With Depillaring.

UNIT III LONGWALL MINING

Important Terminology, Types of Longwall Faces and Their Choice, Merits and Demerits of Longwall Mining, Development of Longwall Panels and Faces, Longwall Advancing Method, Longwall Retreating Method, Length of Longwall Faces, Rate of Face Advance, Double Unit Longwall Faces, Face organization and material supply.

UNIT IV THICK SEAM MINING

Problem in Mining of Thick Seams, Choice of Thick Seam Mining Methods, Inclined Slicing, Horizontal Slicing, Diagonal Slicing, Transverse Slicing, Sublevel Caving, Blasting Gallery Method, Cable-Bolting Method of Thick Seam Extraction.

UNIT V ROOM AND PILLAR MINING

Vermelles Method, Slant Method, Sublevel Method, Coal Saw Method, Mining of Contiguous Seams, Mining of Steeply Inclined Seam, Mining Under Water, Mining of Seams Prone to Spontaneous Heating, Bumps, Air blast etc.

TEXT BOOKS

- Principle and practices of modem Coal Mining – R.D. Singh
- Coal Mining in India – S.P. Mathur

REFERENCE BOOKS

- Wining & working coal – R.T. Deshmukh
- U/G winning of Coal – T.N. Singh

LIST OF EXPERIMENT

- Study of layouts of Board and Pillar development working by without panel system.
- Study of layouts of Board and Pillar development working by panel system.
- Study of layout of Logwall Advancing system.
- Study of layout of Logwall Retreating system.
- Study of various line of extraction used for pillar extraction.
- Study of stook extraction method under difficult roof conditions.

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MI -706

Minor Project & Seminar

MI -707
Industrial Training (Two Week)