UNIT - I

1.1 Concept of ore genesis. McKenzie's fluid and their migration
1.2 Geochemistry and Fluid inclusion in ores
1.3 Mineral deposits associated with geosynclines and different types of plate margins
1.4 Controls of ore localization. Wall rock alteration
1.5 Paragenesis and zoning in mineral deposits. Metallurgical epochs and provinces with special reference to India

UNIT - II

2.1 Fluid inclusions in minerals. Fluid inclusions in igneous, metamorphic, and hydrothermal fluids
2.2 Fluid inclusions in rocks. Fluid inclusion in quartz, feldspar, and dolomite
2.3 Fluid inclusion in minerals and characteristic minerals with suitable inclusions
2.4 Regional metamorphic processes
2.5 Contact metamorphic processes
2.6 Fluid inclusions in Carbonate, K-feldspar, and other minerals. Contact metamorphism, Epithermal, Metasomatite, Epithermal, and Xenothermal
2.7 Fluid inclusion in minerals and Mechanical Concentration

UNIT - III

3.1 Controlling factors for ore body formation. Structure and characteristic minerals with suitable inclusions, examples of the Orogenic and Supergene Enrichment, Regional and Thermal metamorphic processes
3.2 Geological environment of ore occurrence. Genesis and distribution of the major world famous deposits of iron, gold, copper, and lead-zinc
3.3 Ore Microscopy - basic principles and concept. Physical and optical properties of the ore minerals
3.4 Textures and Structures of the ore minerals
3.5 Paragenesis and their determination. Applications of Ore Microscopy

UNIT - IV

4.1 Open Pit Mining
4.2 Basic Concepts and terminology, drilling and blasting in open pit mining
4.3 Advantages and limitations, geological and phsytopgraphical conditions for open pit mining
4.4 Open pit mining methods - Manual and mechanized, Glory hole, Kenlin mining
4.5 Block mining
4.6 Other mining

UNIT - V

5.1 Basic concepts and terminology, classification and choice of mining
5.2 Subidence, rock bursts, mine supports
5.3 Open stopes, overhand and underground stoping
5.4 Slicing, Caving, and Subsidence stoping
5.5 Coal mining methods - Board and pillar, Long wall, Curtain and subcertain mining methods

Books Recommended

Arya, R.P.N., 1996: Course in Mining geology.


INIAN MINERAL DEPOSITS AND MINERAL ECONOMICS

Unit - I
1.1 A brief review of mineral deposits of India - their history and development. Surplus and deficiency positions in mineral sector of the country.
1.2 Geologic environments, mode of occurrence, genesis and distribution in India and uses with examples of the following metaliferous deposits:
   1.3 Iron
   1.4 Manganese
   1.5 Chromium

Unit - II
Geologic environments, mode of occurrence, genesis and distribution in India and uses with examples of the following metaliferous deposits:
2.1 Copper
2.2 Lead and Zinc
2.3 Aluminium
2.4 Tin, Tungsten
2.5 Nickel, Molybdenum

Unit - III
Geologic environments, mode of occurrence, genesis and distribution in India and uses with examples of the following:
3.1 Gold, Silver, Beryllium, Magnesium, Zirconium and related Rare Earths
3.2 Atomic energy minerals
3.3 Glass, Ceramic and Refractory Electrical and Abrasives
3.4 Chemical Fertilizers, Cement and Building materials
3.5 Precious and Semi Precious stones

Unit - IV
Geology, mode of occurrence, and distribution of the following deposits of India with their grades and products:
4.1 Coal (Godawara Coals)
4.2 Tertiary Coal
4.3 Oil and gas fields of eastern India
4.4 Oil and gas fields of western India
4.5 Off shore oil and gas fields.

Unit - V
Mineral Economics
5.1 Concept and scope of mineral economics
5.2 National Mineral Policy
5.3 Mines and mineral legislation of India, Law of international sea bed
5.4 Conservation of minerals, strategic, essential and critical minerals
5.5 Mineral economics of common ore and economic minerals of India

Books Recommended
Unit I: Geological Exploration

1.1 Definition and characteristic features, Scope of prospecting and exploration, surface and subsurface methods.
1.2 Guides for mineral search - physiographic, stratigraphic, lithological, mineralogical and structural guide.
1.3 Pitting, trenching, drilling for prospecting, diamond and churn drilling.
1.4 Sampling methods - different methods of sampling, channel and bore hole sampling.
1.5 Ore reserve categories and estimation.

Unit II: Geophysical Exploration

   Basic principles, field procedures, corrections, interpretations, applications and limitations of the following methods:

2.1 Gravity
2.2 Magnetic
2.3 Seismic
2.4 Electrical - self potential, resistivity and electromagnetic methods.
2.5 Radioactive

Unit III: Geochemical Exploration

3.1 Geochemical principles - Geochemical cycle, mobility, geochemical tracers, anomalies and background values.
3.2 Dispersion patterns - Primary, secondary.
3.3 Geochemical surveys - Exploration sequence, sampling techniques of rock, soil, stream sediments, water, vegetation and vapour.
3.4 Field and laboratory analytical methods, treatment of geochemical data and preparation of geochemical anomaly maps.
3.5 Selected Indian case histories of geochemical exploration of Copper, Lead, Zinc, Nickel and Chromium.

Unit IV: Mineral Beneficiation - I

4.1 Introduction, principles and economic justification of mineral dressing, properties of rocks and minerals as applied to mineral dressing.
4.2 Communion part - 1 - Crushing.
4.3 Communion part - 2 - Grinding.
4.4 Liberation, Sizing and Screening.
4.5 Classification - Principles and mechanism, classifiers.

Unit V: Mineral Beneficiation - II

5.1 Gravity concentration and Heavy media separation.
5.2 Magnetic and Electrical separation.
5.3 Flotation methods - Principles and techniques.

Flow sheets of following important ores and minerals:

5.4 Copper, lead-zinc, iron, manganese, chromite.
5.5 Gold, coal, beach sand, fluorite and limestone.

Books Recommended

Unit - I  
Introduction and Basic Principles  
1.1 Environment - Definition and Concept.  
1.2 Basic Environmental problems  
1.3 Environmental Geosciences - Fundamental Concepts  
1.4 Geosience factor in environmental planning

Unit - II  
Earth and its Environmental System  
2.1 Conservation of matters in various Geospheres - lithosphere, hydrosphere, atmosphere, and biosphere.  
2.2 Earth’s thermal environment and season  
2.3 Concept of ecology and ecosystem  
2.4 General relationship between landscape, climate and biomass.

Unit - III  
Natural Hazards  
3.1 Natural hazards - Nature, zoning, risk assessment and mitigation measures  
3.2 Seismic and Volcanic hazards and their environmental impact  
3.3 Landslides and subsidence and their environmental impact  
3.4 River flooding and coastal hazards and their environmental impact

Unit - IV  
Pollution and Waste Disposal  
4.1 Pollution of surface and subsurface water.  
4.2 Behaviour of pollutants in riverine, lacustrine, estuarine, and marine environment  
4.3 Air and Noise Pollution - nature and effects  
4.4 Waste (solid, liquid, gases) - their impacts, disposal, management and control

Unit - V  
Environmental Health and Environmental Law  
5.1 Geologic factors of environmental health.  
5.2 Chronic diseases, and geologic environment - heart disease and cancer  
5.3 Environmental Policy and Law  
5.4 Environmental legislation in India

Books Recommended