

Unit - I

- 1.1 Concept of ore genesis, Mineralising fluids and their migration.
- 1.2 Geothermometry 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. Metallogenic epochs and provinces with special reference to India

Unit - II

- 2.1 Classification of mineral deposits
Controlling factors, form, size, texture, structure and characteristic minerals with suitable examples of the following processes :-
- 2.2 Magmatic, Pegmatitic and Contact metasomatic
- 2.3 Hydrothermal, Cavity filling and Replacement, Hypothermal, Mesothermal, Epithermal, and Xenothermal
- 2.4 Sedimentary, Bacteriogenic, Volcanogenic and Evaporation
- 2.5 Residual and Mechanical Concentration

Unit - III

- 3.1 Controlling factors, form, size, texture, structure and characteristic minerals with suitable examples of the Oxidation and Supergene Enrichment, Regional and Thermal metamorphic processes
- 3.2 Geological environment, mode of 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 Open Cast Mining

- 4.1 Basic Concepts and terminology, drilling and blasting in open pits
- 4.2 Advantages and limitations, geological and physiographic conditions for open pit mining
- 4.3 Open pit mining methods - Manual and mechanised, Glory hole, Kaolin mining.
- 4.4 Bench mining
- 4.5 Alluvial mining

Unit - V Underground Mining

- 5.1 Basic concepts and terminology, classification and choice of mining
- 5.2 Subsidence, rock bursts, mine supports
- 5.3 Open stopes, overhand and underhand stopping
- 5.4 Slicing, Caving, and Shrinkage stopping
- 5.5 Coal mining methods - Board and pillar, Long wall, Horizon and miscellaneous mining methods.

Books Recommended

- Arogyasami, R.P.N., 1996: Courses in Mining geology.
Boyle, R.W., 1992: Geochemical Pro9specting for Thorium and Uranium Deposits. Elsevier.
Clark, G.B., 1967: Elements of Mining. III Ed. John Wiley.
Craig, J.M. and Vaughan, D.J., 1981: Ore Petrography and Mineralogy. John Wiley.
Evans, A.M., 1993: Ore Geology and Industrial Minerals. Blackwell.
Faure, G. 1986: Principles of Isotope Geology. John Wiley.
Guilbert, J.M. and park, Jr.C.F., 1986: The Geology of Ore Deposits. Freeman.
Holson, G.D., and Tiratsoo, E.N., 1985: Introduction to Petroleum Geology. Gulf Pub.
Klemm, D.D. and Schneider, H.G.J., 1977: Time and Strata Pound Ore Deposits. Springer Verlag.
Mckinstry, H.E., 1962: Mining Geology. II Ed., Asia Pub. House.
Mookherjee, A., 2000: Ore genesis- a Holistic Approach. Allied Publisher.
Sawking, F.J., 1984: Metal deposits in relation to plate tectonics: Springer Verlasg.
Stanton, R.L., 1972: Ore Petrology. McGraw Hill.
Torling, D.H., 1981: Economic Geology and Geotectonics. Black well Sci. Publ.

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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
 Geological environments, mode of occurrence, genesis and distribution in India and uses with examples of the following metaliferrous deposits :-
- 1.2 Iron
 1.3 Manganese
 1.4 Chromium
 1.5 Titanium

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Unit - II

- Geological environments, mode of occurrence, genesis and distribution in India and uses with examples of the following metaliferrous deposits :-
- 2.1 Copper
 2.2 Lead and Zinc
 2.3 Aluminium
 2.4 Tin, Tungstan
 2.5 Nickel, Molebdenum

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Unit - III

- Geological 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
 Geological environments, mode of occurrence, genesis, distribution, specification, grades and industrial uses of the minerals used in following industries with special reference to India
- 3.3 Glass, Ceramic and Refractory Electrical and Abrasives
 3.4 Chemical Fertilizers Cement and Building materials
 3.5 Precious and Semi Precious stones

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Unit - IV

- Geology, mode of occurrence, and distribution of the following deposits of India with their grades and products :-
- 4.1 Gondwana Coals
 4.2 Tertiary Coals
 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.

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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

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Books Recommended

- Chandra, D., Singh, R.M., and Singh, M.P., 2000: Textbook of Coal (Indian Context). Tata Book Agency.
 Dahlkamp, F.J. 1993: Uranium Ore Deposits. Springer Verlag.
 Holson, G.D., and Tiratsoo, E.N., 1985: Introduction to Petroleum Geology. Gulf Pub.
 Levenson, A.I., 1958: Geology of Petroleum. W.H. Fredman.
 North, F.K. 1985 Petroleum Geology. Allen and Unwin.
 Selley, R.C., 1998: Elements of Petroleum Geology. Academic Press.
 Singh, M.P. (Ed), 1998: Coal And Organic Petrology. Hindustan Pub. Corp.
 Tissot, B.P. and Welle, D.H. 1984: Petroleum Formation and Occurrence. Springer Verlag.

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KNT - 303 MINERAL EXPLORATION AND MINERAL BENEFICIATION

Unit - I Geological Exploration I

- 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 guides.
- 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 reserves 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 Comminution part - 1 - Crushing
- 4.3 Comminution 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 limestones

Books Recommended

Arogyasami, R.P.N., 1996: Courses in Mining geology.
Boyle, R.W., 1998: Geochemical Prospecting for Thorium and Uranium Deposits. Elsevier.
Clark, G.B., 1967: Elements of Mining. III Ed. John Wiley.
Dobrin, M.B. 1976 : Introduction to Geophysical Prspecting. Mc Graw Hill. :
Mekinsty, H.E., 1962: Mining Geology. II Ed., Asia Pub. House.
Paranis, D.S. 1975 : Principles of applied geophysics, Chapman and Hill

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