

GEOL 5302. Ore Geology (3 credits)

Unit – 1

Textures and structures of ore and gangue minerals. Fluid inclusions; wall rock alteration. Paragenetic sequences; zoning, dating of ore deposits. Major theories of ore genesis. Mineralization in space and time: Global distribution of ore deposits; Metallogenic provinces and epochs; plate tectonic controls in mineralization. Principles and applications of ore microscopy.

Unit – 2

Ore deposits and environments. Diamond deposits in Kimberlites and Lamprophyres- Alkaline igneous ore environments; the pegmatitic environments; orthomagmatic deposits of Cr, Pt, Ti, Fe, Cu, Ni deposits associated with basic and ultrabasic rocks. Disseminated sulphide, Oxide and sulphate deposits of sedimentary and volcanic environments, hydrothermal deposits. Stratabound deposits, sedimentary deposits; role of metamorphism in ore genesis. Ore deposits associated to weathering & weathered surfaces.

Unit – 3

Mineral Deposits of India- Iron deposits – Mineralogy, classification of iron-ore deposits, grades of iron ore, geological distribution in India, BIF – BHQ, BMQ, Iron deposits esp of Kerala, Bihar, Orissa, Karnataka

Types, grades, mineralogy, uses, origin and occurrences of Manganese (esp. Bihar, Orissa) chromium (esp. of south India), Bauxite (classification based on origin and shape) and copper deposits (esp. Khetri and Malanjkhand) in India. Origin and occurrence of Lead and Zinc, Mica, Gold, PGE, Diamond, Uranium and Thorium deposits of India.

Unit - 4

Mineral Deposits of India. Placer deposits of Kerala – General geologic and geomorphic setting, Ilmenite and rutile, monazite, Zircon, Sillimanite, Garnet, origin of Chavara Placer deposits, silica sands.

Non-metallic deposits – Refractory minerals: acid refractories – silica – Clay Deposits: Origin and Mineralogy, china clay deposits of Kerala – Kyanite – Neutral refractories: chromite – graphite – asbestos – Basic refractories – Magnesite – dolomite. Minerals of Fertilizer industry: phosphorite, apatite. Minerals of Cement industry: limestone – gypsum. Minerals of Chemical industry.

Unit – 5

Mineral resources of the sea – sources of sea minerals, sea water, Extraction of elements, continental shelves, Deposits under the surficial sediments of the continental shelves, deposits in the deep sea floor. Law of the sea – UNCLOS – Exclusive economic zone, International sea bed area and authority – Indian strategy for future exploitation of seabed deposits.

National mineral policy – MM (R&D) act – Procedures for Grant of Mineral Concessions in India – UNFC classification – Global mineral reserves and resources – Minerals and sustainable development – Strategic, Critical and Essential minerals of India. State-wise share of mineral production in India

References

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- Evans, A. M. (1993), Ore Geology and Industrial Minerals: an Introduction, Blackwell, 403p
- Geological Survey of India (2009), Miscellaneous publication no. 30, part-xxii: Geology and mineral resources of india,152p
- Geological Survey of India, Detailed information dossier (DID) of ores in India, (Available at GSI portal:www.portal.gsi.gov.in).
- Indian Bureau of Mines Bulletins of Mineral Information (available at IBM website)Ministry of Mines Annual Report 2011-12, 248p.
- Mookherjee, A., (1999), Ore Genesis- A Holistic Approach, Allied Publishers, 657p.
- Ministry of Mines (2011), Report of the working group on mineral exploration & development (other than coal & lignite) for the 12th five year plan sub group – on survey and mineral exploration, 310p.
- Nuclear Power in India | Indian Nuclear Energy, <http://www.world-nuclear.org/info/inf53.html>
- Prasad, U (2002), Economic Mineral Deposits, CBS Publishers, New Delhi.
- Soman, K. (2001), Geology of Kerala, Geol Soc of India, Bangalore, 335p
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- Uranium 2009: Resources, Production and Demand, (The Red Book) Nuclear Energy Agency, OECD, 452p.
- Wellmer, F.W., Dalheimer, M. and Wagner, M. (2008), Economic Evaluation in Exploration, Springer-Verlag, Berlin.
- Zoellner, T. (2009) Uranium : war, energy, and the rock that shaped the world, Viking, London, 353p.