

Department of Mineral processing
VijayanagaraSriKrishnadevarayaUniversity
PGCentreNandihalli-Sandur
SyllabusforPhDEntranceTest(Effectivefrom2023-24)

PART-I

Research Methodology:

Definition and nature of research, objectives and scope of research. Methods of acquiring knowledge, older methods and modern methods. Art of reading. Concepts concerning the scientific method, goals of scientists. Difference between a scientist and a technologist. Creativity and Motivation for research, different types and styles of research in science. Critical and positive thinking. Research plan, design and formation of infrastructure for research proposal. Tools of research. Collection of literature, sources of information in Mineral Processing, analysis of the problem and processing of the data.

PART-II

UNIT 1: Science and Engineering Technology

Basic Engineering: Gears – Types, Problems, Pumps-Types and Application, Design. Bearings Types, Uses. Fluid Mechanics. Fluid Flow Equations: Mass, Energy, Momentum Equations and its Applications. Motors-A.C/D.C, Generators, Power and Energy Calculations.

UNIT-2: Geology

Definition of Mineral, crystalline and amorphous states, Crystalline aggregates – Columnar, Bladed, Acicular, Fibrous, Tabular, Foliated, Granular and Imitative forms. Properties depending upon light: Colour Pleochroism. Play of colours, Opalescence, Fluorescence, Phosphorescence, Streak, Luster and Diaphaneity.

Forms and types of igneous bodies: - extrusive bodies - Flood basalts, Volcanoes and types of volcanoes. Pyroclastic deposits. Intrusive bodies: - concept of concordant and discordant intrusion, Dikes and sills and types of dikes, breccia pipes, Laccoliths, Lopoliths, Stocks and Batholiths. Concept of metamorphism- Changes in pressure and temperature. Equilibrium and non-equilibrium reactions. Types of metamorphism.

Introduction to the Processes and factors influencing genesis of sediments. Weathering, soil formation, erosion and transport of debris and their deposition and conversion to rocks. Sedimentary structure and texture for petrography of clastic and non-clastic Rocks. Methods of description and classification of sediments and sedimentary rocks

UNIT-3: Mineral processing

Definition, Scope and necessity of Mineral Beneficiation, Historical developments and Economics. Physical Properties of Ores and their importance in Mineral beneficiation. Definition of terms – Concentrate, Tailing, Middling, Recovery and Ratio of concentration. Unit operations. Sampling: Definition, purpose, methods, measurements of accuracy of sampling. Crushing: Purposes, Mechanism of crushing, types of crushers and their salient features. Grinding tumbling mills, Types of tumbling mills, open and closed-circuit


grinding operation. Liberation: Definition and importance of liberation studies and its analysis. Laboratory sizing, Industrial screens.

UNIT-4: Metallurgy

Unit processes of pyro-metallurgy – Drying, Calcining, Roasting, Sintering, Smelting, and Refining. Extraction of Copper, Nickel, Lead, Zinc, Aluminum, Gold, Silver, Titanium, Magnesium, Nuclear, Reactive metals. Use of Halides in non-ferrous extraction processes. Hydrometallurgy: Principles, Chemical and Electrochemical Principles of Leaching, Precipitation, Solvent Extraction, Ion Exchange, Extraction, Eh-pH Diagrams, Metal Extraction under atmospheric pressure, high pressure and temperature. Electrometallurgy: Principles, Electro winning and Electro refining of metals like Copper, Nickel, Lead, Gold, Silver, Zinc etc., Electroplating. Powder Metallurgy: Principles and applications

Reference Books:

1. Frank Press Raymond Siever: Understanding Earth (3rd ed). W.H. Freeman and Company. New York . 2000
2. B.J. Skinner and S.C. Porter: The Dynamic Earth – An Introduction to Physical Geology 3rd edition. John Wiley & Sons, New York. 1995.
3. Best, M.G., 2002, Igneous and metamorphic petrology, 2nd Edition, Blackwell Publishers
4. Philpotts A.R., 1990, Principles of Igneous and metamorphic petrology, Prentice Hall
5. Yardley, B.W., 1989, An introduction to metamorphic petrology, Longman
6. Jensen and Bateman, A.M. - Economic Mineral Deposits
7. K.V.G.K. Gokhale & T.C. Rao - Ore Deposits of India
8. R.L. Stanton - Ore Petrology
9. C.F. Park (Jr) and MacDiarmid - Ore Deposits
10. A.M. Gaudin - Principles of Mineral Dressing
11. S.K. Jain - Ore Processing
12. A.K. Lynch - Crushing and Grinding Circuits
13. B.A. Wills - Mineral Processing Technology
14. E.J. Pryor - Mineral Processing
15. A.F. Taggart - Text Book of Ore Dressing
16. A.F. Taggart - Handbook of Mineral Dressing
17. Robert. H. Richards, Charles Lock & R. Schumann - A Text Book of Ore Dressing
18. H.S. Ray, R. Sridhar & K.P. Abraham, Extraction of Non Ferrous Metals
19. T. Rosenqvist, : Principles of Extractive Metallurgy
20. H.S. Ray & A. Ghosh, : Principles of Extractive Metallurgy
21. R.H. Tupkari, : Introduction to Modern Iron Making


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