MAHARAJA GANGA SINGH UNIVERSITY, BIKANER
Ph. D. COURSE WORK IN GEOLOGY

1. **Review of Literature:**
    a. Need and Process of Systematic Review of Litreture to Understand Regional & Local - Geology, Geomorphology, Stratigraphy, Structural and Tectonic Setting, Mineral Deposits and Hydrogeology etc.

2. **Geological Surveying:**
    a. Nature and scope, important field equipments.
    b. Toposheets – Types, Features. Arrangements of Toposheets.
    c. Geological Mapping Methods. Base map.
    d. Collection of Geological and Structural Data.
3. **Remote Sensing:**
    a. Application of Remote Sensing Techniques in Geological Studies.

4. **Sampling:**
    a. Purposes and Types of Samples. Techniques of Sampling.
    b. Sampling Patterns.
    c. Preparation of Samples for further Studies.

5. **Microscopy:**
    a. Preparation and Studies of Thin Sections and Polished Sections.
    b. Types of Microscopes and their Applications in Geology.

6. **Geochemical Analysis:**
    a. Geochemical techniques and Instruments for Analyses of Rocks, Soils and Water Samples.

7. **Geostatistics :**
    a. Concept of Sampling, Overview of Estimation Methods, Mean, Mode &Median. Standard Deviation.
    b. Common Tests & Methods in Statistics.
    c. Methods of Graphical Representation for Geological Data.

8. **Computer Application in Geology:**

a. Introductory Knowledge of MS office 2007, Application of Excel, Introductory Knowledge of Software Packages for Processing Geological data.
b. Geographical Information System (GIS).

9. Geo-scientific Writing:

I. Pre-writing stage:

a. Scientific Paper – Title, Text & Termination (End Materials).
b. Technical Report – Types of reports & their possible structure, possible main contents of Reports.
c. Illustrations – Maps, Line Diagrams, Graphs, Photographs.

II. Writing Stage :

a. Abstract, Summary, Synopsis, Extended Abstract.
b. References – Within the Text and in the form of List, Patterns of References in Geology.
c. Qualities of Scientific Paper/ Reports – Accuracy of Contents, Clarity & Simplicity of expression, Coherence, Conciseness, Logical Sequence.
d. Aids to writing – Grammar and usage, Abbreviations, Compounding of words, Placement of Phrases, Italics, Numerical Expressions, Units & Symbols, Punctuations, Spellings, and Conclusion.
e. Writing practices –Rewriting, Readability, Check list, Preparation of Final Manuscript.

III. Post Writing stage:

a. Oral & Poster Presentation:
b. Modes of presentation and Use of various kinds of Oral Aids.
c. Poster Presentation.

SUGGESTED READINGS:

- Abbasi & Abbasi - Renewawable Energy Resources & their Implication. (Prentice Hall India).
- Allen – Sedimentary Structures.
- Allum – Photogeology & Regional Mapping.
- Armstrong, H.C. – Geothermal Energy (Span London)
- Arogyaswami, R.N.P. – Courses in Mining Geology (Oxford & I.B.H.).
- Atittatrong H.C. - Geothermal Energy (Span London)
- Badgley, P.C. - Structural Geology for Exploration Geologists (Oxford Univ. Press)
- Bateman, A.M. - Economic Mineral Deposits (J. Wiley & Sons)
- Best - Igneous and Metamorphic Petrology (CBS)
- Black, R.M. - The Elements of Palaeontology. Cambridge University Press.
- Blackith R. E. & Reyment, It. A. - Multivariate Morpltometrics (Academic Press)
- Bloom, A. - Geomorphology (Prentice Hall)
- Blyth – Geology of Engineers (ELBS)
- Bowen, N.L. – Evolution of Igneous rocks (Princeton University Press)
- Chandra, D., Singh, R.M. and Singh, M.P., - Text Book of Coal. Tara Book Agency, Varanasi.
- Chatterjee, K.K. – An introduction to mineral economics (willey eastern).
- Chatterjee, S.C. – Igneous & metamorphic Rocks
- Coates, D.R. – Environmental Geology
- Colbert, E.H. – Evolution of the Vertebrates (J.Wiley & Sons)
- Cooke and Drunkamp - Geomorphology in Environment Pollution
- Cubit and Henley – Statistical analysis in Geology
- Cushman, J.A. – Foraminifera (Cambridge University Press)
- Dana, E. Ford W.E. – A Text book of Mineralogy (Asia Public House)
- Davies – Statistics and Data Analysis in Geology (Wiley)
- Deer, Howie & Zussman – Introduction to Rock Forming Minerals (ELBS)
- Drury, S.A. - Image Interpretation in Geology. (Allen and Unwin)
- Dunber, C.O. & Rodgers, J. – Princples of Stratigraphy (J.Wiley & Sons)
- Eanga Itaja Itao - Coal Preparation and Use (Oxford IBM Pub. Co.)
- Eicher, Don, L. – Geologic Time (Prentice Hall)
- Evans, R.C. – Crystal Chemistry (Cambridge University Press)
- Fairbridge - Encyclopaedia of Geomorphology (Reinhold Corp.)
- Faure, G. - Principles of Isotope Geology. John Wiley.
- Flames, P. T. - Environmental Geology, Conservation Land Use Planning and Resource Development.
- Folk, R.L. – Petrology of Sedimentary Rocks (Hemphill Pub. Co.)

- Fyfe – Geochemistry (Clereton Press Oxford)
- Garg, S.P. – Ground water & Wells.
- Gaudin - Ore dressing.
- Ghose, M.K. – Igneous Petrology (World Press Pvt. Ltd., Kolkata)
- Glaessener, M.F. – Principles of Micropalaeontology(Hafner Press)
- Goulden C.M. – Methods of Statistical Analysis (J. Wiley & Sons)
- Govett, G.J.S. - Hand Book of Exploration Geochemistry. Elsevier.
- Green smith – Sedimentary Petrology(CBS)
- Gupta, C.B. – An Introduction to the Statistical Methods (Vikas Publishing House)
- Gupta, R.P. - Remote Sensing Geology. (Springer Verlag)
- Gupta, S.P. – Elements of statistics
- Haekes R. & Webb - Geochemistry in Mineral Exploration (Academic Press)
- Hobbs, B. E. & Means, W. D. & Williams P. F. - An outline of Structural Geology (J. Wiley & Sons)
- Holmes A. - Physical Geology (Nelson)
- Horn, B. & Scott, M. – Geological Hazards (Springer Verlog)
- Hutchinson, C.S. - Laboratory Hand Book of Petrographic Techniques. John Wiley.
- Itobnnioit & Courcll - Basic Exploration Geophysics.
- Jackson - Textbook of Lithology (CBS)
- Jain and Anantharaman – Introduction to Palaeontology Vishal Publications. Jalandhar.
- Jhanwar, M.L and Chouhan, T.S. – Remote sensing and photogrammetry (Vigyan Prakashan).
- Johanneson, A – A Descriptive Petrology of Igneous Rocks –Vol. I-IV (University of Chicago Press).
- Karanth, K.R. – Ground water Assessment
- Kathal, P.K. – Microfossils & their applications (CBS).
- Keller, E.A. – Environmental Geology (CBS)
- Kinghorn, R.R.F. – An Introduction to the Physics and chemistry of Petroleum (J. Wiley & Sons).
- Klein, C.and Hurlbut, Jr., C.S.,- Manual of Mineralogy. (J. Wiley & Sons)
- Krauskopf, K.B. - Introduction to Geochemistry. McGrew Hill.
- Krishnan, M. S. - Geology of India and Burma (CBS)
- Krishnaswami – Mineral Resources of India (CBS)
- Krumbein and Sloss – Stratigraphy and Sedimentation (W.H. Freeman & Co.)
- Krynine & Judd - Principles of Engineering Geology and Geotectonics (McGraw Hill)
- Landes, K.K. – Petroleum Geology (Robert, Kraieger Pub. Co.).
- Levinson – Introduction to Exploration Geochemistry (Applied Publishers)
- Levorson – Petroleum Geology
- Lilesand, T.M. and Kieffer, R.W., - Remote sensing and Image Interpretation. (John Willey)

- Lobeck, A.K. – Geomorphology (Mc-Graw Hill)
- Lybach, L., Muffer, L.J.P. – Geothermal systems (J. Wiley & Sons)..
- Mason, B. – Principles of Geochemistry (McGraw Hill)
- Mason, B. and Moore, C.B. - Introduction to Geochemistry. Wiley Eastern.
- Mason, Berry – Minerology. (Asian Pub.)
- Mckinstry, H.E. – Mining Geology (Asia Publishing House).
- Miashiros – Metamorphism and metamorphic Rocks (George Allen University)
- Miller, V.C. – Photogeology. (McGraw Hill)
- Mineral Concession Rules, DMG, Govt. of Rajasthan.
- Moore, Laliker & Fisher – Invertebrate fossils (McGraw Hill)
- Moorehouse – A study of Thin Sections (CBS)
- Naqvi, S.M. and Rogers, J.J. – Precambrian Geology of India.
- Pandey, S.N. – Principles of Photo interpretation and Remote Sensing. (McGraw Hill)
- Park C.F. and McDiarmid R.A. – Ore Deposits (W.H. Freeman & Co.)
- Pascoe, E.H. – A Manual of Geology of India & Burma (GSI)
- Pettijohn, F.J. – Sedimentary Rocks (CBS)
- Philipots, A. - Igneous and Metamorphic Petrology. Prentice Hall.
- Phillips, F.C. – An Introduction to Crystallography (ELBS)
- Pockorny – Principles of Zoological Micropalaeontology Vol. I & II
- Ragan, D. M. - Structural Geology (J.Wiley & Sons)
- Ramsay, J.G. - Folding and Fracturing of Rocks (McGraw Hill)
- Rankama, K. – The Geologic Systems-The Pre cambrian Vol.-III Ed.(J. Wiley & Sons)
- Rao, C.R. - Advanced Statistical Methods in Biometrical Research (J. Wiley & Soita)
- Ravindra Kumar – Introduction of Historical Geology and Principles of Stratigraphy (CBS)
- Ray. R.G. - Aerial Photographs in Geologic Interpretations. (USGS)
- Read, H.H. – Rutley's Elements of Mineralogy (Thomas Murby & Co.)
- Reineck and Singh – Depositional Environments.
- Robinson and Courch – Basic exploration Geophysics.
- Roy, Lindholm - A Practical Approach to Sedimentology (CBS)
- S. Eanga Raja Rao – Coal Preparation and use (Oxford IBM Pub. Co.)
- Sabbins, F.F. - Remote sensing- Principles and Applications. (Freeman)
- SathyaNarayan Swami, B.S. – Engineering Geology (Dhanpat Rai & Co.)
- Savindra Singh – Environmental Geography. Prayag Pustak Bhawan.
- Selley, R.C. - Elements of Petroleum Geology. Academic Press.
- Sengupta, S.M. – Introduction of Sedimentology (Oxford & IBH)
- Sharma, N.L. – Determinative Tables (ISM, Dhanbad).

- Shrock & Twenhofel - Principles of Invertebrate Palaeontology (McGraw Hill)
- Shultz, J. R. & Cleaves A. B. - Geology in Engineering (J. Wiley & Soot)
- Singh and Sahni- Advanced Surveying
- Singh, R.D. – Principles and Practices of Modern Coal Mining.
- Sinha and Sharma - Mineral Economics (IBH)
- Sinha R. K. - Treastise on Industrial Minerals of India
- Sinha Roy, S. Malhotra, G & Mohanty, M. – Geology of Rajasthan (Geol. Soc. Ind.)
- Sinha, R.K. – Treatise on Industrial Minerals of India.
- Sinha, R.K. and Sharma, N.L. – Mineral Economics (oxford & IBH)
- Slley, R.C. – Introduction to Sedimentary Rocks (Academic Press London)
- Smirov, V.I. - Geology of Mineral Deposits (MIR. Pub.)
- Spencer, E. W. - Introduction to the Earth's Crust (McGraw Hill)
- Spiegel, M. R. - Theory and Problems of Statistics (Schaum Publishing Co.)
- Stach, E. et al. – Coal Petrology. Gebruder Borntraeger, Stutgart
- Stanton R.L.- Analytical Methods used in Geochemical Exploration (Edward Arnold, London)
- Stanton R. L. - Ore Petrology (McGraw Hill)
- Tank, R. W. - Focus on Environmental Geology (Oxford)
- Taylor, G.H. et al. – Organic Petrology. Gebruder Borntraeger, Stutgart.
- Thomson - Sedimentary Structures
- Thornbury, W.D. – Principles of Geomorphology (J. Wiley & Sons)
- Todd, D. K. - Ground Water Hydrology (J. Wiley & Sons)
- Tolman, C. F. - Ground Water (McGraw Hill)
- Turner, F.J. - Metamorphic Petrology. Mc Graw Hill.
- Valdiya K.S. – Environmental Geology.Tata MGH
- Winchel & Winchel – Elements of Optical Mineralogy (ELBS)
- Winkler H.G.F. - Petrogenesis of Metamorphic Rocks (Springer-Verlog)
- Woods, H. – Invertebrate Palaeontology (CBS)
- Wylie, P. J. - Dynamic Earth (J. Wiley & Sons)