

Solapur University, Solapur
Ph.D. Course Work Syllabus (Applied Geology)
Common Paper for Faculty of Science
(w.e.f. June 2014)
Paper No.I: Research Methodology and ICT

1. Scientific Method:

Block schematic of scientific approach, inductive and deductive logic schemes, imperial basis of laws, theory, hypothesis, deductive system, requirements of theory, dynamics of theory construction, rational explanation, scientific explanation, limits of scientific explanation.

2. Formulation of Research Problem:

Criteria of good research, types of research, significance, literature review, purpose, process of literature review, analysis of an article, search engine, formulation of research problems, accuracy of definition, objectives of research, research design, preparation of research article and thesis.

3. Process of Research:

Definations of problem, planning of experiments, data collection and record keeping, results and discussions, presentation of research outcome as a research paper or filing patent.

4. Research Publications and Quality:

Indices, publications, types, Impact factor, calculation of Impact Factor, uses, calculation of immediacy Index, calculation, SCOPUS, h – index, advantages, criticism ISSN, ISBN.

5. ICT:

Various search engines available on internet, normal vs advanced search, key –words, formulation of search statement, Listing various journals in relevant topic, Science abstracts, e – database.

Application of Computers in research, internet browsing, tool bar options, provisions of MS – word, MS – Excel, MS – PowerPoint, Origin.

6. Fundamentals of Data Analysis and Statistical Methods:

Types of data and various methods of data collection, Framing of questionnaires, various sampling methods.

Statistical techniques for analyzing data: Measures of central tendency, measures of dispersion, measures of asymmetry (Skewness), measure of relationship, simple regression analysis, testing of hypotheses, chi- square test, analysis of variance (ANOVA) and Covariance (ANCOVA).

Reference Books:

1. Research Methods - Ram Ahuja, Rawat Publications
2. Philosophy of Science – Mario Bunge, Transaction Publishers
3. Research Methodology - Methods and Techniques, C. R. Kothari New Age
4. Fundamentals of Statistics - Goon, Gupta and Das Gupta (Vol. I & Vol.)

APPLIED GEOLOGY

Ph.D Course Work Syllabus

PAPER II: RECENT TRENDS IN GEOLOGY

Field procedure in Geological mapping. Preparation of geological maps. Ground investigations, Geological maps and records, Topographic maps, Photo geological interpretation, Ground investigation by boreholes, Borehole drilling methods, Geophysical surveys – Passive and induction methods Sampling methods.

Sample preparation methods for various rock and mineral characterization, Methods for bulk rock chemistry and mineral chemistry, Non-destructive and destructive chemical analysis using XRF, XRD, ICP-ES, ICP-MS, Spectrometric methods – AAS, IR, Radiometric dating methods, Fission track dating.

Geomorphology and morphometric analysis of topographic features, Satellite imageries – FCC and various bands used in imageries, Interpretation of imageries, Application of morphometric studies – linear, aerial, circular and relief, Aspects in evolution of landforms. Application of remote sensing and GIS in resource and disaster management.

Writing geological report, aim and scope of investigation, data presentation and analysis using various softwares, literature related to various geological investigations. Preparation of thematic maps.

Ref: -

1. X - Ray Diffraction by - B.D.Cullity.
2. Field Geology by - Laahi.
3. Analytical Instrumentation by - R.S.Khandar.
4. Fission track dating by - Virk.
5. Laboratory techniques in Geology by - Hachinson.
6. Writing Geological report by - G.S.I. Bangalore.
7. Fluid inclusion study by - E. Roedder.
8. Application of fractals in earth sciences by - Dimari.
9. Manual of field Geology by - Compton.
10. Geology principles & methods by - J Dercourt.
11. Mineral exploration by - Dhanraju
12. Fundamentals of Optical spectroscopy by - Mitra
13. Doing your Masters dissertation by - Chris Hart
14. Social Research Methods by - Laerence Neuman

PAPER III: Any one of the elective papers

Elective I: EXPLORATION AND MANAGEMENT OF MINERAL RESOURCES

Introduction to prospecting and exploration: scale of prospecting; classification of prospecting methods, objectives of exploration, principles of exploration, methods and stages.

Optimization of exploration: planning, choice of exploration methods, integrated exploration sequence, organization and operation during exploration. Evaluation of mineral deposit at various stages of exploration, workable standards.

Prospecting criteria and guides, geological criteria, climate, stratigraphy, facies and lithological aspects, structure and geological aspects, geochemical and geophysical anomalies, geological conditions favorable for prospecting.

Exploration equipments and system, exploration openings, reconnaissance bore holes drilling system, exploration by underground and bore hole workings. Factors affecting choice of system. Methods and types of sampling, choice of sampling, sample spacing, grading mineral deposit, sample error and check.

Introduction to geophysical prospecting, classification and types of prospecting methods, concept and principles of gravity and magnetic surveys, anomalies, their correction, instrumentation and field data acquisition, interpretation and application to geological problems

Concept of seismic reflection and refraction methods, instrumentation and field data acquisition, preparation of travel times curves, identification of subsurface structure

Types of electrical surveys, electrode configuration, field data, resistivity methods interpretations of subsurface lithology and structures by qualitative and quantitative analysis.

Radiometric prospecting, principles and concept, GM and scintillation counters, field data acquisition and interpretation.

Subsurface Geophysical exploration: Types of Well Logging, Instruments, subsurface structural and stratigraphic correlation.

Geochemistry in mineral exploration, classification of geochemical surveys, association of elements, mobility and path finder elements.

Geochemical dispersion and landscape: patterns of deep seated origin, formation of productive plutons, geochemical provinces, host rock petrochemistry, ores related to productive plutons.

Biogeochemical and geobotanical surveys: choice of sampling medium and their anomalies, mapping technique, merits and demerits, biogeochemical and geobotanical indicators.

Ref:-

1. Geophysical prospecting by - Dobrin.
2. Geochemistry in mineral Exploration by - Rose hawkes & web.
3. Geological prospecting by - Kroifer.
4. Environmental Geology by - K.S.Valadya.
5. Mineral Resource of India by - Sinha & Krishanswamy.
6. Mineral Exploration by - Dhanaraju.
7. Fluid Inclusion Techniques by - M.Santosh.