

**Model question paper for the Entrance Examination of Ph.D Programme in Geology**

Time: 2 Hours

Max. Marks: 100

**Section A - Answer all questions.**

1. What is the most widely accepted theory for the origin of the Earth and the solar system?  
a. Big Bang Theory b. Nebular Hypothesis c. Ptolemaic Model d. Steady-State Theory
2. What geological process describes the changes in the Earth's surface over time due to natural forces? a. Evolution b. Plate Tectonics c. Weathering d. Erosion
3. Which of the following is NOT a physical property of minerals?  
a. Color b. Hardness c. Taste d. Cleavage
4. The primary constituents of the Earth's mantle are:  
a. Silicates b. Metals c. Water d. Carbonates
5. Which mineral group includes olivines, pyroxenes, and feldspars?  
a. Carbonates b. Silicates c. Sulfides d. Oxides
6. What is the term for the arrangement of mineral grains in a rock?  
a. Texture b. Structure c. Composition d. Lamination
7. Which type of rock is formed through the solidification of molten material?  
a. Igneous b. Sedimentary c. Metamorphic d. Clastic
8. Faults, joints, and folds are types of structures formed as a result of:  
a. Metamorphism b. Weathering c. Deformation d. Erosion
9. What is the process of creating geological maps to represent the distribution of rock layers and structures on the Earth's surface?  
a. Geological Dating b. Geochronology c. Geological Mapping d. Geochemistry
10. In plate tectonics, what type of boundary is characterized by two plates moving apart from each other?  
a. Convergent Boundary b. Transform Boundary c. Divergent Boundary d. Subduction Zone
11. The concept of stress and strain is primarily associated with which field of geology? a. Mineralogy b. Sedimentology c. Structural Geology d. Petrology
12. The geological time scale is divided into various units. Which is the largest unit of time on the scale? a. Era b. Period c. Epoch d. Eon
13. What type of rock is formed from the compaction and cementation of mineral and organic particles? a. Igneous b. Metamorphic c. Sedimentary d. Clastic
14. Which of the following is a technique used to determine the age of rocks and minerals?

a. Radiocarbon dating b. Dendrochronology c. Radiometric dating d. Ice core analysis Answer: c. Radiometric dating

15. What are fossils?

a. Ancient tools used by early humans b. Preserved remains of once-living organisms c. Geologic features formed by erosion d. Crystalline structures in minerals

16. What type of geologic feature is characterized by a fracture in rocks along which there has been significant movement?

a. Fold b. Joint c. Fault d. Unconformity

17. In the context of plate tectonics, what type of boundary is associated with the collision of two plates? a. Transform Boundary b. Divergent Boundary c. Convergent Boundary d. Subduction Zone

18. The geological classification scheme that categorizes rocks based on their mineral composition and texture is known as:

a. Mohs Scale b. The Rock Cycle c. The Geologic Time Scale d. The Bowen's Reaction Series

19. What is the study of the distribution and movement of groundwater beneath the Earth's surface called?

a. Hydrology b. Hydrogeology c. Geomorphology d. Seismology

20. Which of the following is an important water quality parameter used to assess water quality?

a. Luster b. Streak c. pH d. Hardness

21. What geological process is responsible for the formation of ore deposits, such as gold and copper? a. Volcanism b. Weathering c. Erosion d. Mineralization

22. What is the process of determining the properties of an aquifer through controlled pumping called? a. Waterlogging b. Desalination c. Groundwater Recharge d. Pumping Test

23. Which element is most abundant in the Earth's crust?

a. Iron b. Silicon c. Oxygen d. Aluminum

24. What is the term for the study of the spatial relationships between geological features and phenomena? a. Geochemistry b. Geomorphology c. Geoinformatics d. Geochronology

25. The process of creating maps that represent specific themes or topics, such as population density or geological features, is known as:

a. Cartography b. Geology c. GIS d. Geophysics

26. What is the fundamental step in the research process that involves identifying the main issue to be investigated?
- Data collection
  - Data analysis
  - Research question or problem
  - Literature review
27. What is the term for research that uses numerical data and statistical analysis for interpretation?
- Qualitative research
  - Mixed-method research
  - Quantitative research
  - Descriptive research
28. Which of the following is an example of a qualitative data collection method?
- Surveys
  - Experiments
  - Observations
  - Questionnaires
29. In research methodology, what is the purpose of conducting a literature review?
- To generate research questions
  - To collect primary data
  - To identify gaps in existing knowledge
  - To perform data analysis
30. Which statistical measure provides a single value that represents the center of a data set?
- Standard deviation
  - Mean
  - Range
  - Variance
31. Which statistical technique is used to examine the relationship between two or more categorical variables?
- Correlation analysis
  - Regression analysis
  - ANOVA
  - Chi-square analysis
32. What statistical method is appropriate for comparing means across multiple groups?
- Regression analysis
  - T-test
  - ANOVA
  - Chi-square analysis
33. What is the term for a statistical technique that reduces the dimensionality of data by transforming variables into a smaller set of uncorrelated variables?
- Cluster analysis

- b. Principal Component Analysis
  - c. Factor analysis
  - d. Regression analysis
34. Which of the following represents a common measure of variability in a dataset?
- a. Median
  - b. Mean
  - c. Range
  - d. Mode
35. In research methodology, what is the term for the process of obtaining data from a sample of individuals to make inferences about a larger population?
- a. Sampling
  - b. Data collection
  - c. Data analysis
  - d. Hypothesis testing
36. Which of the following is NOT a step in the research paper writing process?
- a. Data collection
  - b. Data analysis
  - c. Abstract writing
  - d. Conclusion and discussion
37. What is the purpose of conducting an impact factor analysis for research journals?
- a. To identify potential research topics
  - b. To determine the quality and influence of a journal
  - c. To calculate the journal's circulation
  - d. To evaluate the readability of articles
38. Which of the following is an example of a publication ethics issue in research?
- a. Collecting data from a diverse sample
  - b. Properly citing sources in a research paper
  - c. Fabricating or falsifying research results
  - d. Analyzing data using appropriate statistical methods
39. What is the term for using someone else's words, ideas, or work without proper attribution in research writing?
- a. Paraphrasing
  - b. Quoting
  - c. Plagiarism
  - d. Citation
40. In research writing, what is the purpose of using citations and references?
- a. To make the paper longer
  - b. To provide a bibliography
  - c. To give credit to original sources and avoid plagiarism
  - d. To summarize the main points of the paper

41. What is the measure of how often a research paper is cited in other academic publications, often used to assess its impact and influence?
  - a. Abstract
  - b. Index factor
  - c. Impact factor
  - d. Citation factor
42. Which of the following is an example of a quantitative data collection method?
  - a. Content analysis
  - b. In-depth interviews
  - c. Surveys
  - d. Case studies
43. What is the primary goal of factor analysis in research?
  - a. To identify and isolate underlying dimensions or factors within a dataset
  - b. To calculate the mean of a dataset
  - c. To determine the range of values in a dataset
  - d. To establish causation between variables
44. What is the term for the process of identifying the likelihood of an event happening?
  - a. Descriptive statistics
  - b. Probability analysis
  - c. Inferential statistics
  - d. Correlation analysis
45. When conducting research, what is the first step in the research process?
  - a. Data analysis
  - b. Data collection
  - c. Literature review
  - d. Publication
46. What type of research question or problem focuses on the relationship between variables and their potential impact on each other?
  - a. Descriptive
  - b. Exploratory
  - c. Causal
  - d. Qualitative
47. Which of the following is a common method of collecting qualitative data in research?
  - a. Surveys
  - b. Experiments
  - c. In-depth interviews
  - d. Observations
48. What is the term for a systematic approach to conducting research that involves a set of principles and rules?
  - a. Research design
  - b. Research methodology

- c. Research hypothesis
  - d. Research findings
49. Which of the following is NOT a common type of data used in research?
- a. Quantitative data
  - b. Qualitative data
  - c. Spatial data
  - d. Historical data
50. What is the primary purpose of a research paper?
- a. To advertise products or services
  - b. To entertain readers
  - c. To present the results of research and contribute to academic knowledge
  - d. To provide personal opinions and anecdotes

**50 \* 1 = 50 Marks**

### **Section B**

Give an account of *any five* of the following  
Answer for a question should not exceed 20 sentences.  
Draw figures wherever necessary

- 51. Explain the formation of the Earth and the solar system.
- 52. Provide examples of different landforms made by wind action.
- 53. Explore the physical properties of minerals and their significance in geology.
- 54. Examine the textures and structures sedimentary rocks.
- 55. Geometric classification of folds and their types.
- 56. Describe different plate boundaries and the geological features associated with them.
- 57. Discuss the importance of research methodology in the research process.
- 58. Explain the significance of a well-defined research question in the research process.
- 59. Explore the various types of data that can be used in research.
- 60. Give an account of the different methods of data analysis, including measures of central tendency and probability analysis.
- 61. Describe the ethical considerations in research paper writing.
- 62. Examine the concept of impact factor in the context of academic journals.

**5 \*10 = 50 Marks**

# University of Calicut

## Syllabus for the Entrance Examination of Ph.D Programme in Geology

### **Geology:**

Origin of earth and the solar system. Evolution of Earth. Physico-chemical and seismic properties of the earth's interior. Geochronology and age of the Earth.

Geomorphologic principles and processes. The different geologic agents, processes and the various landforms and other products created by these agents.

Important physical and optical properties of minerals. Brief study about the composition, properties and paragenesis of the following mineral groups: Olivines, Pyroxenes, Amphiboles, Micas and Feldspars.

Textures and structures of igneous, sedimentary and metamorphic rocks and their relationship with the rocks' origin. Different classification schemes for igneous rocks. Classification of sandstones and limestones. Concept of metamorphic grade and facies.

Basic principles of structural geology. Brittle and ductile deformation and the structures formed thereof: faults, joints and folds and their types. Geological mapping and map reading. Concept of stress and strain. Tectonites and their types. Shear zone indicators and their significance.

Plate tectonics – fundamental concepts. Different plate boundaries and the features associated with them.

Classification of ore deposits by Bateman. Various ore forming processes and examples for the deposits of ores formed. Important deposits of iron, gold, copper, mica, refractories and radioactive minerals in India.

The important stratigraphic principles. Concept of stratigraphic classification. Geological time scale and its divisions. Major geological events during the different periods of earth history. Brief ideas about the various stratigraphic units of different geologic ages in India.

Fossils and fossilization. Significance of fossils. Classification, morphology, and stratigraphic importance of Brachiopodes, Molluscs and Trilobites. Succession of vertebrate life through geologic time. General characteristics and evolution history of Man. Application of microfossils in the study of palaeoenvironments and palaeoclimate.

Occurrence and movement of groundwater. Hydrological properties of rocks. Important Water quality parameters. Brief idea about pumping tests and aquifer parameter evaluation. Resistivity survey for groundwater prospecting.

Geochemical classification of elements. Concept of geochemical cycles. Principles of geochemical prospecting for ore deposits.

Fundamental principles of geoinformatics. GIS – datatypes, georeferencing, transformation and projection. Thematic maps and their application for various purposes.

Environmental geologic principles. Layering of atmosphere. Global warming and climate change – anthropogenic reasons and remedial measures.

**Research methodology:**

Methodological approach.

Research question or problem.

Types of data to be used.

Quantitative and qualitative data collection methods.

Methods of analysis.

Measures of central tendency, probability analysis.

Principal Component Analysis. Factor analysis. ANOVA.

Visualising the statistical data – bar charts, histograms, scatter plots, pie diagrams.

Applications in river morphometry, sedimentology and water chemistry studies.

Research paper writing. Publication ethics. Plagiarism. Citation. Impact factor of journals.

Significance of field data in geological research.

Role of spatial data in geological research problems.