

GEOLOGY
Paper – I**Time Allowed : Three Hours****Maximum Marks : 200****Question Paper Specific Instructions**

Please read each of the following instructions carefully before attempting questions :

There are **ELEVEN** questions divided under **SIX** Sections.

Candidate has to attempt **SIX** questions in all.

The **ONLY** question in Section A is compulsory.

Out of the remaining **TEN** questions, the candidate has to attempt **FIVE**, choosing **ONE** from each of the other Sections **B, C, D, E** and **F**.

The number of marks carried by a question / part is indicated against it.

Unless otherwise mentioned, symbols, abbreviations and notations have their usual standard meanings.

Neat sketches are to be drawn to illustrate answers, wherever required. They shall be drawn in the space provided for answering the question itself.

Wherever required, graphs/tables are to be drawn on the Question-cum-Answer Booklet itself.

Attempts of questions shall be counted in sequential order. Unless struck off, attempt of a question shall be counted even if attempted partly.

Any page or portion of the page left blank in the Question-cum-Answer Booklet must be clearly struck off.

Answers must be written in **ENGLISH** only.

SECTION A
(Compulsory Section)

Q1. Describe the following in brief with diagrams, wherever necessary :

5×10=50

- | | |
|---|---|
| (a) Isostasy | 5 |
| (b) In-sequence, out-of-sequence and back-thrusting | 5 |
| (c) Relief displacement in aerial photos | 5 |
| (d) Cataclasites and Mylonites | 5 |
| (e) Principles of sequence stratigraphy | 5 |
| (f) Taphonomy | 5 |
| (g) Singhbhum Craton | 5 |
| (h) Binomial nomenclature | 5 |
| (i) Concept of flow regime | 5 |
| (j) Syringothyris Limestone | 5 |

SECTION B

Attempt any **one** question.

- Q2.** (a) Describe the Indian Remote Sensing (IRS) P-series of satellites with special emphasis on the sensors used in each, and their characteristics. 15
- (b) Describe electromagnetic spectrum and energy available for sensing. Describe ranges of spectrum transmitted through the atmosphere and available for space-borne sensing. 15
- Q3.** (a) Describe conditions required for delta formation. Give reasons why no deltas are formed in the western coastal margin while many deltas are found in the eastern coastal margin of India. 10
- (b) Describe different geomorphological features formed by the valley and continental glaciers. 10
- (c) Describe the Earth's internal structure as revealed by seismic waves. 10

SECTION C

Attempt any **one** question.

- Q4.** (a) Describe the procedure of structural analysis of an area that has undergone single event and polyphase event. 15
- (b) What are the characteristics of ductile shear zone ? Describe with neat diagrams of different shear indicators used for sense of shear along a shear zone. 15
- Q5.** (a) What characteristic of Flinn's k enables us to determine the kind of strain in deformed rocks ? 10
- (b) What are the parameters required to measure and estimate to classify a fold as per Ramsay's classification from fold profile ? 10
- (c) With neat diagram, describe Foliation boudinage and Classical boudinage. Also write their differences. 10

SECTION D

Attempt any **one** question.

- Q6.** (a) What is Walther's law of facies succession ? Substantiate your answer by discussing fluvial facies model. 15
- (b) Describe significant penecontemporaneous (synsedimentary) deformational structures. Give criteria of their distinction from tectonic deformational structures. 15
- Q7.** (a) Describe the procedure of paleocurrent analysis. Comment on its significance giving suitable examples. 10
- (b) With the help of neat sketches, describe the sedimentary basin in a convergent margin ocean basin. 10
- (c) Describe the factors which control the composition of sandstone. 10

SECTION E

Attempt any one question.

- Q8.** (a) Give a brief account of the Lower Gondwana flora and add a note on their geographic and stratigraphic distribution. 15
- (b) Illustrate with neat sketches the structural modification in Trilobites. Discuss the adaptive modification in Trilobites. 15
- Q9.** (a) Give an account of the evolutionary history of Hominidae. 10
- (b) Explain with diagram the bi-phasic life cycle in Foraminifera. 10
- (c) How do you distinguish between Regular and Irregular Echinoids ? 10

SECTION F

Attempt any **one** question.

- Q10.** (a) Give the stratigraphic succession of Cuddapah Supergroup and comment on the age, tectonics and Basin evolution. 15
- (b) What was the paleogeographic set-up during Lower Cambrian times ? Discuss the Precambrian – Cambrian boundary problem in Indian context. 15
- Q11.** (a) Give a brief account on the Lameta Formation and comment on its depositional environment and fauna. 10
- (b) Elucidate the hierarchical classification and definition of chronostratigraphic units and add on the litho-bio-chrono-stratigraphic correlation. 10
- (c) Give an account of stratigraphy, sedimentation and fauna of Siwalik Supergroup. 10

10/10/10

10/10/10

10/10/10

The first part of the day was spent in the laboratory, where we carried out the experiment on the effect of temperature on the rate of reaction. We used a range of temperatures from 10°C to 50°C and measured the time taken for the reaction to complete. The results showed that the rate of reaction increased with temperature, as expected.

We then carried out a series of experiments to determine the effect of concentration on the rate of reaction. We used a range of concentrations from 0.1M to 1.0M and measured the time taken for the reaction to complete. The results showed that the rate of reaction increased with concentration, as expected.

Finally, we carried out a series of experiments to determine the effect of surface area on the rate of reaction. We used a range of surface areas from 1 cm² to 10 cm² and measured the time taken for the reaction to complete. The results showed that the rate of reaction increased with surface area, as expected.

The results of our experiments show that the rate of reaction is affected by temperature, concentration, and surface area. This is in agreement with the theory of collision theory, which states that the rate of reaction is determined by the number of effective collisions between the reactant molecules.

Our experiments also showed that the rate of reaction is affected by the nature of the reactants. For example, we found that the reaction between zinc and hydrochloric acid was faster than the reaction between iron and hydrochloric acid.

In conclusion, our experiments have shown that the rate of reaction is affected by a number of factors, including temperature, concentration, surface area, and the nature of the reactants. This is in agreement with the theory of collision theory.