C-AVZ-O-HPKB

GEOLOGY
Paper—II

Question Paper Specific Instructions

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

There are EIGHT questions divided in Two Sections and printed both in HINDI and in ENGLISH. Candidate has to attempt FIVE questions in all.

Question Nos. 1 and 5 are compulsory and out of the remaining, THREE are to be attempted choosing at least ONE from each Section.

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

Answers must be written in the medium authorized in the Admission Certificate which must be stated clearly on the cover of this Question-cum-Answer (QCA) Booklet in the space provided. No marks will be given for answers written in medium other than the authorized one.

Word limit in questions, wherever specified, should be adhered to.

Diagrams/Sketches, wherever required, may be drawn in the space provided for answering the question 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.
Discuss the structures of inosilicates with neat sketches and mineralogical examples.

Q. 1(b) यमलन (टिंपिंग) की परिपट्ति को समझाएं एवं साफ रेखाचित्रों द्वारा फेल्डस्पार में यमलन पर चर्चा कीजिए।

Explain the phenomenon of twinning and discuss the twinning in feldspars with neat sketches.

Q. 1(c) ‘पेरिटेक्टिक’ क्या है ? पेरिटेक्टिक को निरूपित करने वाली एक उपयुक्त अभिव्यक्ति पर चर्चा कीजिए।

What is a peritectic? Discuss an appropriate reaction that represents a peritectic.

Q. 1(d) समझाएं कि ‘ब्रूनुलाईट फेल्सिस’ के शैलों का ‘एम्फिबोलाइट केल्सिस’ के शैलों से बुनावट एवं लक्जिज्य आधार पर कैसे विभेदित किया जा सकता है?

Explain how granulite facies rocks can be texturally and mineralogically differentiated from amphibolite facies rocks.

Q. 1(e) ‘बलुआपाल्पर’ एवं ‘गड़ढ़स्टर’ में उत्कीर्ण चिह्न आम होते हैं। क्या कारण है कि वे ‘संगुटिकाश्यों’ एवं ‘शैलों’ में विरल होते हैं?

Ripple marks are common in sandstones and siltstones. Why are they rare in conglomerates and shales?

Q. 2(a) साफ रेखाचित्रों द्वारा समूर्दीक निकाय (आइसोमेट्रिक सिस्टम) के ‘प्रसामान्य वर्ग’ के समस्त तत्त्वों और आकृतियों का वर्णन कीजिए। इस वर्ग के तीन लक्जिज्यों के नाम लिखिए।

With neat sketches describe the symmetry elements and forms of the normal class of the isometric system. Name three minerals belonging to this class.

Q. 2(b) मृलिका लक्जिजों के वर्गीकरण और रासायनिक संधान पर चर्चा कीजिए।

Discuss the classification and chemistry of clay minerals.

Q. 2(c) जबकि ‘मैन्टल’ में क्वार्ट गूच्छों में नहीं होता है, क्या कारण है कि यह महाद्वीपों पर सबसे ज्यादा सामान्य लक्जिज है?

While quartz is completely absent in the mantle, why is it the most common mineral on the continents?
Q. 3(a) What are the different discontinuities within the earth picked up by seismic waves? What are the petrological explanations for each of these discontinuities?

Q. 3(b) What do the following two series signify and what is the difference between the two?

(i) Chlorite → Biotite → Garnet → Staurolite → Kyanite → Sillimanite

(ii) Shale → Slate → Phyllite → Schist → Gneiss.

Q. 3(c) What is a Komatiite? What is the reason for the spinifex texture shown by Komatiites? From your answer discuss the possible reason why Komatiites are found mostly in the Archean.

Q. 4(a) Explain the process of lithification and diagenesis with special reference to limestones.

Q. 4(b) Discuss the evolution and characteristic features of the major sedimentary basins of India.

Q. 4(c) Considering the Bowen’s reaction series, discuss how an igneous rock will be affected during retrogressive transformation.

SECTION—B

Q. 5(a) Explain the difference between syngenetic and epigenetic deposits with neat sketches and suitable examples.
Q. 5(b) What are the placer minerals produced from beach sands in India? Describe the properties and uses of any two of these minerals.

Q. 5(c) Briefly describe the principles and applications of self-potential and induced polarization methods of electrical prospecting.

Q. 5(d) What are the chemical parameters which determine the coordination number of a cation in crystal structure? Illustrate with examples of cations in 3-fold and 4-fold coordination in rock forming minerals.

Q. 5(e) What are the sources of marine pollution and their effect on marine eco-system?

Q. 6(a) Which one of the two minerals, magnetite and hematite, contains more iron? Illustrate by calculating iron concentration (in wt. %) of magnetite and hematite. Atomic weight of Fe = 56, O = 16.

Q. 6(b) Explain the process of formation of magmatic sulphide deposit. What is the characteristic mineral assemblage of magmatic sulphide deposit?

Q. 6(c) Write a note on air-borne magnetic survey and its advantage over ground based magnetic survey.

Q. 6(d) What are the methods of underground mining of mineral deposits? Add a note on impact of underground mining on ground surface and environment.
Q. 7(a) Give a list of the major petroliferous basins of India. Describe the geology and hydrocarbon occurrence of Bombay High oilfield. 15

Q. 7(b) Describe different categories of ore reserves and their application in the Indian context. 10

Q. 7(c) Describe the methods of geochemical prospecting and the geological conditions in which these methods are adopted. 15

Q. 7(d) Explain how substitution of one element by another takes place in minerals. Write a note on solid solution with example from silicate minerals. 10

Q. 8(a) Describe the iron ore basins in Singhbhum craton and the characteristics of associated iron ore deposits. 15

Q. 8(b) What are the gravity separation methods of ore beneficiation? Describe the process of heavy media separation of coal. 15

Q. 8(c) What is polymorphism in minerals? Explain with suitable examples from rock forming minerals and ore minerals. 10

Q. 8(d) Describe different types of radioactive wastes. Write a note on the methods of disposal of radioactive wastes. 10