भूविज्ञान परीक्षा
Geologist Examination 2014

A–FDN/RB–N–HMC

GEOLOGY

Paper—III

Time Allowed : Three Hours | *Maximum Marks : 200*

INSTRUCTIONS

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

*There are **SIX** questions divided under **TWO** sections.*

*Candidate has to attempt **ALL** the **SIX** questions.*

*ALL the parts in the **ONLY** question in Section A are compulsory.*

*In Section B, **THREE** parts out of **FOUR** are to be attempted in each of the **FIVE** questions.*

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

All parts and sub-parts of a question are to be attempted together in the answer book.

Attempts of questions shall be counted in chronological 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 answer book must be clearly struck off.

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

Neat sketches are to be drawn to illustrate answers, wherever required.

SECTION—A

1. Write short answer for each of the following with sketches wherever necessary : 5×10=50

   (a) Geobotanical Indicators in geochemical prospecting.

   (b) Steel making minerals.

   (c) Landslide hazard Zonation map.

   (d) Maceration techniques and their application in coal seam correlation.

   (e) Limiting conditions of gas hydrate formation in continental shelf.

   (f) Characteristics of diamond bearing Kimberlite.

   (g) Rampura-Agucha Zinc-lead deposit.

   (h) Alkali-aggregate reaction in concrete.

   (i) Utility of gamma-gamma logging in coal exploration.

   (j) Magma-mixing model for origin of stratiform chromite deposits.

SECTION—B

2. Answer any **THREE** of the following : 10×3=30

   (a) Compare the geological setting, age, ore mineralogy and genesis of manganese ore deposits associated with the Eastern Ghats and Sausar Group of rocks. 10

(b) Discuss the salient aspects of India's current National Mineral Policy and explain how the policy aims at the development of strategic mineral resources. 10

(c) Give one important example of each of the following types of mineral deposits in India along with their mineral assemblage and associated host rocks : 2×5=10

(i) SEDEX barite

(ii) Muscovite pegmatite

(iii) Greisen tungsten

(iv) PGE associated with ultramatic/ultrabasic rocks

(v) Orogenic gold.

(d) (i) Draw a schematic geological map of Singhbhum craton showing Singhbhum shear zone and associated mineral deposits. 5

(ii) Describe the iron ore basins of Singhbhum craton and associated BIF-hosted iron ore deposits. 5

3. Answer any **THREE** of the following :

(a) What are sub-marine hydrothermal sulphides ? Explain their genesis in relation to MOR settings. Discuss their types, mineralogy and economic importance. 10

(b) (i) What are the properties of fluid inclusions in ore mineral assemblages ? 5

(ii) Explain the methods of determining chemical composition of fluid inclusions. 5

(c) (i) How are metals transported in hydrothermal ore forming processes ? 5

(ii) What are the causes of ore deposition from hydrothermal solution ? 5

(d) Describe the geological characteristics and genesis of skarn-hosted ore deposits. 10

4. Answer any **THREE** of the following : 10×3=30

(a) (i) What are the field evidences useful in prospecting of mineral deposits ? 5

(ii) Write a note on categorisation of ore reserve. 5

(b) (i) Why core drilling is more useful in mineral exploration compared to non-core drilling ? 5

(ii) How wire-line drilling is more useful in mineral exploration compared to conventional core drilling ? 5

(c) A vertical and tabular copper ore body having an average thickness of 2.86 m is being mined by developing levels at 30 m interval. The adjacent levels are connected by raise/winze at an interval of 40 m. Considering specific gravity of ore to be 2.94, calculate tonnage of ore in a block bounded by two consecutive levels and raises/winzes. If the average ore grade is 3.22 wt.% Cu, calculate the metal content of the block. 5+5=10

(d) (i) Explain different electrode configurations used in resistivity surveys. 5

(ii) How apparent resistivity is derived from the data obtained during resistivity survey ? 5

5. Answer any **THREE** of the following : 10×3=30

(a) (i) Write briefly about oxidation of coal and its effect. 5

(ii) Discuss the causes and environmental impact of underground coal combustion. 5

(b) (i) Draw a labelled section of anticlinal structural trap formed by folding of clastic rocks consisting of sandstone and shale. 5

(ii) Mention five major causes for migration of petroleum. 5

(c) (i) Explain the process of coalification. 5

(ii) Distinguish between coking and non-coking varieties of coal with examples from India. 5

(d) (i) Describe the geological setting of any three types of uranium deposits in India. 6

(ii) Write a note on primary and secondary uranium minerals. 4

6. Answer any **THREE** of the following : 10×3=30

(a) What are the possible hazards associated with construction of large dams in the Himalayas ? 10

(b) Give a neat sketch of the seismic zone map of India. Discuss the need for the revision of the existing seismic map in the light of the recent earthquakes in Peninsular India. 5+5=10

(c) Write notes on :

(i) Use of geotextiles in road construction. 5

(ii) Deere and Miller classification of important rocks on the basis of their unconfined compressive strength. 5

(d) (i) What is seismic microzoning ? Explain the application of seismic microzoning in hazard mitigation. 5

(ii) Modified Mercalli Scale and its relationship with Richter Scale. 5