

Test Paper Code : GG

QUESTION BOOKLET CODE

A

Reg. No.

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Time : 3 Hours

Name :

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Maximum Marks : 100

SEAL

GENERAL INSTRUCTIONS

1. This Question-cum-Answer Booklet has **20** pages consisting of Part-I and Part-II.
2. An **ORS** (Optical Response Sheet) is inserted inside the Question-cum-Answer Booklet for filling in the answers of Part-I. Verify that the **CODE** and **NUMBER** Printed on the **ORS** matches with the **CODE** and **NUMBER** Printed on the **Question-cum-Answer Booklet**.
3. Based on the performance of Part-I, a certain number of candidates will be shortlisted. Part-II will be evaluated only for those shortlisted candidates.
4. The merit list of the qualified candidates will depend on the performance in both the parts.
5. Write your **Registration Number and Name** on the top right corner of this page as well as on the right hand side of the **ORS**. Also fill the appropriate bubbles for your registration number in the **ORS**.
6. The Question Booklet contains blank spaces for your rough work. No additional sheets will be provided for rough work.
7. **Non-Programmable Calculator is ALLOWED. But clip board, log tables, slide rule, cellular phone and other electronic gadgets are NOT ALLOWED.**
8. The Question-cum-Answer Booklet and the **ORS** must be returned in its entirety to the Invigilator before leaving the examination hall. **Do not remove any page from this Booklet.**
9. Refer to special instructions/useful data on the reverse of this page.

Instructions for Part-I

10. Part-I consists of **35** objective type questions. The first 10 questions carry **ONE** mark each and the rest 25 questions carry **TWO** marks each.
11. Each question has 4 choices for its answer: (A), (B), (C) and (D). Only **ONE** of the four choices is correct.
12. Fill the correct answer on the left hand side of the included **ORS** by darkening the appropriate bubble with a black ink ball point pen as per the instructions given therein.
13. There will be **negative marks for wrong answers**. For each 1 mark question the negative mark will be 1/3 and for each 2 mark question it will be 2/3.

Instructions for Part-II

14. Part-II has **8** subjective type questions. Answers to this part must be written in blue/black/blue-black ink only. The use of sketch pen, pencil or ink of any other color is not permitted.
15. Do not write more than one answer for the same question. In case you attempt a descriptive question more than once, please cancel the answer(s) you consider wrong. Otherwise, the answer appearing last only will be evaluated.

SEAL

A

Special Instructions / Useful Data

**Do not draw any figure for answering descriptive questions.
Drawings will not be considered for evaluation.**

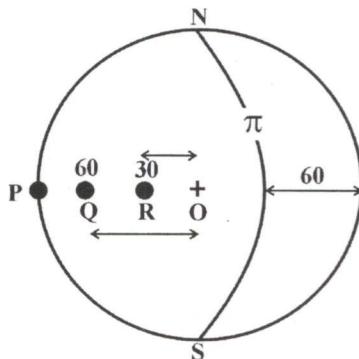
IMPORTANT NOTE FOR CANDIDATES

- Part-I consists of 35 objective type questions. The first ten questions carry one mark each and the rest of the objective questions carry two marks each. There will be negative marks for wrong answers. For each 1 mark question the negative mark will be $1/3$ and for each 2 mark question it will be $2/3$.
- Write the answers to the objective questions by filling in the appropriate bubble on the left hand side of the included ORS.
- Part-II consists of 8 descriptive type questions each carrying five marks.

PART- I: Objective Questions

Q. 1 – Q. 10 carry one mark each.

Q.1 Identify the pole to the great circle π in the given stereographic projection.



(A) P

(B) Q

(C) R

(D) O

Q.2 Transform fault is a

(A) strike-slip fault
(C) reverse fault

(B) normal fault
(D) thrust fault

Q.3 In what type of country rock do sink-holes develop?

(A) Phyllite (B) Gneiss (C) Limestone (D) Sandstone

Q.4 The Gutenberg discontinuity lies between

(A) crust and mantle (B) lithosphere and asthenosphere
(C) outer core and lower mantle (D) inner core and outer core

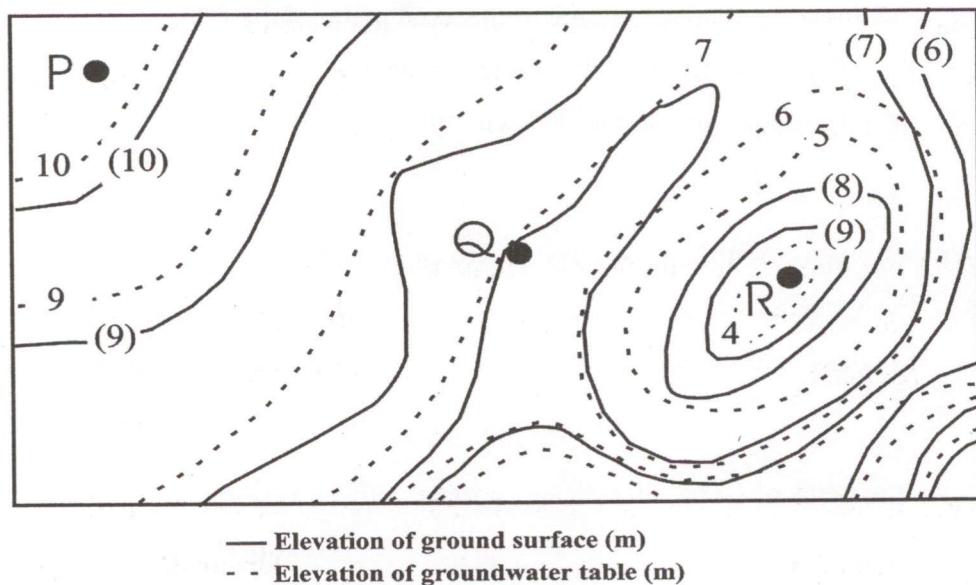
- Q.5 Among the following ores, of which is gossan a characteristic surface indicator?
- (A) pyrite-chalcopyrite (B) chromite-magnetite
(C) pyrolusite-psilomelane (D) columbite-tantalite
- Q.6 Which of the following physical properties characterize galena?
- (A) Prismatic form (B) Cherry red streak
(C) Yellow colour (D) High specific gravity
- Q.7 In which of the following rocks does groundwater flow obey Darcy's law?
- (A) Shale (B) Sandstone
(C) Marble (D) Granite
- Q.8 Which of the following minerals belongs to the cubic system?
- (A) Orthoclase (B) Quartz
(C) Garnet (D) Apatite
- Q.9 Which one of the following rocks has maximum compressive strength?
- (A) Marble (B) Slate
(C) Sandstone (D) Granite
- Q.10 From the sedimentary rocks listed below, select the most fine-grained.
- (A) Sandstone (B) Conglomerate
(C) Siltstone (D) Claystone

Q. 11 – Q. 35 carry two marks each.

- Q.11 Which combination of geological entities occurs in the same craton?
- (A) Chitradurga schist belt-Closepet Granite- Huttı gold mine
(B) Bhilwara Supergroup- Sittampundi anorthosite-Zawar Pb-Zn deposit
(C) Kolar schist belt- Malani rhyolite - Malanjkhanda copper deposit
(D) Mansar Formation-Makrana marble- Sukinda chromite deposit
- Q.12 Choose the correct statement from the following :
- (A) Vindhyan Supergroup is devoid of limestone
(B) The top of the Cuddapah Supergroup is Phanerozoic
(C) Kaladgi basin is situated in the Bastar Craton
(D) The Mesozoic Bhuj Formation consists predominantly of sandstone

- Q.13 Identify the correct chronostratigraphic sequence of the Siwalik Group from the following (oldest to youngest):
- Pinjor-Nagri-Dhok Pathan-Tatrot
 - Nagri-Dhok Pathan-Tatrot-Pinjor
 - Dhok Pathan-Tatrot-Nagri-Pinjor
 - Tatrot-Pinjor-Nagri-Dhok Pathan
- Q.14 If the strike of an inclined bed is N15°E, the dip direction can be
- S75°W
 - N75°E
 - S75°E
 - S15°W
- Q.15 Parallel fold is one in which
- the orthogonal thickness is same all around the fold.
 - the thickness is same parallel to the axial plane of the fold.
 - the outer and inner arcs have same curvature.
 - the dip isogons are parallel to each other.
- Q.16 ‘Comb structure’ with ‘symmetrical banding’ is formed by
- Early magmatic process
 - Hydrothermal process
 - Chemical sedimentary process
 - Residual concentration process
- Q.17 Match the items of **Group-I** with appropriate items in **Group-II**.
- | Group-I | Group-II |
|--------------------------|------------------------|
| P. Banded Iron Formation | 1. Copper |
| Q. Andesite porphyry | 2. Diamond |
| R. Lamproite | 3. Rare metals |
| S. Pegmatite | 4. Blue dust |
| (A) P-4, Q-1, R-2, S-3 | (B) P-3, Q-2, R-4, S-1 |
| (C) P-4, Q-3, R-1, S-2 | (D) P-4, Q-1, R-3, S-2 |

- Q.18 Which one of the following minerals is commonly used for determination of vibration direction of the polarizer in a petrological microscope?
- (A) Muscovite (B) Hornblende (C) Augite (D) Tourmaline
- Q.19 A mafic rock in the eclogite facies may contain the assemblage
- (A) chlorite-epidote-albite
 (B) garnet-clinopyroxene-hornblende-plagioclase
 (C) garnet-clinopyroxene
 (D) garnet-clinopyroxene-orthopyroxene-plagioclase
- Q.20 Elevation contours of ground surface (values in parenthesis) and groundwater table (values in normal font) are given in the figure below.



What do the points P, Q and R represent?

- (A) P-recharge area, Q-spring, R-discharge area
 (B) P-discharge area, Q-spring, R-recharge area
 (C) P-spring, Q-recharge area, R-discharge area
 (D) P-discharge area, Q-recharge area, R-spring

Q.21 Airy's model of isostasy

- (A) requires mountains to have higher density than the oceanic crust
- (B) requires mountains to have lower density than the oceanic crust
- (C) requires mountains to have the same density as oceanic crust
- (D) does NOT consider the densities of mountain and oceanic crust

Q.22 Choose the correct statement about the igneous forms, lopolith and laccolith.

- (A) Both are concordant; lopolith is convex upward while laccolith is concave upward.
- (B) Both are discordant; both are convex upward.
- (C) Both are concordant; laccolith is convex upward, while lopolith is convex downward.
- (D) Both are discordant; both are convex downward.

Q.23 Which one of the following belongs to the Equidae family?

- | | |
|-------------------------|----------------------------|
| (A) <i>Stegodon</i> | (B) <i>Stegolophodon</i> |
| (C) <i>Ramapithecus</i> | (D) <i>Gigantopithecus</i> |

Q.24 Which one of the following flora is a conifer?

- | | |
|-------------------------|--------------------------|
| (A) <i>Glossopteris</i> | (B) <i>Gangamopteris</i> |
| (C) <i>Buriadia</i> | (D) <i>Schizoneura</i> |

Q.25 Match sedimentary features in **Group-I** with the processes in **Group-II**.

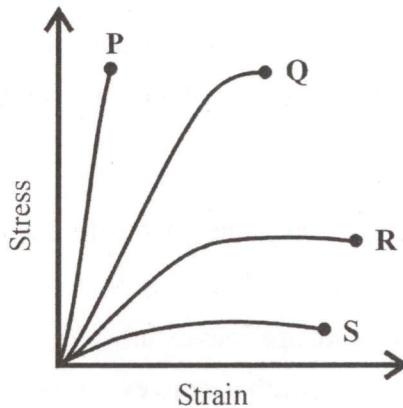
Group-I

- P. Flute cast
- Q. Convolute lamination
- R. Cross-stratification
- S. Flaser bedding
- (A) P-2, Q-1, R-3, S-4
- (C) P-1, Q-2, R-4, S-3

Group-II

- 1. Deformation of sediments
- 2. Erosion
- 3. Fluctuating current
- 4. Migration of bed forms
- (B) P-2, Q-1, R-4, S-3
- (D) P-2, Q-3, R-4, S-1

- Q.26 Stress-strain deformation curves for four rocks P, Q, R and S are given below. The dots at the ends of the curves indicate the respective failure points of each rock. Choose the rock with the highest brittle strength.



- (A) P (B) Q (C) R (D) S

- Q.27 A closed form belonging to crystal class $\frac{4}{m} \bar{3} \frac{2}{m}$ intercepts the axes at $a = 1$, $b = 1$ and $c = \infty$. The name and the Miller Indices of the form are

- | | |
|----------------------|-------------------------|
| (A) Octahedron (111) | (B) Hexoctahedron (321) |
| (C) Cube (100) | (D) Dodecahedron (110) |

- Q.28 Match the mineral deposits in **Group-I** with the localities of their occurrences in **Group-II**.

Group-I		Group-II	
P.	Lignite	1.	Dariba
Q.	Fluorite	2.	Noamundi
R.	Chromite	3.	Panandhro
S.	Sphalerite-Galena	4.	Amba Dongar
(A)	P-2, Q-3, R-4, S-5	5.	Naushahi
(C)	P-3, Q-4, R-2, S-1	(B)	P-3, Q-4, R-5, S-1
		(D)	P-4, Q-5, R-1, S-2

Q.29 Match the minerals in **Group-I** with their optical properties in **Group-II**.

Group-I	Group-II
P. Quartz	1. Oblique extinction
Q. Hornblende	2. Isotropic
R. Muscovite	3. Mottled extinction
S. Garnet	4. Uniaxial positive
(A) P-3, Q-2, R-1, S-4	(B) P-4, Q-3, R-2, S-1
(C) P-4, Q-1, R-3, S-2	(D) P-3, Q-4, R-1, S-2

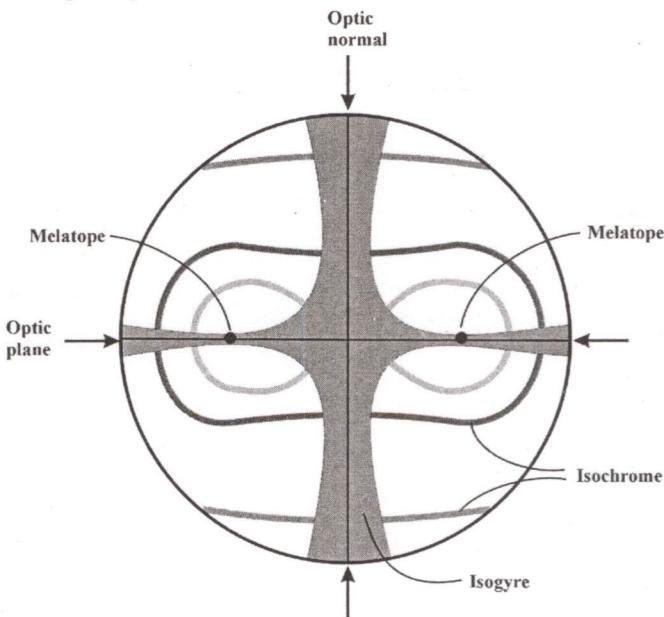
Q.30 Two minerals, P and Q, were studied under the microscope. Mineral P is characterized by two orthogonal cleavages. Mineral Q has more than one set of cleavage, but these are NOT at right angles; Q also changes relief on rotation of the stage. Identify P and Q from the following alternatives:

- | | |
|----------------------------------|-------------------------------|
| (A) P - hornblende, Q - calcite | (B) P - calcite, Q - diopside |
| (C) P - diopside, Q - hornblende | (D) P - diopside, Q - calcite |

Q.31 A potash-rich ultrabasic rock containing phlogopite both as megacrysts and groundmass is

- | | | | |
|---------------------|--------------------|-----------------|----------------|
| (A) leucite syenite | (B) K-rich granite | (C) carbonatite | (D) kimberlite |
|---------------------|--------------------|-----------------|----------------|

Q.32 Identify the interference figure given below.



- | | |
|---------------------------------|------------------------------------|
| (A) Biaxial optic normal figure | (B) Biaxial acute bisectrix figure |
| (C) Uniaxial optic axis figure | (D) Uniaxial flash figure |

Q.33 Match the genera in **Group-I** with the phyla in **Group-II**.

Group-I

- P. *Mya*
- Q. *Micraster*
- R. *Olenoides*
- S. *Leptaena*
- (A) P-3, Q-4, R-1, S-2
- (C) P-2, Q-4, R-1, S-3

Group-II

- 1. Echinodermata
- 2. Mollusca
- 3. Brachiopoda
- 4. Arthropoda
- (B) P-2, Q-1, R-3, S-4
- (D) P-2, Q-1, R-4, S-3

Q.34 Match the landforms given in **Group-I** with the causative processes given in **Group-II**.

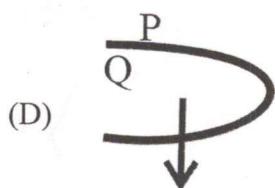
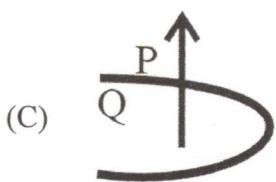
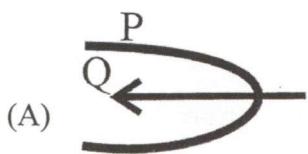
Group-I

- P. Strath
- Q. Drumlins
- R. Cirque
- S. Point bar
- (A) P-4, Q-1, R-2, S-3
- (C) P-4, Q-2, R-1, S-3

Group-II

- 1. Glacial deposition
- 2. Glacial erosion
- 3. Fluvial deposition
- 4. Fluvial erosion
- (B) P-3, Q-1, R-2, S-4
- (D) P-1, Q-2, R-3, S-4

Q.35 Which of the following symbols indicates a synform?

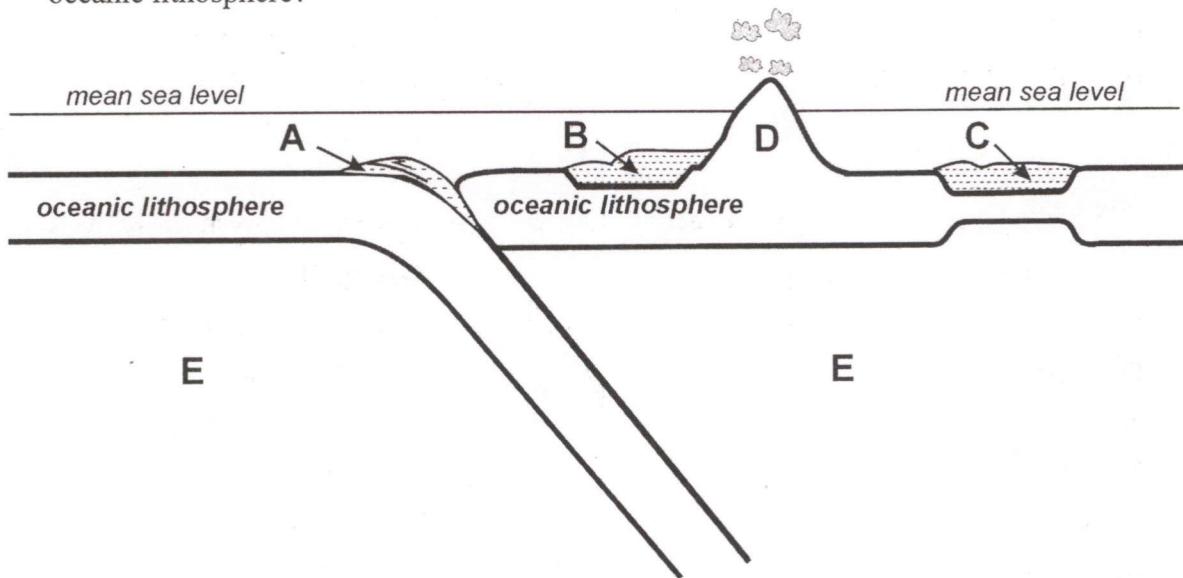


A

PART - II: Descriptive Questions

Q. 36 – Q. 43 carry five marks each.

- Q.36 The figure below is a schematic section across an ocean-ocean subduction zone. Identify the features **A**, **B** and **C** that are characterized by sedimentary accumulations. What does the elevated zone **D** represent? What is the zone **E** that lies on both sides of the subducting oceanic lithosphere?



A:

B:

C:

D:

E:

A

Q.37 Given below is a list of gastropods.

Conus, Turritella, Vermetus, Calliostoma, Aporrhais, Acteonella, Schizostoma, Bellerophon

Identify the biconical, discoidal and turreted forms.

Biconical:

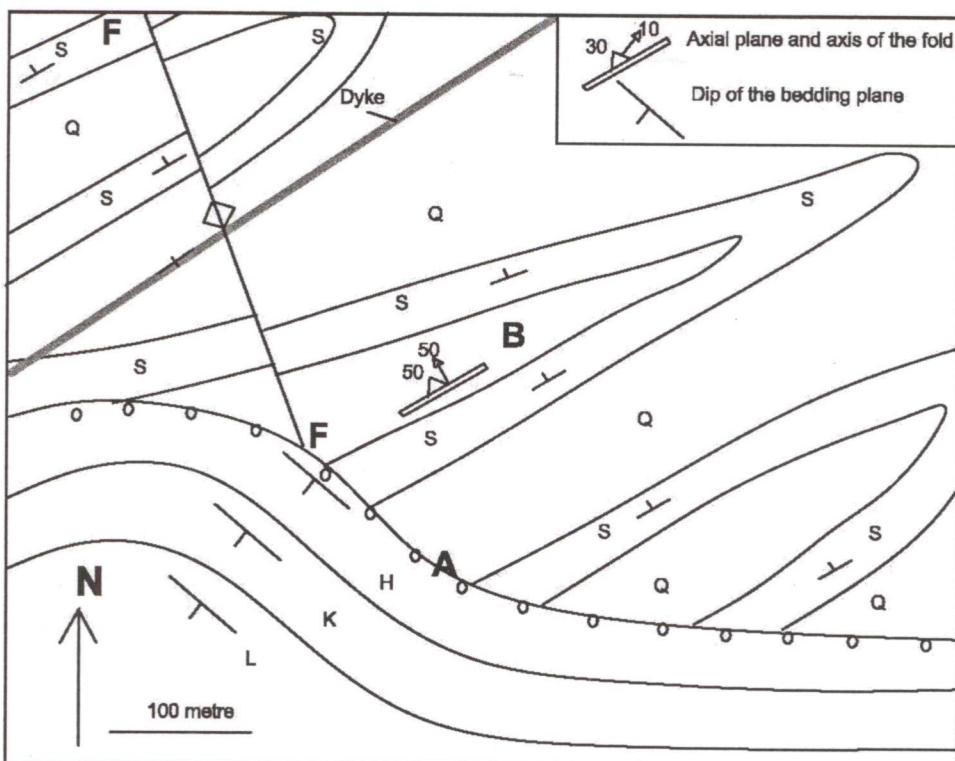
Discoidal:

Turreted:

Distinguish between holostomatous and siphonostomatous apertures in gastropods.

A

Q.38 Based on the geological map, answer the questions below.



Identify the nature of the surface passing through A.

Identify the sets of beds and the relative ages of those sets.

Identify the nature of the fold at B.

In the map, vertical fault F-F cuts across the dyke and adjacent beds. Find the nature of slip along the fault.

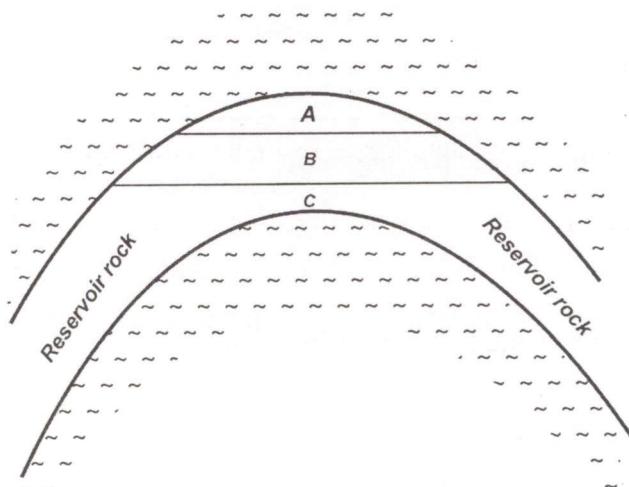
Why is the dyke NOT displaced by the fault?

A

- Q.39 Which type of topography and climatic conditions are suitable for formation of plateau-type bauxite deposits?

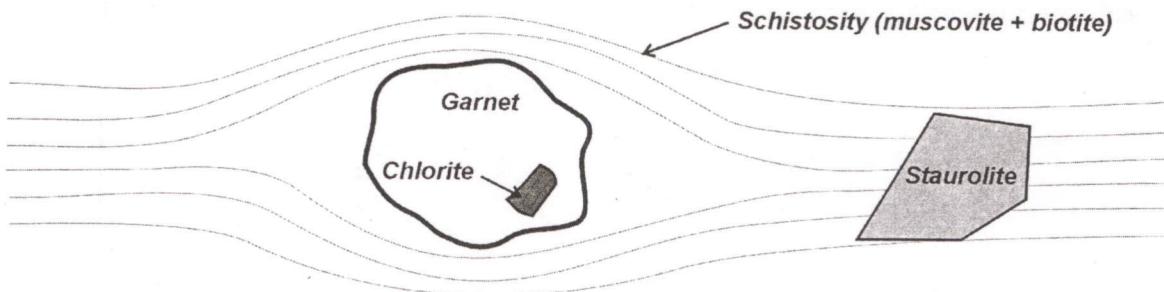
Name two essential minerals found in bauxite.

The figure below shows an idealized anticlinal hydrocarbon reservoir containing oil, gas and water. Which zone out of A, B and C will be occupied predominantly by oil, and why?



A

Q.40 Study the textural relations given below:



In what sequence are the minerals garnet, chlorite and staurolite formed? Give reasons for your answer.

Two pelitic rocks, A and B, contain the following assemblages:

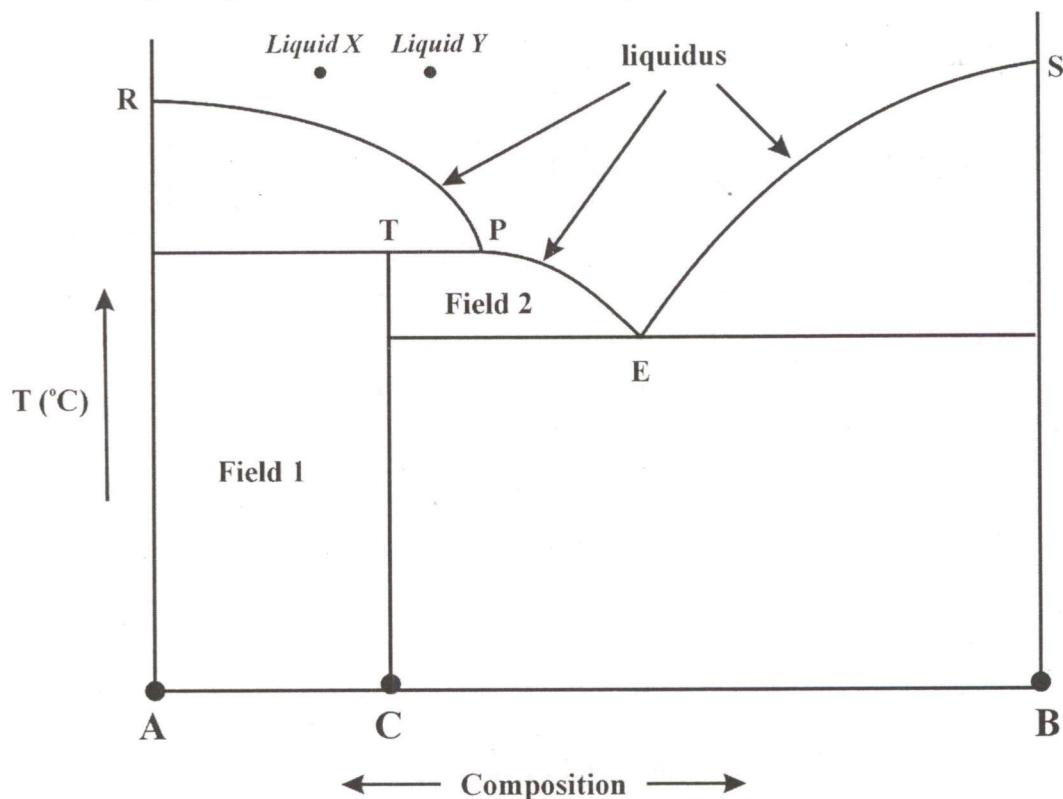
A : Quartz-sillimanite-garnet-muscovite-biotite-graphite

B : Quartz-sillimanite-garnet-K-feldspar-biotite-graphite

Which of the two can be called a 'khondalite', and why?

A

- Q.41 The figure below represents an isobaric binary system involving the solid phases A, B and C and their liquidus phase relations. Based on the figure, answer the following questions.



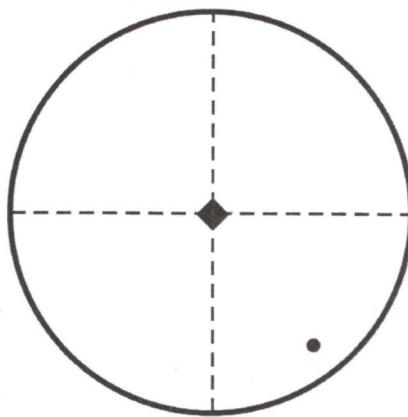
What phases (among A, B, C and liquid) are stable in Field 1 and Field 2, respectively?

At which point in this figure can a ‘corona’ texture develop?

Trace the equilibrium crystallization histories of liquid X and liquid Y.

A

- Q.42 The figure below is a stereographic projection of the symmetry elements in the class 4/m of the Tetragonal system, with a tetrad axis normal to a plane of symmetry. Given the projection of one face (marked by a dot in the figure), how many faces will the form have? What is the name of this form?



Write the Si:O ratios of **olivine**, **diopside** and **nepheline**.

A

Q.43. A stratigraphic column, consisting of formations A, B and C (from bottom to top), having mutual gradational contacts, is characterized as follows:

C – shore-face sandstone

B – inner to middle shelf sandstone-shale alternation

A – outer shelf mud with occasional thin sandstone

What does this stratigraphic column indicate – transgression or regression? Justify.

Which formation has the sandstone with the least matrix, and why?

Which formation has the most rounded sand grains?

A

Space for rough work

A

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GG-18/20

A

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A

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A

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Question Number	Marks	
36		
37		
38		
39		
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41		
42		
43		
Total Marks in the Subjective Part		

Total Marks (in words)	:	
Signature of Examiner(s)	:	
Signature of Head Examiner(s)	:	
Signature of Scrutinizer	:	
Signature of Chief Scrutinizer	:	
Signature of Coordinating Head Examiner	:	

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