B

2009 – GG

Test Paper Code : GG

Time : 3 Hours Maximum Marks : 300

INSTRUCTIONS

1. The question-cum-answer booklet has **24** pages and has **44** questions. Please ensure that the copy of the question-cum-answer booklet you have received contains all the questions.
2. Write your **Roll Number, Name and the name of the Test Centre** in the appropriate space provided on the right side.
3. Write the answers to the objective questions against each Question No. in the **Answer Table for Objective Questions,** provided on Page No. **7**. Do not write anything else on this page.
4. Each objective question has **4 choices** for its answer : (A), (B), (C) and (D). Only **ONE** of them is the correct answer. There will be **negative marking** for wrong answers to objective questions. The following marking scheme for objective questions shall be used :
   (a) For each correct answer, you will be awarded **3 (Three)** marks.
   (b) For each wrong answer, you will be awarded **–1 (Negative one)** mark.
   (c) Multiple answers to a question will be treated as a wrong answer.
   (d) For each un-attempted question, you will be awarded **0 (Zero)** mark.
   (e) Negative marks for objective part will be carried over to total marks.
5. Answer the subjective question only in the space provided after each question.
6. Do not write more than one answer for the same question. In case you attempt a subjective question more than once, please cancel the answer(s) you consider wrong. Otherwise, the answer appearing last only will be evaluated.
7. All answers must be written in blue/ black/blue-black ink only. Sketch pen, pencil or ink of any other colour should not be used.
8. All rough work should be done in the space provided and scored out finally.
9. No supplementary sheets will be provided to the candidates.
10. **Clip board, log tables, slide rule, calculator, cellular phone, pager and electronic gadgets in any form are NOT allowed.**
11. The question-cum-answer booklet must be returned in its entirety to the Invigilator before leaving the examination hall. Do not remove any page from this booklet.

Sample

B

2009 – GG

READ INSTRUCTIONS ON THE LEFT SIDE OF THIS PAGE CAREFULLY

ROLL NUMBER						

Name :

Test Centre :

Do not write your Roll Number or Name anywhere else in this question-cum-answer booklet.

I have read all the instructions and shall abide by them.

.....

Signature of the Candidate

I have verified the information filled by the Candidate above.

.....

Signature of the Invigilator

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B

IMPORTANT NOTE FOR CANDIDATES

- **Questions 1-30 (objective questions) carry *three* marks each and questions 31-44 (subjective questions) carry *fifteen* marks each.**
- **Write the answers to the objective questions in the *Answer Table for Objective Questions* provided on page 7 only.**

Q.1 The raised area adjacent to a stream channel that is produced by frequent flooding and overbank deposition is

(A) Crevasse (B) Point bar (C) Levee (D) Oxbow lake

Q.2 The following two figures, I and II, show outcrop patterns on flat grounds. What are the correct interpretations of structures in I and II?

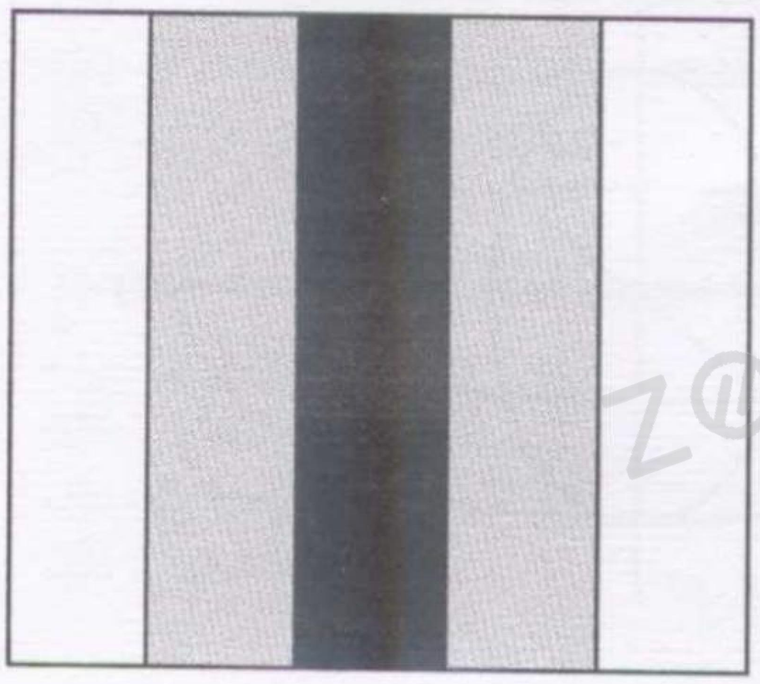


Fig. I

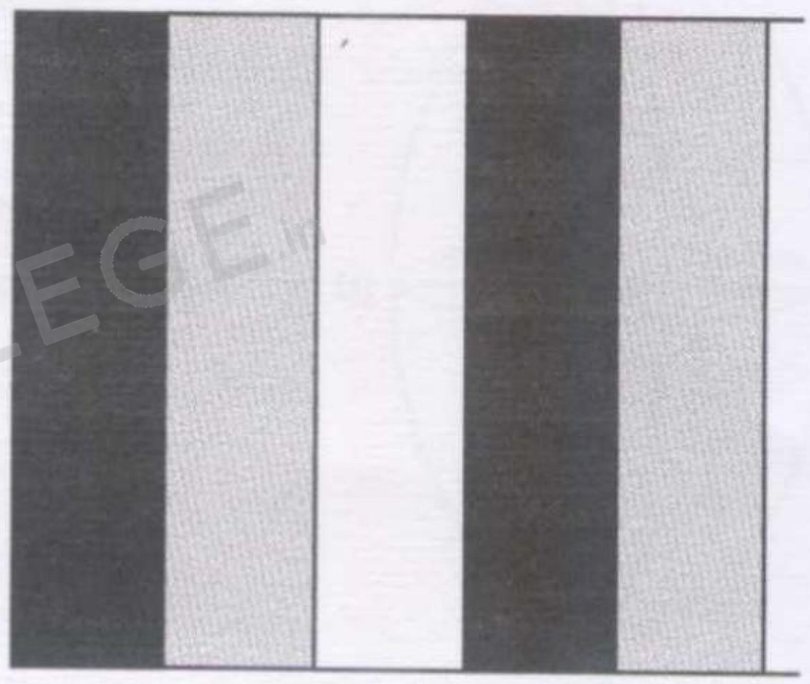


Fig. II

(A) I-fold; II-fold
(B) I-fold; II-fault
(C) I-fault; II-fault
(D) I-fault; II-fold

Q.3 If the Reynolds Number is > 2000, the flow regime is

(A) Laminar (B) Turbulent (C) Transitional (D) Critical

Q.4 Which of the following is a product of aeolian processes?

(A) Point bar (B) Tillite (C) Calcrete (D) Loess

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Q.5 Which one of the following suggests the presence of an unconformity?

(A) Gouge
(B) Mylonite
(C) Cataclasite
(D) Basal conglomerate

Q.6 An igneous rock contains SiO_2, Al_2O_3, Na_2O, K_2O, FeO, MnO, CaO and MgO. Assuming that the degree of freedom is 2, the number of minerals present in the rock is

(A) 4 (B) 8 (C) 10 (D) 1

Q.7 Following two figures (I & II) show the optical indicatrix of uniaxial crystals. Which one of the following interpretations is correct?

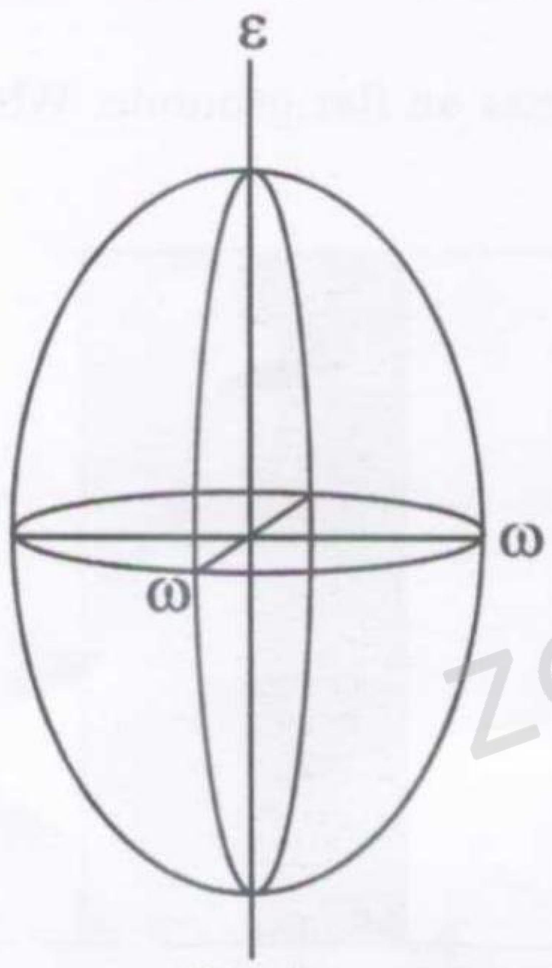


Fig. I

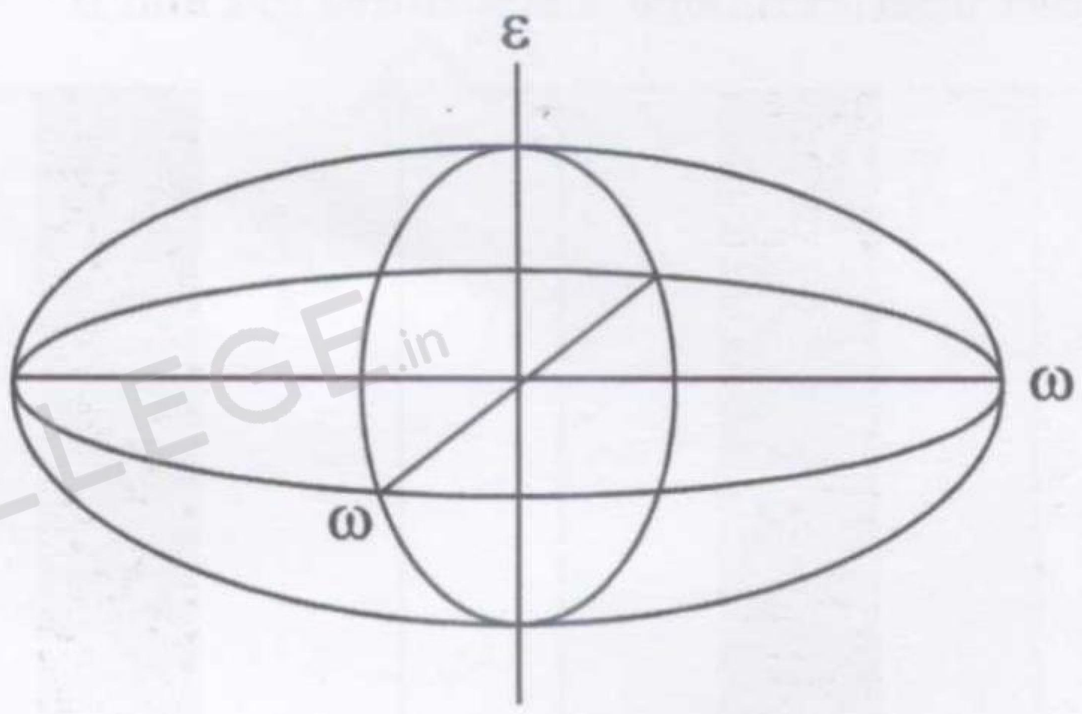


Fig. II

(A) I-positive, II-negative
(B) I-negative, II-positive
(C) I-positive, II-positive
(D) I-negative, II-negative

Q.8 Match the following :

Group I (Silicate Structure)	Group II (Mineral)
P. Nesosilicate	1. Muscovite
Q. Cyclosilicate	2. Quartz
R. Phyllosilicate	3. Forsterite
S. Tektosilicate	4. Beryl

(A) P-1, Q-2, R-3, S-4
(B) P-4, Q-3, R-2, S-1
(C) P-3, Q-4, R-1, S-2
(D) P-2, Q-1, R-4, S-3

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Q.15 A rock containing equal proportions of plagioclase, pyroxene and olivine is

(A) Anorthosite (B) Dunite (C) Lherzolite (D) Norite

Q.16 Which of the following is an ore mineral of uranium?

(A) Sphalerite (B) Pitchblende (C) Cassiterite (D) Wolframite

Q.17 Which one of the following minerals is characterized by black streak?

(A) Hematite (B) Sphalerite (C) Magnetite (D) Malachite

Q.18 In igneous rocks graphic texture forms at

(A) Peritectic conditions (B) Eutectic conditions
(C) Triple point (D) Critical point

Q.19 Which of the following is formed by storm waves?

(A) Herring-bone cross beds (B) Antidunes
(C) Linguoid ripples (D) Hummocky cross beds

Q.20 Which one of the following assemblages is characteristic of the eclogite facies?

(A) Hornblende + plagioclase + staurolite
(B) Orthopyroxene + clinopyroxene + plagioclase (no staurolite, no muscovite)
(C) Omphacite + garnet (no plagioclase)
(D) Actinolite + chlorite + epidote + albite

Q.21 Tin and Tungsten mineralization is commonly associated with

(A) Basalt (B) Gabbro (C) Dunite (D) Granite

Q.22 What is the porosity of sandstone with solid rock volume of 70%?

(A) 0.7 (B) 0.4 (C) 0.3 (D) 0.07

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Q.23 Which one of the following fault types is developed if the intermediate principal stress axis (σ_2) is vertical?

(A) Normal (B) Reverse (C) Thrust (D) Strike-slip

Q.24 Which of the following is a Middle Cambrian Trilobite?

(A) *Olenus* (B) *Paradoxides* (C) *Olenellus* (D) *Phacops*

Q.25 Which one of the following is a Lower Gondwana flora?

(A) *Gangamopteris* (B) *Ptilophyllum* (C) *Otozamites* (D) *Nilssonia*

Q.26 Which one of the following stratigraphic units is marine?

(A) Umaria Beds (B) Kamthi Beds
(C) Pali Beds (D) Barren Measures

Q.27 The true dip of a limestone bed is 45° towards NE. The trace of this bed appears horizontal on a road section. What is the alignment of the road section?

(A) NE (B) NNE (C) NW (D) NNW

Q.28 In a pelecypod shell, if umbos curve is in such a way that the beak points in an anterior direction, the umbos are

(A) Opisthogyrate (B) Prosogyrate (C) Orthogyrate (D) Spirogyrate

Q.29 Match the stratigraphic units listed in Group I with their respective ages mentioned in Group II.

Group I	Group II
P. Neobolus Beds	1. Devonian
Q. Muth Quartzites	2. Miocene
R. Katrol Group	3. Jurassic
S. Tipam Sandstone	4. Cambrian

(A) P-1, Q-2, R-3, S-4
(B) P-2, Q-3, R-1, S-4
(C) P-4, Q-1, R-3, S-2
(D) P-2, Q-1, R-4, S-3

Q.30 What is the most commonly agreed age of the Archean-Proterozoic boundary?

(A) 1500 Ma (B) 2500 Ma (C) 570 Ma (D) 3500 Ma

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Q.31 (a) Draw two labeled figures to depict the differences between a transform fault and a transcurrent fault. (6)

(b) Define isostasy. Draw two labeled diagrams to illustrate Airy's and Pratt's hypotheses. (3 + 6)

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Q.32 (a) Draw a labeled diagram and explain the '*Equilibrium Line*' of a glacier. (9)

(b) What are *barchans* and *parabolic dunes*? With labeled diagram show different components as well as wind directions in these two types of dunes. (3 + 3)

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Q.33 (a) Draw labeled figures to show profile sections of the following folds :
(i) Anticline, (ii) Antiformal syncline and (iii) Synformal anticline (9)

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(b) The following figures, I, II, and III, show stereographic projections of axial planes and hinge lines of different folds. Name the type of fold represented in each stereogram. (6)

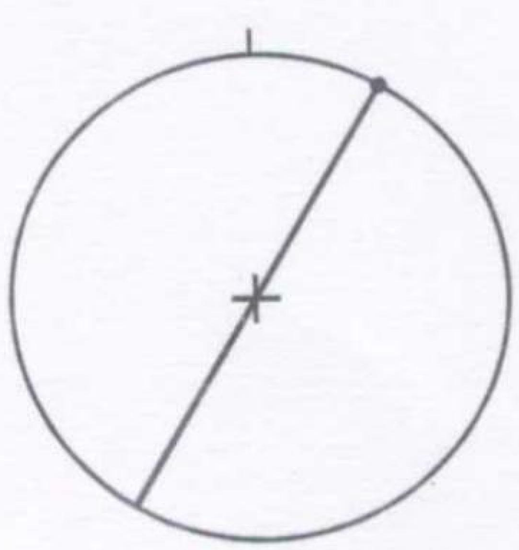


Fig. I

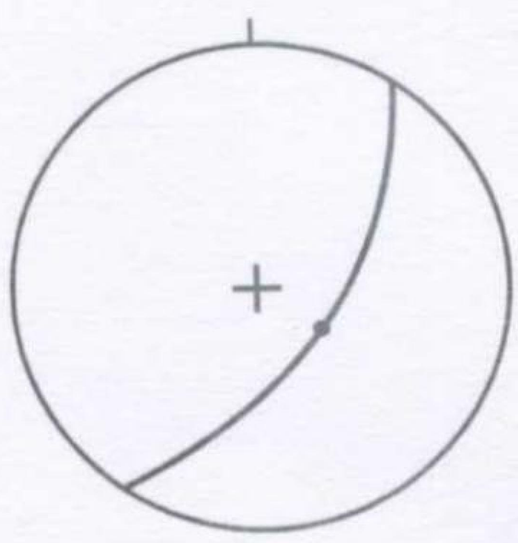


Fig. II

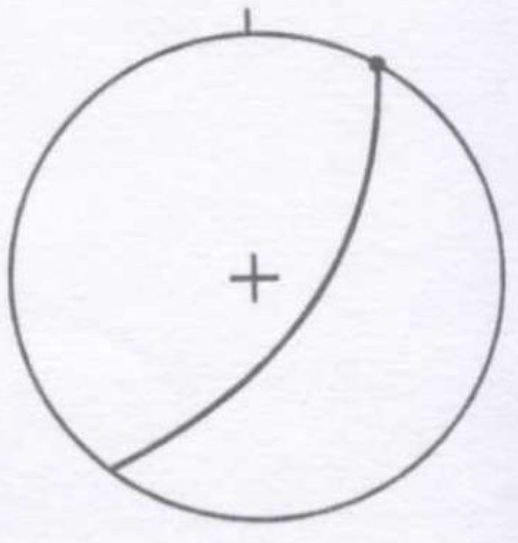
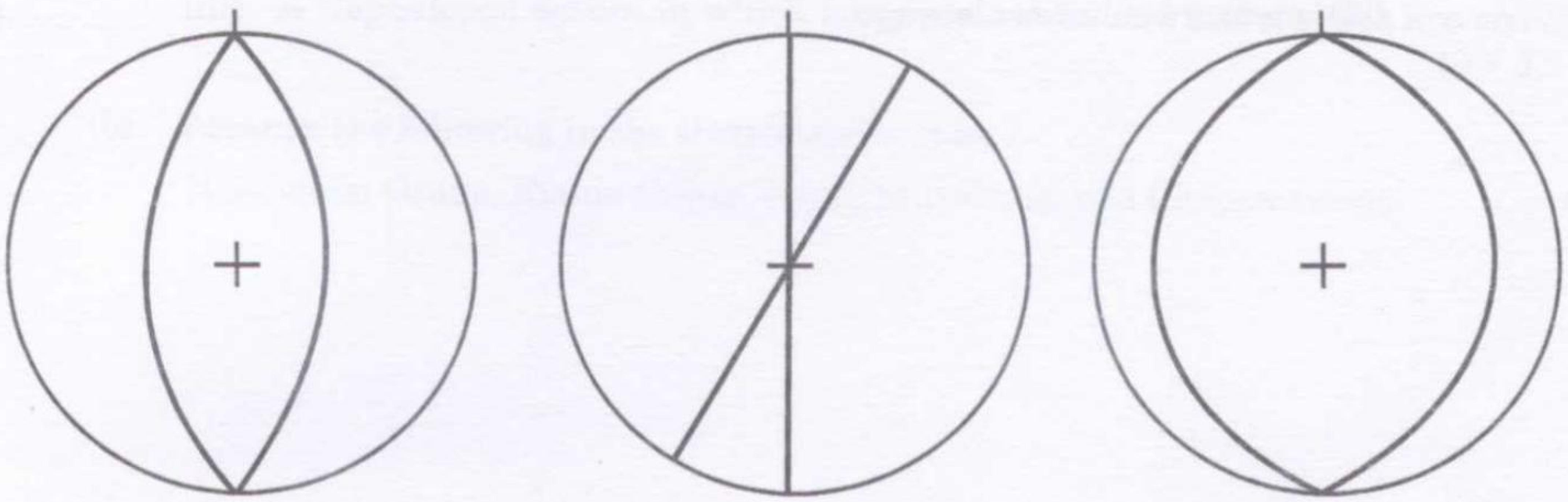


Fig. III

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Q.34 (a) Plot positions of the principal stress directions and show the sense of movement on faults shown in the following stereograms. (9)



Normal fault

Strike-slip fault

Thrust fault

(b) Draw labeled figures showing a mylonite and a fault-breccia. (6)

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Q.35 (a) Draw diagrams showing the dip-isogon patterns and geometries of Class 1A and Class 3 folds. (6)

(b) Draw labeled figures to show (i) slaty cleavage, (ii) crenulation cleavage, and (iii) pressure solution cleavage. (9)

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Q.36 (a) Name the following :

(i) The five plates of the apical system that lie above ambulacra in Echinoids

(ii) The facial suture that meets the genal angle in a Cephalon of a Trilobite shell

(iii) A Cephalopod suture in which lobes are subdivided and saddles are smooth. (3 + 3 + 3)

(b) Arrange the following in the stratigraphic order :

Nallamalai Group, Kistna Group, Papaghani Group and Cheyair Group. (6)

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Q.37 (a) Name the type area of Jurassic sequence in India. Write in brief about their depositional environment and the dominant class of fossils found in the sequence. (6)

(b) With the help of a curve that shows the relationship between generic diversity and time, write the radiation history of Brachiopoda in brief. (9)

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Q.38 (a) What are Pteridophytes? Give three examples of Lycopodiales. (6 + 3)

(b) Write in brief the ecology of Anthozoans. (6)

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Q.39 (a) Name the six crystal systems. List two classes of symmetry for any two of the crystal systems. (3 + 3)

(b) Define isomorphism and polymorphism with an example of each. Which factors are responsible for causing isomorphism and polymorphism in minerals? (6 + 3)

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Q.40 (a) What are perthite and antiperthite intergrowths? (3 + 3)

(b) Complete the following reactions : (3 × 3)

$CaCO_3$ + SiO_2 = _____ + _____
(calcite) (quartz)

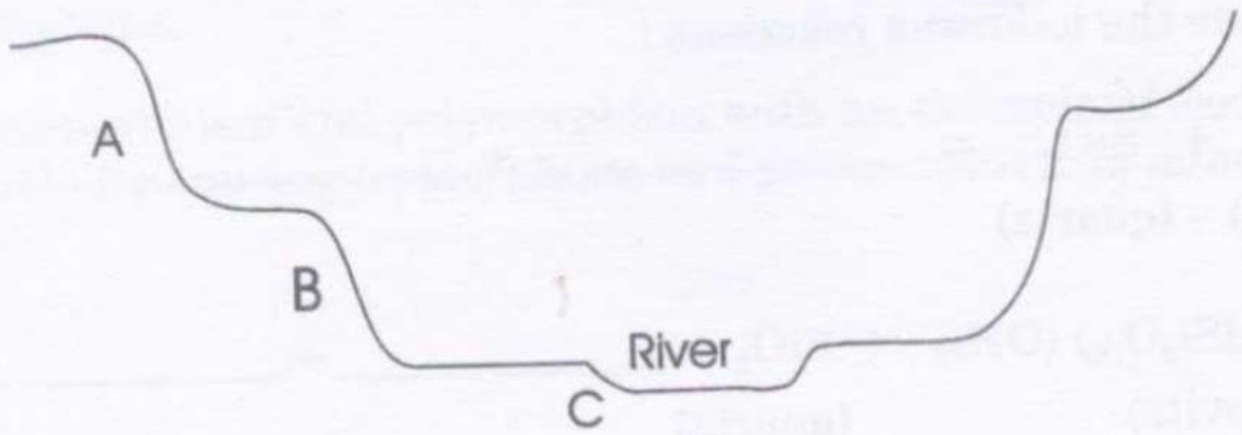
$KAl_2(AlSi_3O_{10})(OH)_2$ + SiO_2 = _____ + _____ + _____
(muscovite) (quartz)

$4\,Mg_2SiO_4$ + $6H_2O$ = _____ + _____
(forsterite) (water)

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Q.41 Using the figure below answer the following questions



(a) Which is the oldest terrace amongst A, B and C? Are these terraces paired or un-paired? (6)

(b) Draw a labeled diagram showing the main units of a classical "*Bouma Sequence*". (9)

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Q.42 (a) With the help of diagrams, define *porphyroblast* and *phenocryst*. (6)

(b) What are the essential minerals present in (i) Tonalite (ii) Khondalite and (iii) Dunite? (9)

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Q.43 (a) What are the conditions for the formation of hydrothermal deposits? (9)

(b) What are stockworks? Enumerate the causes of their formation. (6)

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Q.44 (a) What is Darcy's Law? What is the difference between primary porosity and secondary porosity? (6 + 3)

(b) Draw a stress – strain diagram showing yield strength, ultimate strength and rupture strength. (6)

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