



Paper - II
EARTH, ATMOSPHERIC, OCEAN &
PLANETARY SCIENCES

Booklet Code

A

SUBJECT CODE :

02

Test Booklet No.

Roll No. :

(Figures as per admission card)

Roll No. (in words) :

OMR Sheet No. :

Name and Signature of Invigilator/s

Signature : _____

Name : _____

Time : 2 Hours

Maximum Marks : 200

Number of Pages in this Booklet : 24

Number of Questions in this Booklet : 100

Instructions for the Candidates

1. Write your roll number in the space provided on the top of this page.
2. This paper consists of hundred (100) multiple-choice type of questions.
3. At the commencement of examination, the test booklet will be given to you. In the first 5 minutes, you are requested **To Open the Booklet and Compulsorily Examine it as Below:**
 - (i) To have access to the Test Booklet, tear off the paper seal on the edge of the cover page. Do not accept a booklet without sticker seal or open booklet.
 - (ii) Tally the number of pages and number of questions in the booklet with the information printed on the cover page. Faulty booklets due to pages/questions missing or duplicate or not in serial order or any other discrepancy should be got replaced immediately by a correct booklet from the invigilator within the period of 5 minutes. Afterwards, neither the Test Booklet will be replaced nor any extra time will be given.
 - (iii) After the verification is over, the Test Booklet Number should be entered in the OMR Sheet and the OMR Sheet Number should be entered on this Test Booklet.
4. Each item has four alternative responses marked (A), (B), (C) and (D). You have to darken the circle as indicated below on the correct response against each item.
Example : Ⓐ Ⓑ ● Ⓓ
where (C) is the correct response.
5. Your responses to the questions are to be indicated in the **OMR Sheet kept inside this Booklet**. If you mark at any place other than in the circles, the OMR Sheet will not be evaluated.
6. Read the instructions given in OMR Sheet carefully. Fill the Booklet Code of Paper-II in OMR Sheet **Compulsorily**.
7. Rough Work is to be done in the end of this booklet.
8. If you write your name or put any mark on any part of the OMR Answer Sheet, except for the space provided for the relevant entries, which may disclose your identity, you will render yourself liable to disqualification.
9. You have to return the OMR answer Sheet to the invigilators at the end of the examination compulsorily and must NOT carry it with you outside the Examination Hall.
10. You can take away test booklet and carbon copy of OMR Answer Sheet after the examination.
11. **Use only Blue/Black Ball point pen.**
12. **Use of any calculator, electronic gadgets or log table, etc. is prohibited.**
13. **There is no negative mark for incorrect answer.**



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prepp
Your Personal Exam Guide



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1. Which of the following pressure (P) and temperature (T) conditions are correctly associated with a subducting slab?

(A) Low T and high P environment
 (B) High T and high P environment
 (C) High T and low P environment
 (D) Low T and low P environment

2. What will be the Clarke concentration value for Hg whose average concentration in the upper crust is 0.1 ppm and ore grade concentration is 1%?

(A) 100
 (B) 1000
 (C) 10,000
 (D) 100,000

3. Which of the following radiometric dating method was first used in the determination of age of the Earth?

(A) Sm-Nd method
 (B) U-Pb method
 (C) Rb-Sr method
 (D) Ar-Ar method

4. Match List-I and List-II and select the correct answer from the codes given below:

List-I

(Geochronometers)

P. Sm-Nd System

Q. U-Pb System

R. Rb-Sr System

S. K-Ar System

List-II

(Materials)

1. Zircon
 2. Micas
 3. Hornblende, Sanidine
 4. Igneous rocks

Codes:

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

5. Which of the following pyroxene is correctly associated with the eclogite?

(A) Jadeite
 (B) Omphacite
 (C) Pigeonite
 (D) Diopside

6. LILs enrichment relative to REE and HFS, marked with the negative Nb-Ta-Ti anomaly on the Primitive Mantle or Chondrite normalized trace element patterns, is suggestive of which of the following?

(A) Island Arc Basalt
 (B) Mid Oceanic Ridge Basalt
 (C) Ocean Island Basalt
 (D) Ocean-Floor Basalt



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7. If the cation to anion radius ratio is between 0.414 and 0.732, then which of the following coordination results?

(A) Triangular
(B) Octahedral
(C) Tetrahedral
(D) Cubic

8. Given below are two statements:

Statement I: When 14 possible space lattice types (Bravais lattices) are combined with the symmetry elements in the 32 crystal classes (point groups) as well as translational elements, space groups result

Statement II: Total 230 space groups illustrate information content of the Hermann-Mauguin system as used for both space groups and point groups

In light of the above statements, choose the most appropriate answer from the codes given below:

(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect
(C) Statement I is correct and Statement II is incorrect.

(D) Statement I is incorrect and Statement II is correct.

9. Match List-I and List-II and select the correct answer from the codes given below:

List-I

(Two or more crystals joined by the symmetry laws)

P Cyclic twins
Q Penetration twins
R Polysynthetic twins
S Contact twins

List-II

(Minerals)

1 Twins of leucite
2 Albite and pericline twins in the plagioclase
3 Carlsbad twin in the feldspar
4 Albite twins in the plagioclase

Codes:

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



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10. Given below are two statements:

Statement I: In isobaric phase diagram of a binary Forsterite (MgSiO_4) - Silica (SiO_2) peritectic system, an intermediate phase of Enstatite exists between the end-member phases Forsterite and silica.

Statement II: Mg-rich olivine and quartz can never coexist in equilibrium in igneous rocks.

In light of the above statements, choose the most appropriate answer from the codes given below:

- (A) Both Statement I and Statement II are incorrect
- (B) Statement I is correct and Statement II is incorrect
- (C) Both Statement I and Statement II are correct
- (D) Statement I is incorrect and Statement II is correct

11. When original mineral as well as texture/structure of the rock is preserved after recrystallization, the texture/structure is called:

- (A) Xenoblast
- (B) Maculose

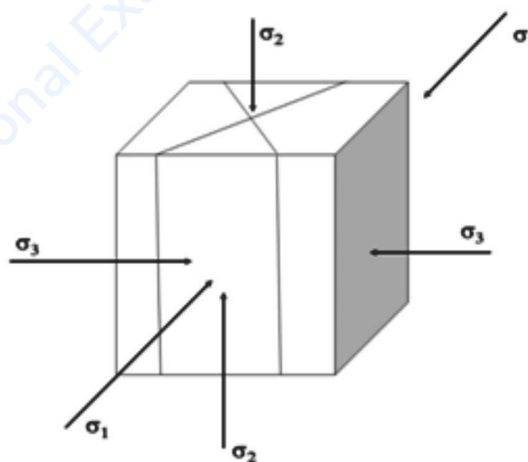
- (C) Blastopsammitic

- (D) Palimpsest

12. Plagioclase + hypersthene + biotite mineral assemblage is suggestive of which of the following metamorphic facies?

- (A) Amphibolite
- (B) Green schist
- (C) Epidote
- (D) Pyroxene hornfels

13. Above diagram represents the orientations of Principal stress directions of a:



- (A) Reverse Fault
- (B) Normal Fault
- (C) Strike-Slip Fault
- (D) Thrust Fault

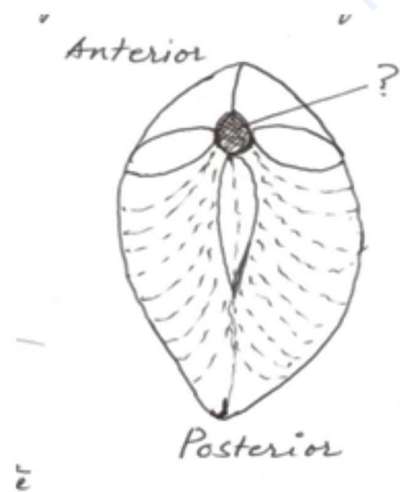


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14. Slicken side striations are a type of:
- (A) Foliation
(B) Bedding
(C) Lineation
(D) Fault plane
15. Which of the following rocks occurs typically in a ductile shear zone?
- (A) Gouge
(B) Breccia
(C) Tachylite
(D) Mylonite
16. A bedding plane dipping 30° due east, has a mineral lineation. The plunge of the lineation may be:
- (A) 20°
(B) 40°
(C) 70°
(D) 90°
17. Arrange the following Himalayan sub-divisions from West to East:
- I. Kashmir Himalaya
II. Himachal Himalaya
III. Darjeeling Himalaya
IV. Arunachal Himalaya
- (A) I, II, III, IV
(B) IV, III, II, I
(C) I, II, IV, III
(D) II, III, IV, I
18. Which of the following best explains the creation and breakup of supercontinents.
- (A) Wilson Cycle
(B) Davis Cycle
(C) King's Cycle
(D) Hutton Cycle
19. The Horizontal Equivalent, measured between successive strike lines on a map for a vertical bedding plane is:
- (A) Zero
(B) Infinitely large
(C) Moderately large
(D) Variable
20. Conservative plate boundary is represented by:
- (A) Normal fault
(B) Growth fault
(C) Transform fault
(D) Reverse fault



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21. Organisms which protect the coast lines and provide habitat and shelter to other organisms are :
- (A) Echinoderms
(B) Bivalves
(C) Graptolites
(D) Corals
22. Secondary adaptation in graptolites in the form of air bladder or floats are related to :
- (A) Floatation
(B) Spinosity
(C) Sinking
(D) Rotation
23. The stem of which Gondwana flora is similar to modern Cycas plants :
- (A) Nilssonia
(B) Vertebraria
(C) Williamssonia
(D) Ottozamites
24. Identify the given part of bivalve shell:
- 
- (A) Ligament
(B) Madreporite
(C) Delthyrium
(D) Lunule
25. In some brachiopods, the valves are held together by means of muscles and mantle and are termed 'Inarticulates'. One such example is :
- (A) Productus
(B) Terebratula
(C) Lingula
(D) Spirifer
26. In Brachiopods, Lophophore is also known as :
- (A) Pedicillare
(B) Brachia
(C) Radula
(D) Pedicle
27. Noncoiled cap shaped primitive gastropods are :
- (A) Pterobranchs
(B) Prosobranchs
(C) Opisthobranchs
(D) Pulmonates


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28. Some pelagic squids possess colour changing light organs, which contain a crypt and a lense.
Crypt is a small sac which houses luminous :
- (A) Viruses
(B) Bacteria
(C) Cells
(D) Tissues
29. Based on the occurrence of pentamerid brachiopods (Pentamerifera sp.) in the top horizon of the Muth Quartzite suggests:
- (A) Early Devonian age
(B) Late Silurian age
(C) Early Ordovician age
(D) Permian age
30. Which of the following is an example of mineral replacement :
- (A) Woolly Mammoth
(B) Fairy Ball
(C) Petrified wood
(D) Pedum burrows
31. Kuling System in Spiti Himalaya belongs to:
- (A) Precambrian age
(B) Permian age
(C) Jurassic age
(D) Ordovician age
32. Lithification includes
- (A) Compaction and desiccation
(B) Compaction, desiccation and cementation
(C) Compaction, desiccation, cementation and recrystallization
(D) Compaction, desiccation, cementation, recrystallization and alteration
33. The size of the sand in Wentworth scale varies from:
- (A) 1/16 to 2 mm in diameter
(B) 1/16 to 4 mm in diameter
(C) 1/16 to 1/256 mm in diameter
(D) 2-4 mm in diameter
34. If Reymond number is less than 500, then the flow of the fluid would be:
- (A) Turbulent
(B) Laminar
(C) Transitional
(D) Rapid
35. Coarsening upward depositional sequences are characteristic of:
- (A) Aeolin environment
(B) Fluvial environment
(C) Deltaic environment
(D) Lucustrine environment



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36. Which of the following are remnants of the glacial deposits?
- (A) Dhosa oolites
(B) Bagh beds
(C) Talchir boulder bed
(D) Fenestella shales
37. Which of the following era was dominated by dinosaurs?
- (A) Precambrian
(B) Palaeozoic
(C) Mesozoic
(D) Cenozoic
38. Marine Palaeozoic sequences are generally absent in :
- (A) Spiti region
(B) Peninsular India region
(C) Kashmir Himalaya
(D) Salt range
39. Which of the following processes is responsible for the nucleosynthesis of the most abundant nuclei between $A = 28$ and $A = 57$?
- (A) H burning
(B) He burning
(C) C and O burning
(D) Si burning
40. Eu anomalies are associated with which of the following minerals?
- (A) Orthoclase
(B) Alkali plagioclase
(C) Sanidine
(D) Calcic plagioclase
41. Given below are two statements, one labelled as Assertion (a) and the other labelled as Reason (r). Read the statements and choose the correct answer from the code given below:
- Assertion (a) : The mineral Pyrrhotite always shows more sulphur per formula unit than that corresponding to formula FeS
- Reason (r): Absence of some Fe atoms from their places in lattice, causes deficiency of Fe.
- (A) Both (a) and (r) are true and (r) is not correct explanation of (a)
(B) (a) is true, but (r) is false
(C) (a) is false, but (r) is true
(D) Both (a) and (r) are true and (r) is a correct explanation of (a)



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42. Match List-I and List-II and select the correct answer from the codes given below

List-I

(Si-tetrahedra arrangements)

- P Sharing all four O atoms
 Q Sharing 2 O atoms
 R Sharing 3 O atoms
 S Sharing 1 O atoms

List-II

(Si:O ratios)

- 1 2:5
 2 2:7
 3 1:2
 4 1:3

Codes:

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

43. Given below are two statements:

Statement I: For elements of the same group in the Periodic Table, the ionic radii decrease as the atomic number of the elements increase.

Statement II: For positive ions of the same group, the ionic radii increase with increasing charge.

In light of the above statements, choose the most appropriate answer from the codes given below:

- (A) Both Statement I and Statement II are correct
 (B) Both Statement I and Statement II are incorrect
 (C) Statement I is correct and Statement II is incorrect
 (D) Statement I is incorrect and Statement II is correct

44. Given below are two statements:

Statement I: H, C, N, O and S isotopes have low atomic mass. Nuclides with less than mass number 16 do not fractionate efficiently in nature. C, N and S exist more than one oxidation states and participate in processes over a wide range of redox conditions.

Statement II: The relative difference in mass between heavy and light isotopes of each of H, C, N, O and S nuclides is fairly small. In light of the above statements, choose the most appropriate answer from the codes given below:

- (A) Both Statement I and Statement II are correct
 (B) Both Statement I and Statement II are incorrect
 (C) Statement I is correct and Statement II is incorrect
 (D) Statement I is incorrect and Statement II is correct



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45. Given below are two statements:

Statement I: K- 40 decays in two ways: (a) by β decay to form ^{40}Ca and (b) K-electron capture to form ^{40}Ar . The half-life period of K-Ar method is optimal, but because it severely suffers from the Ar loss, this K - Ar method is not used in dating of basic dykes and lava flows.

Statement II: Micas and amphiboles have best retention of Ar, hence they are used for age determination. The K-Ar method of age determination of metamorphic rocks gives date of metamorphic event.

In light of the above statements, choose the most appropriate answer from the codes given below:

- (A) Statement I is correct and Statement II is incorrect
- (B) Statement I is incorrect and Statement II is correct
- (C) Both Statement I and Statement II are correct
- (D) Both Statement I and Statement II are incorrect

46. Process of separation of two immiscible melts in a magma leads to the formation of which of the following ore deposit?

- (A) Chromite
- (B) PGE sulphide
- (C) Rare-metal pegmatites
- (D) Diamond

47. Given below are two statements, one labelled as Assertion (a) and the other labelled as Reason (r). Read the statements and choose the correct answer from the code given below:

Assertion (a): Diamond deposits in kimberlite and lamproite form from magmas that are generated below the depth of the graphite-diamond transition in the mantle.

Reason (r): Critical factor in the formation of diamond is not the concentration, but rather carriage of low diamond concentration from depth greater than 140 km in the mantle (where diamond is stable) to the surface

- (A) (a) is true, but (r) is false
- (B) (a) is false, but (r) is true
- (C) Both (a) and (r) are true and (r) is correct explanation of (a)
- (D) Both (a) and (r) are true and (r) is not correct explanation of (a)



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- 48 Match List-I and List-II and select the correct answer from the codes given below:

List-I

(Processes)

- P Supergene Sulphide
 Q Placer
 R Dissemination
 S Chemical Weathering

List-II

(Deposit)

- 1 Gold
 2 Diamond
 3 Bauxite
 4 Covellite

Codes:

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

49. Given below are two statements:

Statement I: Mn-ore as well as Gondite horizon overlies Mansar Stage of the Sausar Series.

Statement II: Mn-ore as well as Gondite horizon underlies Mansar Stage of the Sausar Series.

In light of the above statements, choose the most appropriate answer from the codes given below:

- (A) Both Statement I and Statement II are correct
 (B) Both Statement I and Statement II are incorrect
 (C) Statement I is correct and Statement II is incorrect
 (D) Statement I is incorrect and Statement II is correct

50. Which of the following sequences correctly represents progressive stages of coalification?

- (A) Anthracite-bituminous coal-lignite-peat
 (B) Bituminous coal-anthracite-peat-lignite
 (C) Peat-lignite-bituminous coal-Anthracite
 (D) Peat-lignite-anthracite-bituminous coal



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51. Which one of the following minerals is identified by perfect dodecahedral {011} cleavage, resinous luster and white, yellow to pale brown streak?

(A) Galena
(B) Pyrite
(C) Sphalerite
(D) Fluorite

52. Match List-I and List-II and select the correct answer from the codes given below:

List-I

(Maceral)

P Fusain
Q Durain
R Clarain
S Vitrain

List-II

(Diagnostic characters)

1. Vitreous luster, thick bands or lenses
2. Soft, silky and fibrous
3. Hard compact and dull
4. Vitreous luster, <1 mm thin streaky

Codes:

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

53. The Great Boundary Fault marks the boundary between:

(A) Lesser Himalaya and Outer Himalaya
(B) Siwalik and Ganga Plain
(C) Aravalli and the Vindhya
(D) Aravalli and the Marwar Supergroup

54. Which of the following elements was almost absent from the Earth's atmosphere during Archaean?

(A) Hydrogen
(B) Nitrogen
(C) Oxygen
(D) Silicon

55. Precambrian-Cambrian boundary is globally recognised by the presence of:

(A) Stromatolites
(B) Trilobites
(C) Pedum burrows
(D) Ediacaran metazoans



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56. Which of the following is an Archean succession?
- (A) Delhi Supergroup
- (B) Vindhyan Supergroup
- (C) Banded Gneissic Complex
- (D) Lesser Himalayan Sedimentary sequences
57. Last glacial period is referred to as:
- (A) The most recent glacial period within the current ice age occurring during 110,000 to 10,000 years B.P.
- (B) Period around 22,000 years B.P.
- (C) Period around 15,000 years B.P.
- (D) Since 2.6 million years.
58. Heinrich events are referred to :
- (A) Extreme and short-lived cold events during the general colder climatic conditions
- (B) Extreme and short-lived warmer events during the general colder climatic conditions
- (C) Extreme and short-lived cold events during the general warmer climatic conditions
- (D) Extreme and short-lived warm events during the general warmer climatic conditions
59. Which of the following dating technique is most suitable for dating Quaternary lacustrine deposits?
- (A) Potassium – Argon
- (B) Rubidium – Strontium
- (C) Thermoluminescence
- (D) Lead - Lead
60. Which of the following is NOT an indicator of Active tectonics?
- (A) Triangular facets
- (B) Skewed fans
- (C) Braid bars
- (D) Stream piracy
61. Which of the following does NOT indicate warmer climatic conditions?
- (A) Higher $^{18}\text{O}/^{16}\text{O}$ ratio in the Spelothems
- (B) Lowering of the Equilibrium Line Altitude (ELA)
- (C) Rise of sea level
- (D) Altitudinal rise of tree line


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62. Submerged glacial troughs are known as _____.
 (A) Sea mounts
 (B) Guyots
 (C) Island arcs
 (D) Fjords
63. Which of the following is related to GIS?
 (A) Euclidean space
 (B) Ramanujan space
 (C) Pythagorean space
 (D) Both (B) and (C)
64. The ratio of total solar radiant energy returned by a planetary body to total radiant energy incident on the body is called:
 (A) Reflectance
 (B) Reflectance factor
 (C) Albedo
 (D) Transmittance
65. Sun at 6000 K temperature has maximum exitance of _____ wavelength of EMR.
 (A) 0.1 to 0.2 μm
 (B) 0.4 to 0.6 μm
 (C) 2.0 to 4.0 μm
 (D) 10.0 to 12.0 μm
66. Satellite image of which part of the EMR is most useful to distinguish between the types of snow and cloud?
 (A) Visible part
 (B) Near infrared
 (C) Thermal infrared
 (D) Microwave
67. The Geographic Information System (GIS) is capable of handling:
 (A) Only locational data
 (B) Only attribute data
 (C) Both attribute and locational data
 (D) Neither attribute nor locational data
68. Porosity of a rock (α) in terms of Grain density (ρ_m) and Bulk density (ρ_d) is expressed as:
 (A) $\alpha = 1 - \frac{\rho_d}{\rho_m}$
 (B) $\alpha = 1 + \rho_d / \rho_m$
 (C) $\alpha = 1 - \rho_m / \rho_d$
 (D) $A = 1 + \rho_m / \rho_d$



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69. A map that exhibits variation in the thickness by contour lines drawn through the points of vertically drilled thickness of gently dipping strata (without referring to its true thickness) is called:

- (A) Structure contour map
- (B) Isopach map
- (C) Isochore map
- (D) Isograd map

70. Given below are two statements, one labelled as Assertion (a) and the other labelled as Reason (r). Read the statements and choose the correct answer from the code given below:

Assertion (a) : The exhalative sedimentary deposits are considered as syngenetic deposits developed within a definite stratigraphic horizon.

Reason (r): Such deposits show wall-rock alteration aureole which is used as exploration guide.

- (A) Both (a) and (r) are true and (r) is correct explanation of (a)
- (B) Both (a) and (r) are true and (r) is not correct explanation of (a)

(C) (a) is true, but (r) is false

(D) (a) is false, but (r) is true

71. Match List-I and List-II and select the correct answer from the codes given below:

List-I

(Methods)

- P Induced Polarization
- Q Self-potential
- R Electromagnetic
- S Radar

List-II

(Physical Properties)

- 1 Electrical inductance
- 2 Dielectric constant
- 3 Electrical conductivity
- 4 Electrical capacitance

Codes:

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



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72. Given below are two statements:

Statement I: Altitude of the mountain tends to decrease gravity value and the presence of considerable mass above sea level increases the measured value of gravity.

Statement II: The gravity is independent of density of the rock mass.

In light of the above statements, choose the most appropriate answer from the codes given below:

- (A) Both Statement I and Statement II are correct.
- (B) Both Statement I and Statement II are incorrect.
- (C) Statement I is correct and Statement II is incorrect.
- (D) Statement I is incorrect and Statement II is correct.

73. Match List-I and List-II and select the correct answer from the codes given below:

List-I

(Deposit types)

- P Complex base metal
- Q Complex precious metal

R Porphyry Cu

S Black shale

List-II

(Association of elements)

1 Au-Ag-As-Sb

2 Fe-Cu-Mo

3 Al-Ag-As-Au

4 Fe-Zn-Pb

Codes:

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

74. Which of the following gas anomaly is commonly associated with the subsurface U mineralization?

- (A) Ar
- (B) Rn
- (C) Kr
- (D) Xe



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75. Given below are two statements, one labelled as Assertion (a) and the other labelled as Reason (r). Read the statements and choose the correct answer from the code given below:

Assertion (a) : In triangular ore reserve estimation method, the entire ore body is sub-divided into a series of preferably equilateral triangles.

Reason (r): The triangles do not permit delineation of physical ore types.

- (A) Both (a) and (r) are true and (r) is correct explanation of (a)
- (B) Both (a) and (r) are true and (r) is not correct explanation of (a)
- (C) (a) is true, but (r) is false
- (D) (a) is false, but (r) is true

76. Given below are two statements:

Statement I: Geobotany is the study of plants as related to their geologic environment, but several factors that have no relation to the geology have major influence on distribution of plants.

Statement II: Plants respond to geologic environment by showing abnormal colours

and morphological features, caused by a poisonous element in the nutrient solution are called toxicity symptoms.

In light of the above statements, choose the most appropriate answer from the codes given below:

- (A) Both Statement I and Statement II are correct.
- (B) Both Statement I and Statement II are incorrect
- (C) Statement I is correct and Statement II is incorrect.
- (D) Statement I is incorrect and Statement II is correct.

77. Which of the following group of minerals is used as exploration guide for the recognition of primary alteration ring or halo of a hydrothermal sulphide deposit?

- (A) Hydrous Mg-Fe-Al chloride
- (B) Hydrous Mg-Fe-Al silicate
- (C) Hydrous Fe-oxide
- (D) Hydrous Fe- carbonate



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78. Elevation correction is applied to which of the following data?
- (A) Electromagnetic data
(B) Gravity data
(C) Seismic reflection data
(D) Magnetic data
79. What is the approximate average thickness of the Lithosphere?
- (A) 400 km
(B) 250 km
(C) 100 km
(D) 50 km
80. What type of dynamic range does a long and short period seismometers have?
- (A) Narrow
(B) Broad
(C) Zero
(D) Infinite
81. Which of the following indicates maximum extension of glaciers in the geological past?
- (A) Hanging valley
(B) Medial moraine
(C) Kame terrace
(D) Terminal moraine
82. What is the apparent resistivity (ρ_a) of a medium, if the electric and magnetic fields are $4 \times 10^{-3} \text{ V km}^{-1}$ and 10^{-9} Tesla at a frequency of 2 Hz?
- (A) 1.6 ohm-m
(B) 2.8 ohm-m
(C) 5.6 ohm-m
(D) 4.8 ohm-m
83. If z-Transform of $f(k)$ is $F(z)$, then z-transform of $a^k f(k)$ is equal to:
- (A) $a^k F(z)$
(B) $F(z)/a^k$
(C) $F(z/a)$
(D) $F(za)$
84. The Poisson's equation for gravitational field is given by:
- (A) $\nabla^2 U = 0$
(B) $\nabla^2 U = -4\pi Gm$
(C) $\nabla^2 U = -4\pi G\rho$
(D) $\nabla^2 U = 4\pi G\rho$
- (Where m = mass, G = Gravitational constant, ρ is density of material, U = potential field)



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85. For a Poisson Solid, the ratio of P- and S-wave velocities is:
- (A) 2.23
(B) 3.00
(C) 1.73
(D) 1.41
86. The second order central difference quotient is also called as:
- (A) One- point formula
(B) Two- point formula
(C) Three- point formula
(D) Four- point formula
87. The value of elevation correction, amounts to about (assuming crystal density = 2.67 g/cc):
- (A) 0.02 mgal/m
(B) 0.2 mgal/m
(C) 2.0 mgal/m
(D) 20.0 mgal/m
88. The isostatic gravity anomaly is defined as the:
- (A) Addition between Bouguer gravity anomaly and the computed anomaly of the root zone
(B) Multiplication between Bouguer gravity anomaly and the computed anomaly of the root zone
(C) Division between Bouguer gravity anomaly and the computed anomaly of the root zone
(D) Difference between Bouguer gravity anomaly and the computed anomaly of the root zone
89. What is the value of the dry adiabatic lapse rate (DALR) in the atmosphere?
- (A) 4.5°C/km
(B) 5.4°C/km
(C) 6.5°C/km
(D) 9.8°C/km
90. The potential temperature is defined as that temperature assumed by the system when compressed or expanded to a reference pressure of 1000 mb by an:
- (A) Isothermal process
(B) Adiabatic process
(C) Isobaric process
(D) Isochoric process

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91. At 30° latitude on Earth's surface, what will be the oscillation period of an air parcel displaced horizontally from its equilibrium position under the influence of force of gravity?
- (A) 02 sidereal day
(B) 01 sidereal day
(C) $1/2$ sidereal day
(D) $1/4$ sidereal day
92. Cyclostrophic Flow is due to a balance between
- (A) Pressure gradient force and the centrifugal force
(B) Coriolis force and centrifugal force
(C) Coriolis force and pressure gradient force
(D) Coriolis force and thermal force
93. What is the characteristic temperature of the Abyssal Zone?
- (A) Less than or equal to 4°C
(B) From 4 to 8°C
(C) From 8 to 12°C
(D) Greater than 12°C
94. The region of rapid density change in ocean is known as:
- (A) Pycnocline
(B) Thermocline
(C) Permanent thermocline
(D) Stenothermic
95. Ekman Number (E_z) is defined as:
- (A) Coriolis force multiplied by Friction force
(B) Friction force divided by Coriolis force
(C) Coriolis force divided by Friction Force
(D) Coriolis force added to Friction force
96. The ratio of amount of CO_2 dissolved in the ocean to the CO_2 contents in atmosphere is (approximately):
- (A) 30
(B) 40
(C) 50
(D) 60



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97. In the abyssal circulation, in the interior of the ocean:

- (A) Potential vorticity is increased
 (B) Potential vorticity is decreased
 (C) Potential vorticity is conserved
 (D) Flow lines become horizontal

List-II

(Description)

- 1 Vertical passage from ground to tunnel
 2 Passage for entry of men and equipment for tunneling
 3 Meeting point of the roof and two side walls of a tunnel
 4 Tunnel for releasing water from reservoir

98. _____ is not considered in the Rock Mass Classification.

- (A) Joint aperture
 (B) Ground water condition
 (C) Strength of material
 (D) In-situ stress condition

Codes:

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

99. Match List-I and List-II and select the correct answer from the codes given below:

List – I

(Structures)

- P Spring Line
 Q Shaft
 R Adit
 S Spillway

100. An arch dam is composed of a single concrete wall curved in plan with its_____.

- (A) Convex face downstream
 (B) Convex face upstream
 (C) Convex face parallel to valley
 (D) Concave face upstream



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