

Test Booklet Code & Serial No.

प्रश्नपत्रिका कोड व क्रमांक

Paper-II

A

EARTH, ATMOSPHERIC, OCEAN AND PLANETARY SCIENCE

Signature and Name of Invigilator

Seat No.

1. (Signature)

(In figures as in Admit Card)

(Name)

Seat No.

2. (Signature)

(In words)

(Name)

OMR Sheet No.

MAR - 35223

Time Allowed : 2 Hours]

(To be filled by the Candidate)

[Maximum Marks : 200

Number of Pages in this Booklet : 16

Number of Questions in this Booklet : 100

Instructions for the Candidates

- Write your Seat No. and OMR Sheet No. in the space provided on the top of this page.
- This paper consists of **100** objective type questions. Each question will carry *two* marks. *All* questions of Paper II will be compulsory.
- At the commencement of examination, the question booklet will be given to the student. In the first 5 minutes, you are requested to open the booklet and compulsorily examine it as follows :
 - To have access to the Question Booklet, tear off the paper seal on the edge of this cover page. Do not accept a booklet without sticker-seal or open booklet.
 - Tally the number of pages and number of questions in the booklet with the information printed on the cover page. Faulty booklets due to missing pages/questions or questions repeated or not in serial order or any other discrepancy should not be accepted and correct booklet should be obtained from the invigilator within the period of 5 minutes. Afterwards, neither the Question Booklet will be replaced nor any extra time will be given. The same may please be noted.
 - After this verification is over, the OMR Sheet Number should be entered on this Test Booklet.
- Each question 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.

<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
A	B	C	D
- Your responses to the items are to be indicated in the **OMR Sheet given inside the Booklet only**. If you mark at any place other than in the circle in the OMR Sheet, it will not be evaluated.
- Read instructions given inside carefully.
- Rough Work is to be done at the end of this booklet.
- If you write your Name, Seat Number, Phone Number or put any mark on any part of the OMR Sheet, except for the space allotted for the relevant entries, which may disclose your identity, or use abusive language or employ any other unfair means, you will render yourself liable to disqualification.
- You have to return original OMR Sheet to the invigilator at the end of the examination compulsorily and must not carry it with you outside the Examination Hall. You are, however, allowed to carry the Test Booklet and duplicate copy of OMR Sheet on conclusion of examination.
- Use only Blue/Black Ball point pen.
- Use of any calculator or log table, etc., is prohibited.
- There is no negative marking for incorrect answers.

विद्यार्थ्यांसाठी महत्वाच्या सूचना

- परीक्षार्थींनी आपला आसन क्रमांक या पृष्ठावरील वरच्या कोपऱ्यात लिहावा. तसेच आपणांस दिलेल्या उत्तरपत्रिकेचा क्रमांक त्याखाली लिहावा.
- सदर प्रश्नपत्रिकेत **100** बहुपर्यायी प्रश्न आहेत. प्रत्येक प्रश्नास **दोन** गुण आहेत. या प्रश्नपत्रिकेतील **सर्व** प्रश्न सोडविणे अनिवार्य आहे.
- परीक्षा सुरू झाल्यावर विद्यार्थ्यांला प्रश्नपत्रिका दिली जाईल. सुरुवातीच्या 5 मिनिटांमध्ये आपण सदर प्रश्नपत्रिका उघडून खालील बाबी अवश्य तपासून घ्याव्यात.
 - प्रश्नपत्रिका उघडण्यासाठी प्रश्नपत्रिकेवर लावलेले सील उघडावे. सील नसलेली किंवा सील उघडलेली प्रश्नपत्रिका स्वीकारू नये.
 - पहिल्या पृष्ठावर नमूद केल्याप्रमाणे प्रश्नपत्रिकेची एकूण पृष्ठे तसेच प्रश्नपत्रिकेतील एकूण प्रश्नांची संख्या पडताळून घ्यावी. पृष्ठे कमी असलेली/कमी प्रश्न असलेली/प्रश्नांचा चुकीचा क्रम असलेली किंवा इतर त्रुटी असलेली सदोष प्रश्नपत्रिका सुरुवातीच्या 5 मिनिटांतच पर्यवेक्षकाला परत देऊन दुसरी प्रश्नपत्रिका मागवून घ्यावी. त्यानंतर प्रश्नपत्रिका बदलून मिळणार नाही तसेच वेळही वाढवून मिळणार नाही याची कृपया विद्यार्थ्यांनी नोंद घ्यावी.
 - वरीलप्रमाणे सर्व पडताळून पाहिल्यानंतरच प्रश्नपत्रिकेवर ओ.एम.आर. उत्तरपत्रिकेचा नंबर लिहावा.
- प्रत्येक प्रश्नासाठी (A), (B), (C) आणि (D) अशी चार विकल्प उत्तरे दिली आहेत. त्यातील योग्य उत्तराचा रकाना खाली दर्शविल्याप्रमाणे ठळकपणे काळा/निळ्या करावा.
उदा. : जर (C) हे योग्य उत्तर असेल तर.

<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
A	B	C	D
- या प्रश्नपत्रिकेतील प्रश्नांची उत्तरे ओ.एम.आर. उत्तरपत्रिकेतच दर्शावावीत. इतर ठिकाणी लिहिलेली उत्तरे तपासली जाणार नाहीत.
- आत दिलेल्या सूचना काळजीपूर्वक वाचाव्यात.
- प्रश्नपत्रिकेच्या शेवटी जोडलेल्या कोऱ्या पानावरच कच्चे काम करावे.
- जर आपण ओ.एम.आर. वर नमूद केलेल्या ठिकाणाव्यतिरिक्त इतर कोठेही नाव, आसन क्रमांक, फोन नंबर किंवा ओळख पटेल अशी कोणतीही खूण केलेली आढळून आल्यास अथवा असभ्य भाषेचा वापर किंवा इतर गैरमार्गांचा अवलंब केल्यास विद्यार्थ्यांला परीक्षेस अपात्र ठरविण्यात येईल.
- परीक्षा संपल्यानंतर विद्यार्थ्यांने मूळ ओ.एम.आर. उत्तरपत्रिका पर्यवेक्षकांकडे परत करणे आवश्यक आहे. तथापि, प्रश्नपत्रिका व ओ.एम.आर. उत्तरपत्रिकेची द्वितीय प्रत आपल्याबरोबर नेण्यास विद्यार्थ्यांना परवानगी आहे.
- फक्त निळ्या किंवा काळ्या बॉल पेनचाच वापर करावा.
- कॅलक्युलेटर किंवा लॉग टेबल वापरण्यास परवानगी नाही.
- चुकीच्या उत्तरासाठी गुण कपात केली जाणार नाही.

MAR - 35223/II—A

Earth, Atmospheric, Ocean and Planetary Science Paper II

Time Allowed : 120 Minutes]

[Maximum Marks : 200

Note : This Paper contains **Hundred (100)** multiple choice questions. Each question carrying **Two (2)** marks. Attempt *All* questions.

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| <p>1. The correct order of succession of supercontinent formation amongst the following is :</p> <p>(A) Rodinia–Pangea–Gondwana
(B) Columbia–Arctica–Atlantica
(C) Columbia–Rodinia–Pannotia
(D) Columbia–Gondwana–Rodinia</p> <p>2. The value of SAR is used in classifying the water for :</p> <p>(A) Domestic use
(B) Irrigation use
(C) Industrial use
(D) (A) and (B)</p> <p>3. Which stratigraphic unit of the paleozoic succession of Lidar Valley, Kashmir Basin is unfossiliferous ?</p> <p>(A) Hapatnar Group
(B) Muth Formation
(C) Zewan Formation
(D) Fenestella shales</p> <p>4. Which of the following is considered a good index fossil for the Mesozoic Biostratigraphy ?</p> <p>(A) Foraminifera
(B) Conodont
(C) Ammonite
(D) Echinoderm</p> | <p>5. The first appearance datum (FAD) of which fossil species demarcate the Cambrian-Ordovician boundary ?</p> <p>(A) FAD <i>Trichophycus pedum</i>
(B) FAD <i>Oryctocephalus indicus</i>
(C) FAD <i>Lapetognathus fluctivagus</i>
(D) FAD <i>Tetragraptus approximates</i></p> <p>6. Trace fossil <i>Repichnia</i> indicate which strategy ?</p> <p>(A) Feeding (B) Grazing
(C) Locomotion (D) Escaping</p> <p>7. Which sponge species has spicules composed of silicic acid ?</p> <p>(A) <i>Euplectella</i> (B) <i>Sycon</i>
(C) <i>Leucosolenia</i> (D) <i>Petrosoma</i></p> <p>8. The term ‘coprolite’ is applied to :</p> <p>(A) Fossil shell
(B) Fossil excreta
(C) Fossil traces
(D) Fossil bones</p> <p>9. Which of the following is <i>not</i> a body fossil ?</p> <p>(A) <i>Ptilophyllum</i>
(B) <i>Neogloboquadrina</i>
(C) <i>Valcourea</i>
(D) <i>Ceratites</i></p> |
|---|---|

10. Short range forecasting refers to forecasting the weather valid for :
- (A) 1 week to 2 weeks
 (B) 3 weeks to 4 weeks
 (C) 1 to 3 days
 (D) 4 to 5 days
11. The average electrical conductivity of the Earth is about :
- (A) 10 s/meter
 (B) 1 s/meter
 (C) 10^{-3} s/meter
 (D) 10^{-9} s/meter
12. Stationary front occurs when :
- (A) Surface position of a front moves so that warm air occupies territory formerly covered by cooler air
 (B) Cold continental polar air actively advances into a region occupied by warm air
 (C) An active cold front overtakes a warm front
 (D) Air flow on both sides of a front is neither towards the cold air mass nor towards the warm air mass
13. The Coriolis force at the equator is :
- (A) negative (B) positive
 (C) infinite (D) zero
14. The electric potential of the electrosphere is positive with respect to Earth and its magnitude is about :
- (A) 1000 kV (B) 3000 kV
 (C) 300 kV (D) 30 kV
15. In regions when there is a net outflow of air, a situation referred to as :
- (A) Convergence (B) Advection
 (C) Convection (D) Divergence
16. The dominant mechanism of heat transfer in a hot spring is :
- (A) Radiation (B) Convection
 (C) Conduction (D) Transmission
17. The three principal stresses S_v , S_H and S_h represent the magnitudes of vertical component of stress, maximum horizontal stress and minimum horizontal stress. According to Anderson's faulting theory, a strike-slip fault movement may be inferred if :
- (A) $S_H > S_h > S_v$
 (B) $S_h > S_H > S_v$
 (C) $S_H > S_v > S_h$
 (D) $S_v > S_H > S_h$
18. The half-life of radioactive decay of ^{14}C is 5730 years. An archaeological artifact containing wood had only 80% of the ^{14}C found in a living tree. The estimated age of the artifact would be :
- (A) 3208 years (B) 5730 years
 (C) 1846 years (D) 2303 years

19. Which of the following statements is *correct* ?
- (i) Seismic reflection method depends on acoustic impedance contrast
 - (ii) Gravity method is sensitive to lateral density variations
 - (iii) Magnetic method is sensitive to susceptibility contrast
 - (iv) Electrical method depends on electrical resistivity variations
- (A) Only (i) is correct
 (B) Only (ii) and (iii) are correct
 (C) Only (iv) is correct
 (D) (i), (ii), (iii) and (iv) are correct
20. A cross-plot between which two well logs show “football” effect/presence of free gas ?
- (A) Neutron-Sonic
 - (B) Neutron-density
 - (C) Density-Sonic
 - (D) NMR-Neutron
21. A single tone 5 kHz message signal is sampled with 12 kHz, 8 kHz and 5 kHz. “Aliasing” effect will be observed in the reconstructed signal, when the 5 kHz signal is sampled with :
- (A) 12 kHz
 - (B) Both 12 kHz and 8 kHz
 - (C) Both 8 kHz and 5 kHz
 - (D) Aliasing will not be observed in any case
22. The segments of oceanic crust between island arcs and continents are termed :
- (A) Fore-arc basins
 - (B) Island arc margins
 - (C) Back-arc basins
 - (D) Sea mounts
23. The stress regime at the mid-ocean ridges is tensional in character. This is supported by earthquakes due to :
- (A) Normal faulting
 - (B) Strike-slip faulting
 - (C) High angle reverse faulting
 - (D) Opening of rift at the ridge crest
24. The focal mechanism solution of an earthquake depicts quadrants of :
- (A) Dilatation
 - (B) Compression
 - (C) Compression and dilatation
 - (D) Amount of energy released
25. Evidence for the Earth’s liquid outer core comes from the fact that :
- (A) S-waves do not travel through the core
 - (B) A shadow zone for S-waves exists beyond 103° from the earthquakes focus
 - (C) Both (A) and (B)
 - (D) Neither (A) nor (B)
26. How many total number of pixel values will a 8-bits satellite image have ?
- (A) 64
 - (B) 128
 - (C) 256
 - (D) 7856

27. The 'boundary model' is sometimes also called as :
- (A) Topological data model
 (B) Temporal data model
 (C) Topological discrete model
 (D) Temporal discrete model
28. In the process of image classification which of the following methods result in a greater accuracy of classes within an image actually matching land use patterns on the ground ?
- (A) Automated
 (B) Unsupervised
 (C) Supervised
 (D) Robotic
29. Satellite data stores pixel information band by band for each line, or row, of the image is data format.
- (A) BIL (B) BIP
 (C) BSQ (D) BQR
30. Which of the following is small scale Aerial photo ?
- (A) 1 : 10000 (B) 1 : 25000
 (C) 1 : 50000 (D) 1 : 250000
31. What is the wavelength of ultraviolet spectrum ?
- (A) 0.3 to 0.4 micrometer
 (B) 1 to 300 millimeter
 (C) 0.4 to 0.7 micrometer
 (D) > 300 centimeter
32. Which of the following statements are *correct* with respect to transportation of matter by stream ?
- (i) Dissolved matter is transported in the form of chemical ions
 (ii) Sand, gravel and larger particles move as bed load
 (iii) Clay and silt are carried as suspended load
 (iv) Generally, the bed load is the largest
- Codes :**
- (A) (i) and (ii) only
 (B) (ii) and (iii) only
 (C) (i), (ii) and (iii) only
 (D) (iii) and (iv) only
33. Match the following :
- List-I (River)**
- (a) Indus
 (b) Ganga
 (c) Brahmaputra
 (d) Cauvery
- List-II (Tributary)**
- (i) Raga Zangbo
 (ii) Herangi
 (iii) Shiger
 (iv) Alaknanda
- Codes :**
- (a) (b) (c) (d)
 (A) (iii) (ii) (i) (iv)
 (B) (iii) (iv) (i) (ii)
 (C) (ii) (iv) (iii) (i)
 (D) (iii) (i) (ii) (iv)

34. Which one of the following statements is not *correct* about soils of Extra-Peninsular India ?
- (A) These soils are mainly found in river valleys and deltas
- (B) These soils have been formed by the decomposition of rock in situ
- (C) They are deep and constitute some of the most fertile tracts of the country
- (D) These soils are often referred to as transported or azonal soils
35. Amongst the listed ecosystems, which one has the highest net primary production ?
- (A) Estuaries (tidal)
- (B) Midlatitude forest
- (C) Midlatitude grassland
- (D) Lakes and streams
36. If the surface temperature of the air parcel is 30 degree Celsius and the moist adiabatic lapse rate 7 degree Celsius/km, what will be the temperature of the air parcel at 4 km altitude for a lifting condensation level of 2 km ?
- (A) -6 degree Celsius
- (B) -4 degree Celsius
- (C) 0 degree Celsius
- (D) 6 degree Celsius
37. Given below are two statements, Assertion (A) and Reason (R). Read the statements carefully and choose the correct answer from the codes given below :
- (A) Ozone is concentrated in stratosphere at the height of about 30 km.
- (R) At 30 km height in the atmosphere there is enough microwave radiation necessary to produce atomic hydrogen.
- Codes :**
- (A) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (B) Both (A) and (R) are true and (R) is not the correct explanation of (A)
- (C) (A) is true but (R) is false
- (D) (A) is false but (R) is true
38. Given below are two statements Assertion (A) and Reason (R). Read the statements carefully and choose the correct codes from those given below :
- (A) Raised shorelines are common along the continental and island coasts of Pacific Ocean.
- (R) In these regions tectonic processes are active along the mountain and island arcs.
- Codes :**
- (A) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (B) Both (A) and (R) are true and (R) is not the correct explanation of (A)
- (C) (A) is true but (R) is false
- (D) (A) is false but (R) is true

39. Where the shoreline is straight for many kilometers littoral drift moves the sand along the beach resulting in the formation of :
- (A) Pocket beach
(B) Sandspit
(C) Abrasion platform
(D) Stack
40. Which one of the following schist belt *does not* belong to Dharwar craton ?
- (A) Shimoga schist belt
(B) Nuggihalli schist belt
(C) Gangpur schist belt
(D) Sargur schist belt
41. Which of the following schist belt is the youngest ?
- (A) Dharwar
(B) Sargur
(C) Wynad
(D) Sathyamangalam
42. Global scale events at ~1.8 Ga and 0.9 Ga refer to :
- (A) Amalgamation of supercontinents Columbia and Rodinia
(B) Amalgamation of supercontinent Columbia and fragmentation of Rodinia
(C) Fragmentation of supercontinents Columbia and Rodinia
(D) Fragmentation of supercontinent Columbia and amalgamation of Rodinia
43. Which of the following is *not* true for Komatiites ?
- (A) They are associated with greenstone belts
(B) They are of Archaean age
(C) They are ultramafic lavas
(D) They are characterized by ophitic texture
44. An is a layer or layered sequence of rock or sediment comprising one or more geological formations that contains water and is able to transmit significant quantities of water under an ordinary hydraulic gradient.
- (A) Aquitard (B) Aquiclude
(C) Aquifer (D) Aquifuge
45. In which zone groundwater fills all the interstices ?
- (A) Capillary zone
(B) Soil zone
(C) Vadoze zone
(D) Zone of saturation
46. What is the residence time of water in Atmosphere ?
- (A) 20 days (B) 30 days
(C) 9 days (D) 50 days
47. A detention basin for flood control is the one which is provided with :
- (A) Uncontrolled outlet and spillway
(B) Uncontrolled outlet but uncontrolled spillway
(C) Controlled outlet but uncontrolled spillway
(D) Controlled outlet and spillway
48. Intensity of an earthquake is measured by :
- (A) Seismograph
(B) Richter scale
(C) Modified Mercalli scale
(D) Derivatograph

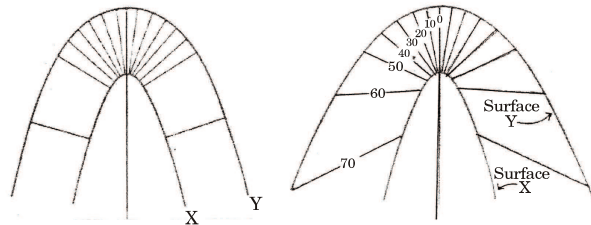
49. Read the following statements and choose the *correct* answer from the codes given below :
- (i) The movement of mineral nutrients in an ecosystem is unidirectional in nature
- (ii) The movement of energy in an ecosystem is cyclic in nature
- Codes :**
- (A) Both (i) and (ii) are true
 (B) Both (i) and (ii) are false
 (C) (i) is true but (ii) is false
 (D) (i) is false but (ii) is true
50. Placers formed upon hill slopes or along the foot hills from minerals released from a nearby source rock are called :
- (A) Alluvial placers
 (B) Eluvial placers
 (C) Beach placers
 (D) Aeolian placers
51. Nickel-Copper sulphide deposits of Insizwa, South Africa and Sudbury, Ontario, Canada are the examples of :
- (A) Early magmatic dissemination
 (B) Early magmatic segregation
 (C) Residual liquid segregation
 (D) Immiscible liquid segregation
52. Volcanic hosted massive sulphide (VMS) deposits mostly associated with felsic volcanic rocks are called as :
- (A) Kuroko-type (B) Besshi-type
 (C) Cyprus-type (D) Noranda-type
53. Porphyry copper deposits are associated with
- (A) Mid-oceanic ridges
 (B) Subduction zones
 (C) Continental rifts
 (D) Back arc basins
54. Which one of the following is an ore of platinum group of elements (PGE)?
- (A) Sperrylite (B) Digenite
 (C) Diopside (D) Bornite
55. Commercial banded iron formations of India are mostly of :
- (A) Palaeozoic age
 (B) Mesozoic age
 (C) Proterozoic and Archaean age
 (D) Cenozoic age
56. Match the following :
- I**
- (1) Cumulus texture
 (2) Exsolution texture
 (3) Caries texture
 (4) Cockade texture
- II**
- (i) Banding and crustification in open space
 (ii) Protuberances of replacing minerals with replaced host
 (iii) Spindles or lamellae of one mineral in another
 (iv) Aggregates of minerals with non-penetrative mineral boundaries
- Codes :**
- (1) (2) (3) (4)
 (A) (iv) (iii) (ii) (i)
 (B) (iii) (iv) (ii) (i)
 (C) (ii) (iii) (i) (iv)
 (D) (iii) (ii) (i) (iv)

57. Which of the following is the best mineral for fluid inclusion thermometry ?
(A) Chalcopyrite (B) Magnetite
(C) Wolframite (D) Quartz
58. Which of the following states of India is the largest producer of Lignite ?
(A) Gujarat (B) Tamil Nadu
(C) Rajasthan (D) Assam
59. Copper in a calcareous environment is :
(A) Mobile
(B) Immobile
(C) Sometimes mobile and sometimes immobile
(D) Partially mobile
60. Saturation vapour pressure in air :
(A) Increases linearly with temperature
(B) Increases non-linearly with temperature
(C) Decreases linearly with temperature
(D) Decreases non-linearly with temperature
61. A significant proportion of solar rays cannot penetrate in the Ocean upon depth of :
(A) 50 m (B) 15 m
(C) 20 m (D) 200 m
62. Which of the following statements is/are true for the major principal layers of oceanic water ?
(i) a thin upper layer of warm, well-stirred water
(ii) a thick mass of deeper, colder water that is relatively calm and slow-moving
(iii) a thick upper layer of warm well-stirred water
(iv) a thin mass of deeper, colder water which is well-stirred water
(A) (ii) and (iii)
(B) (i) and (ii)
(C) (i) and (iii)
(D) (ii) and (iv)
63. About how much concentration of dissolved salt (NaCl) present in the open ocean ?
(A) 10 g of dissolved salt per kg of water
(B) 20 g of dissolved salt per kg of water
(C) 30 g of dissolved salt per kg of water
(D) More than 100 g of dissolved salt per kg of water
64. What should be the height of the submarine volcanic mountain to be called as seamount ?
(A) Minimum 1000 m
(B) Between 1000 m – 500 m
(C) Between 100 m – 500 m
(D) Less than 100 m

65. Which of the following given statements is/are correct ?
- (i) Exclusive economic zone extent seaward upto 200 nautical miles from the baseline
 - (ii) Contiguous zone extends seaward upto 24 nautical miles from the baselines
 - (iii) Territorial sea extend seaward upto 10 nautical miles from the baseline
- (A) (i) and (iii)
 (B) (i) and (ii)
 (C) (ii) and (iii)
 (D) (i), (ii) and (iii)
66. What is the spreading rate of slow spreading ridge ?
- (A) 8-16 cm/year
 (B) 40-80 mm/year
 (C) 10-40 mm/year
 (D) 16-24 cm/year
67. Adding to lime or cement reduces swelling and improve engineering properties of expansive soils.
- (A) Bitumen (B) Anhydrite
 (C) Bauxite (D) Fly ash
68. The ground beneath a large lake consists of a 50 m thick deposit of clay with a rock substratum. The bed of the lake is flat and 20 m depth. The action of geological processes generates clay in suspension which in a very short time form a 2 m thick layer of sediments that completely covers the bottom of the lake. Assuming the free water surface remains unchanged, determine the total vertical stress in the original situation.
- Given : The saturated unit weight of the clay is constant and equal to $r_{sat} = 20 \text{ kN/m}^3$.
 The unit weight of water is $r_w = 10 \text{ kN/m}^3$.
- The rock substratum is impervious for practical purpose. The surface of the water in the lake is taken as the origin of the depth axis z .
- (A) 400 kPa (B) 810 kPa
 (C) 1200 kPa (D) 1600 kPa
69. Clay with of iron oxides when burnt produces brick of buff colour.
- (A) 2 to 3% (B) 3 to 6%
 (C) 6 to 8% (D) 8 to 12%

70. Features given below are diagnostic to which sedimentary environment?
Tectonic setting : Formed in very deep water basin, trench, along ophiolites, epicratonic basins or as starved of clastic debris, accumulated thick sequences of chalk, cherts or black shales.
Geometry : Form vast, thin, tabular sheets, in fault-bounded basins it can reach thousands of meters in thickness
Typical sequence : Homogeneous, thin bedded, laminated chalk, chert or shales.
Sedimentology : Chalks, opaline silica, clay minerals are predominant, Minor authigenic minerals, volcanic and eolian dust, phosphatic fragment. Extensive bioturbation and burrowing.
Fossils : Planktonic microfossil, siliceous or phosphatic microfossils.
 (A) Tidal
 (B) Pelagic
 (C) Continental shelf
 (D) Deltas
71. A galena grain of diameter 0.5 mm falls in water with a settling velocity of 8.27 in/s. Calculate the Froude Numbers for the galena grain.
 $P_s = 7.5 \text{ g/cm}^3$
 $g = 981 \text{ cm/sec}^2$
 $P_f = 1 \text{ g/cm}^3$
 $\mu = 0.01 \text{ g cm}^{-1} \text{ sec}^{-1}$
 (A) 6.99 (B) 7.09
 (C) 8.99 (D) 6.01
72. Using Stokes equation for settling velocity estimate the maximum diameter of silica grain that exhibit laminar flow in water at 20°C assuming that silica grain Reynolds' number is < 1.
 Given :
 Density of silica = 2.65 g/cm^3
 Density of water = 1.0 g/cm^3
 Viscosity of water = $0.01 \text{ g/cm} \cdot \text{sec}$
 Acceleration due to gravity = 981 cm/sec^2
 (A) $103.2 \mu\text{m}$ (B) $204.1 \mu\text{m}$
 (C) $402.1 \mu\text{m}$ (D) $322 \mu\text{m}$
73. A rock with < 1 mm separation in the joint gouge with 4 rating is termed as, that can be excavated with very hard ripping as per the Rippability Chart of Weaver (1975).
 (A) Very good rock
 (B) Good rock
 (C) Fair rock
 (D) Poor rock
74. The marine isotope stage 5 problem refers to the timing of penultimate interglacial which appears to have begun 10 thousand years in advance of :
 (A) Younger Dryas
 (B) Last interglacial
 (C) Last glaciation
 (D) Solar forcing
75. The little Ice Age cold event during Holocene was abruptly followed by :
 (A) Holocene cooling
 (B) Mesopotemia
 (C) Medieval Warming
 (D) Younger Dryas

76. The final closure of the seaway between North and South Americas may have laid to strengthening of the Gulf stream delivering more moisture to feed snow accumulation at the northern high latitude leading to :
- (A) Ice Age
(B) Interglacial Warming
(C) Cooling of Pacific
(D) Heating of Indian Ocean
77. Mark the correct order of stages from older to younger during the Holocene period :
- (A) Boreal–Pre-Boreal–Subboreal
(B) Subatlantic–Atlantic–Subboreal
(C) Boreal–Atlantic–Subboreal
(D) Subatlantic–Subboreal–Preatlantic
78. The negative Bouger anomaly across the Mid-Oceanic ridges is due to :
- (A) Ridge Topography
(B) Hot mantle convergence
(C) Hot mantle surrounded by cold mantle
(D) Ridge push mechanism
79. The Yilgarn shield and Pilbara shield comprises significant part of the older cratonic shields of the continent :
- (A) Australia
(B) Africa
(C) South America
(D) Canada
80. The heights and widths of the mid-oceanic ridges with reference to the abyssal plane is of the order :
- (A) 6 km and 1500 km, respectively
(B) 2.5 km and 3000 km, respectively
(C) 3 km and 500 km, respectively
(D) 3000 km and 1000 km, respectively
81. The heat flux in the 'X' direction (q_x) is proportional to the magnitude of temperature change across a unit distance in 'X' direction. If 'K' is thermal conductivity of the material, then the heat flux can be expressed as :
- (A) $q_x = (dT/dx)/K$
(B) $q_x = -K(dT/dx)$
(C) $q_x = (dT/dx)$
(D) $q_x = dT(dx/K)$
82. A fold with interlimb angle of zero is :
- (A) Gentle (B) Open
(C) Tight (D) Isoclinal
83. Identify the Ramsay fold type :



- (A) Class 1A and Class 2
(B) Class 1B and Class 2
(C) Class 1C and Class 1A
(D) Class 1A and Class 1B

84. Vertical faults have throw but do not have
 (A) Heave (B) Strike slip
 (C) Dip slip (D) Rake
85. In an S-tectonite the strain ellipsoid will be :
 (A) Prolate finite strain
 (B) Plane strain
 (C) Oblate finite strain
 (D) Infinite plane strain
86. A rock having composition-Nepheline-olivine-clinopyroxene-plagioclase known as :
 (A) Tephrites (B) Basanite
 (C) Troctolite (D) Olivinenorite
87. The reaction : Tremolite + Calcite + Quartz = Diopside + H₂O + CO₂ is a :
 (A) Net-Transfer reaction
 (B) Mixed volatile reaction
 (C) Both (A) and (B)
 (D) Exchange reaction
88. The presence of galucophane and jadeite indicate :
 (A) High pressure and low temperature
 (B) Low pressure and high temperature
 (C) Low pressure and low temperature
 (D) High pressure and high temperature
89. The snowball garnet are the product of :
 (A) Dynamic metamorphism
 (B) Cataclastic metamorphism
 (C) Dynamothermal metamorphism
 (D) Plutonic metamorphism
90. The characteristic of common orogenic belts (Barrovian type), where the sequence is Zeolite facies → Prehnite-pumpellite facies → Greenschist facies → Amphibolite facies → Granulite facies are formed represent the metamorphic series :
 (A) Medium P/T series
 (B) High P/T series
 (C) Both (A) and (B)
 (D) Low P/T series
91. The process by which a solid melts to a liquid and another solid, both of different composition than the original is known as :
 (A) Congruent melting
 (B) Incongruent melting
 (C) Eutectic melting
 (D) Equilibrium melting
92. If the groundmass of a porphyritic texture in a rock is hemicrystalline, the texture is known as :
 (A) Vitrophyric
 (B) Felsophyric
 (C) Glomerophyritic
 (D) Mesostasis
93. Which of the following rocks is dominantly composed of clinopyroxene and garnet, mafic in bulk composition and equilibrated under high pressure and low geothermal gradient conditions in the lithospheric mantle ?
 (A) Eclogite (B) Tinguaitite
 (C) Pyroxenite (D) Alkali Basalt

94. This trace element is mostly concentrated in the crust and substitute for a major element in feldspar, muscovite, biotite and sodic plagioclase.
 (A) Nickel (B) Neodymium
 (C) Rubidium (D) Calcium
95. Consider the following statements :
Statement-1 : The ratio of Ni : Mg is highest in early formed crystals like olivine and shows a steady decline in late formed minerals.
Statement-2 : The nickel ion has essentially the same radius as magnesium.
 Which of the following is *correct* with respect to the above statements ?
Codes :
 (A) Both statement-1 and statement-2 are true and statement-1 is the correct explanation of statement-2
 (B) Both statement-1 and statement-2 are true and statement-1 is not the correct explanation of statement-2
 (C) Statement-1 is true but statement-2 is false
 (D) Statement-1 is false but statement-2 is true
96. $^{206}\text{Pb}/^{238}\text{U}$ versus $^{207}\text{Pb}/^{235}\text{U}$ ratios when plotted yield concordant ages, also indicate :
 (A) Pb loss event
 (B) Alteration event
 (C) Loss or gain of radiogenic lead
 (D) No loss or gain of radiogenic lead
97. Which of the following statements is true ?
 (A) Oxidation of Mn (II) to Mn (IV) is required for manganese ore precipitation
 (B) Reduction of Mn (IV) to Mn (II) is required for manganese ore precipitation
 (C) Manganese ore precipitation is independent of redox conditions
 (D) Both (A) and (B) are correct
98. Higher amounts of which of the following isotopes indicate plume related enriched mantle origin of early Deccan volcanic rocks.
 (A) $^{87}\text{Sr}/^{86}\text{Sr}$
 (B) $^{87}\text{Rb}/^{86}\text{Rb}$
 (C) $^3\text{He}/^4\text{He}$
 (D) $^{187}\text{Os}/^{188}\text{Os}$
99. Solid angle is an angle between at least :
 (A) Two lines (B) Three lines
 (C) Two facies (D) Three facies
100. Which of the following have curved crystal facies ?
 (A) Hypersthene (B) Actinolite
 (C) Siderite (D) Lepidolite

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ROUGH WORK