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Series **C**

OCT-35226
Paper-II
EARTH, ATMOSPHERIC, OCEAN AND PLANETARY SCIENCE

Question Booklet Serial No.
प्रश्नपत्रिका अनुक्रमांक

Signature and Name of Invigilator

1. (Signature) .....
   (Name) .....
2. (Signature) .....
   (Name) .....

Seat No. | | | | | | | | |
(In figures as in Admit Card)

Seat No. .....
(In words)

OMR Sheet No. | | | | | | |
(To be filled by the Candidate)

Time Allowed : 2 Hours] **[Maximum Marks : 200**

Number of Pages in this Booklet : **16**

Number of Questions in this Booklet : **100**

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Instructions for the Candidates

1. Write your Seat No. and OMR Sheet No. in the space provided on the top of this page.
2. This paper consists of **100** objective type questions. **Each** question will carry **two** marks. **All** questions of Paper II will be **compulsory**.
3. 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 :
   (i) 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.**
   (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 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.
   (iii) After this verification is over, the OMR Sheet Number should be entered on this Test Booklet.
4. 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 (B) is the correct response.
   (A) ● (C) (D)
   Following wrong methods should not be used as they are not recognised by scanning machine in digitized assessment. Candidate using such method will be responsible for their loss.

WRONG METHODS
(A) ✓ (C) (D) (A) ✗ (C) (D) (A) ● (C) (D) (A) (B) (C) (D)

5. 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.
6. Read instructions given inside carefully.
7. Rough Work is to be done at the end of this booklet.
8. 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.
9. 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.
10. **Use only Blue/Black Ball point pen.**
11. Use of any calculator or log table, etc., is prohibited.
12. There is no negative marking for incorrect answers.

विद्यार्थ्यांसाठी महत्त्वाच्या सूचना

1. परीक्षार्थींनी आपला आसन क्रमांक या पृष्ठावरील वरच्या कोपऱ्यात लिहावा. तसेच आपणांस दिलेल्या OMR उत्तरपत्रिकेचा क्रमांक त्याखाली लिहावा.
2. सदर प्रश्नपत्रिकेत **100** बहुविकल्प प्रश्न आहेत. प्रत्येक प्रश्नास **दोन** गुण आहेत. या प्रश्नपत्रिकेतील **सर्व** प्रश्न सोडविणे अनिवार्य आहे.
3. परीक्षा सुरू झाल्यावर विद्यार्थ्याला प्रश्नपत्रिका दिली जाईल. सुरुवातीच्या 5 मिनिटांमध्ये आपण सदर प्रश्नपत्रिका उघडून खालील बाबी अवश्य तपासून पहाव्यात :
   (i) प्रश्नपत्रिका उघडण्यासाठी प्रश्नपत्रिकेवर लावलेले सील उघडावे. **स्टीकर सील नसलेली किंवा सील उघडलेली प्रश्नपत्रिका स्वीकारू नये.**
   (ii) पहिल्या पृष्ठावर नमूद केल्याप्रमाणे प्रश्नपत्रिकेची एकूण पृष्ठे तसेच प्रश्नपत्रिकेतील एकूण प्रश्नांची संख्या पडताळून पहावी. **पृष्ठे कमी असलेली/कमी प्रश्न असलेली/ प्रश्नांचा चुकीचा क्रम असलेली किंवा इतर त्रुटी असलेली सदोष प्रश्नपत्रिका सुरुवातीच्या 5 मिनिटातच पर्यवेक्षकाला परत देऊन दुसरी प्रश्नपत्रिका मागवून घ्यावी.** त्यानंतर प्रश्नपत्रिका बदलून मिळणार नाही तसेच वेळही वाढवून मिळणार नाही याची कृपया नोंद घ्यावी.
   (iii) वरीलप्रमाणे सर्व पडताळून पाहिल्यानंतरच प्रश्नपत्रिकेवर ओ.एम.आर. उत्तरपत्रिकेचा क्रमांक लिहावा.
4. प्रत्येक प्रश्नासाठी (A), (B), (C) आणि (D) अशी चार विकल्प उत्तरे दिली आहेत. त्यातील योग्य उत्तराचा रकाना खाली दर्शविल्याप्रमाणे ठळकपणे काळा/निळा करावा.
   उदा. : जर (B) हे योग्य उत्तर असेल तर.
   (A) ● (C) (D)
   खालील चुकीच्या पद्धती वापरू नये, कारण डिजिटाइज्ड (Digitized) मूल्यांकनात स्कॅनिंग मशीन त्यांना ओळखत नाही. त्या पद्धती वापरून नुकसान झाल्यास त्यास विद्यार्थीच जबाबदार असतील.

चुकीची पद्धती
(A) ✓ (C) (D) (A) ✗ (C) (D) (A) ● (C) (D) (A) (B) (C) (D)

5. या प्रश्नपत्रिकेतील प्रश्नांची उत्तरे **ओ.एम.आर. उत्तरपत्रिकेतच दर्शवावीत**. इतर ठिकाणी लिहिलेली उत्तरे तपासली जाणार नाहीत.
6. आत दिलेल्या सूचना काळजीपूर्वक वाचाव्यात.
7. प्रश्नपत्रिकेच्या शेवटी जोडलेल्या कोऱ्या पानावरच कच्चे काम करावे.
8. जर आपण ओ.एम.आर. उत्तरपत्रिकेवर 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 विद्यार्थ्याला परीक्षेस अपात्र ठरविण्यात येईल.
9. परीक्षा संपल्यानंतर विद्यार्थ्याने मूळ ओ.एम.आर. उत्तरपत्रिका पर्यवेक्षकांकडे परत करणे आवश्यक आहे. तथापि, प्रश्नपत्रिका व ओ.एम.आर. उत्तरपत्रिकेची द्वितीय प्रत आपल्याबरोबर नेण्यास विद्यार्थ्यांना परवानगी आहे.
10. **फक्त निळ्या किंवा काळ्या बॉल पेनचाच वापर करावा.**
11. कॅलक्युलेटर किंवा लॉग टेबल वापरण्यास परवानगी नाही.
12. चुकीच्या उत्तरासाठी गुण कपात केली जाणार नाही.

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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.

1. Bedded barite associated with Fuchsite -Kyanite quartzite is characteristic of which sequence ?
   (A) Bababudan Group
   (B) Sargur Group
   (C) Kolar Group
   (D) Ranibennur Subgroup

2. Which sequence best represents the proposed tectono-magmatic initiation of Cuddapah Basin ?
   (A) Subsidence → Dyke Swarms → Doming → Volcanism
   (B) Doming → Dyke Swarms → Thermal relaxation → Down sagging
   (C) Thrusting → Rifting → Granite intrusion → Subsidence
   (D) Impact → Volcanism → Folding → Platform sedimentation

3. Which association hosts the richest manganese mineralisation of the Sausar belt ?
   (A) Sitasaongi quartzite and Bichva Marble
   (B) Charbaoli quartzite and Junewani Schist
   (C) Mansar Mica Schist and Lohangi Carbonate
   (D) Tirodi gneiss and Bichva Calc-silicate

4. The Dharwar supracrustal belt extending into Ratnagiri, Maharashtra, is the northern continuation of which belt ?
   (A) Chitradurga Belt
   (B) Hutti Belt
   (C) Sandur Belt
   (D) Shimoga Belt

5. Match the term with the correct meaning.
   (A) Trace – Rainfall exceeding a heavy
   (B) Hail – Liquid water droplets below 0°C
   (C) Fog – Precipitation made only of ice
   (D) Dew – Condensation on surfaces near the ground

6. The Chief phosphorite member is associated with _____ formation.
   (A) Takche
   (B) Thango
   (C) Krol
   (D) Tal

7. The horizontal distance at right angles to the crest between the trough points on both sides of the ripple crest are known as
   (A) Toe point
   (B) Summit point
   (C) Ripple length
   (D) Ripple index

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8. A ripple bedding in which mud streaks are preserved completely in the troughs and partially on the crests are known as
   (A) Flaser bedding
   (B) Lenticular bedding
   (C) Lunate bedding
   (D) Load casts bedding

9. The cross stratification structures forms during storm events with a combined wave and current activity in shallow seas, and is the result of aggradation of mounds and swales are known as
   (A) Planar cross stratification
   (B) Trough cross stratification
   (C) Hummocky cross stratification
   (D) Climbing cross stratification

10. A ternary petrologic system contains four equilibrium phases and is experimentally maintained at constant total pressure, while temperature is allowed to vary. What is its variance ?
   (A) f = –1, so the assemblage is impossible
   (B) f = 0, so the equilibrium temperature is fixed at that pressure
   (C) f = 1, so temperature remains an independent variable
   (D) f = 2, because composition provides two additional degrees of freedom

11. The progressive closure of the Central American Seaway during the late Cenozoic is thought to have
   (A) Strengthened Atlantic overturning and contributed to the intensification of Northern Hemisphere glaciation
   (B) Opened the Drake passage
   (C) Produced no climatic effect
   (D) Desiccated the Mediterranean waters

12. Out of the following, which records can produce highest resolution of the longer duration of paleoclimatic signatures during quaternary ?
   (A) Marine core
   (B) Ice core
   (C) Speleothem
   (D) Tree rings

13. The Milankovitch cycle of eccentricity is of the order of
   (A) 200 Ka
   (B) 300 Ka
   (C) 100 Ka
   (D) 20 Ka

14. A Quaternary section in Thar deserts consisting of calcareous well sorted sand, massive with indurated calcrete indicate
   (A) Semiarid climate
   (B) Arid climate
   (C) High rainfall climate
   (D) Esker climate

15. The shell of an Ostracode is called
   (A) Carapace
   (B) Rostrum
   (C) Frustules
   (D) Foramen

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16. A proposed concrete dam is to be founded on alternating beds of sandstone and shale. Which bedding attitude would be considered most unfavourable for foundation stability ?
(A) Beds dipping gently upstream
(B) Beds dipping steeply upstream
(C) Beds dipping at low angle downstream
(D) Nearly vertical beds striking across the valley

17. Which geophysical exploration method is suitable for exploration of disseminated base metal sulphides ?
(A) Seismic reflection method
(B) Gravity method
(C) Induced polarisation method
(D) Radioactivity method

18. Groundwater rises through natural opening in a confining layer and discharges at the surface because the potentiometric surface lies above the discharge point. The spring is classified as a
(A) Contact spring
(B) Depression spring
(C) Artesian spring
(D) Seepage spring

19. Which one of the following would be considered as an exception to the $Ca^{+2} - HCO_3^-$ type groundwater in limestone aquifers ?
(A) Groundwater near equilibrium with calcite
(B) Groundwater strongly influenced by halite dissolution
(C) Groundwater containing high concentration of Ca^{+2} and HCO_3^-
(D) Recharging water interacting with soil CO_2

20. The relationship between groundwater storage and baseflow can best be described as
(A) Increased groundwater storage leads to decrease in baseflow
(B) Baseflow for a drainage basin is independent of groundwater storage
(C) Reducing groundwater storage leads to declining baseflow
(D) Baseflow for a drainage basin increases when the water table falls

21. In relatively oxidized I-type magmatic fluids, sulphur occurs mainly as
(A) H_2S
(B) HS^-
(C) SO_4^{2-}
(D) S^{2-}

22. 'High-sulfidation' and 'low-sulfidation' primarily refer to differences in
(A) Total sulfur abundance
(B) Sulfur isotope composition
(C) Sulfide mineral abundance
(D) Sulfur oxidation state

23. In the calculation of shale volume using SP log, what is the full form of PSP ?
(A) Primary Static Potential
(B) Pseudo Static Potential
(C) Permanent Static Potential
(D) Primary Structural Potential

24. The occurrences of lignite are known in the _____ area, South Arcot district, Tamil Nadu.
(A) Kanyakumari
(B) Neyveli
(C) Tiruchirappalli
(D) Salem

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25. Which feature marks the profound unconformity above peninsular Gneiss ?
(A) Polymict conglomerate
(B) Banded iron formation
(C) Quartz-pebble conglomerate
(D) Fuchsite quartzite

26. The ratio of focal length to camera height constitutes
(A) Photo scale
(B) Photo nadir
(C) Nadir point
(D) Front overlap

27. Increase of pore fluid pressure affects the normal stress acting on a fault/fracture in the following way
(A) Increases the effective normal stress and moves the Mohr's circle towards the Coulomb failure line
(B) Reduces the effective normal stress and shifts the Mohr's circle towards the Coulomb failure line
(C) Does not affect the normal stress at all
(D) Increases the differential stress

28. A 300 cm core run produces sound core pieces of 28 cm, 43 cm, 34 cm, 2 cm and 48 cm. What is the RQD and corresponding rock quality ?
(A) 20%
(B) 51%
(C) 61%
(D) 76%

29. Two boreholes penetrate the same lithology. Borehole X gives an RQD of 85%, whereas borehole Y gives an RQD of 35%. Assuming representative drilling, which interpretation is most appropriate ?
(A) Borehole Y represents less fractured rock
(B) Borehole X represents the more intensely fractured rock mass
(C) Borehole X generally represents better quality less fractured rock
(D) RQD cannot provide information about fracture density

30. A tunnel passes through a hill where bedding or fault planes dip toward the valley slope. After prolonged saturation which problem is most likely ?
(A) Improvement in rock-mass stability
(B) Reduction in discontinuity controlled movement
(C) Sliding and instability along unfavourably oriented planes
(D) Development of completely massive rock around the tunnel

31. By mass, which ion has the longest residence time in the ocean water ?
(A) Lithium (Li^+)
(B) Potassium (K^+)
(C) Sodium (Na^+)
(D) Calcium (Ca^{2+})

32. The thermohaline circulation is driven principally by
(A) Lunar and solar tidal forcing
(B) The coriolis force
(C) Density contrasts generated by temperature and salinity differences
(D) Wind stress

33. The pattern in which many species disappear over a short interval and are replaced by functionally and taxonomically similar species, after which the new assemblage persists with little change, is termed
(A) Adaptive radiation
(B) Coordinated turnover followed by stasis
(C) Phyletic gradualism
(D) Convergent iteration

34. In which one of the following ecosystems the ecological pyramid is spindle-shaped ?
(A) Forest ecosystem
(B) Grassland ecosystem
(C) Pond ecosystem
(D) Tree ecosystem

35. A pyroxenite with 40% olivine and >5% clinopyroxene and 75% orthopyroxene is called
(A) Olivine gabbro
(B) Olivine clinopyroxenite
(C) Olivine orthopyroxenite
(D) Olivine websterite

36. According to Ramsay's classification _____ is an example of similar fold.
(A) Class – I a
(B) Class – I b
(C) Class – I c
(D) Class – II

37. When the axis plunges directly down the dip of the axial plane; the fold is known as
(A) Plunging fold
(B) Periclinal fold
(C) Reclined fold
(D) Flexure fold

38. Lines Joining points of equal limb dip in successive layers through the fold profile are known as
(A) Agonic lines
(B) Isohyetes
(C) Dip isogons
(D) Contour lines

39. Salt domes are best examples of
(A) Diapiric fold
(B) Reclined fold
(C) Drag fold
(D) Pericline fold

40. Nappe structures can be formed by
(A) Overthrusting
(B) Folding
(C) Normal faulting
(D) Strike slip faulting

41. The large-scale tropical overturning circulation with rising motion near the equator and sinking in the subtropic is the
(A) Ferrel cell
(B) Polar cell
(C) Hadley cell
(D) Walker cell

42. The periodic warming of the ocean that occurs in the central and eastern pacific refer to
(A) La Nina
(B) El Nino
(C) Ocean Nino Index
(D) ENSO

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43. Which statement about the global conveyor belt is correct ?
(A) It completes one full cycle in about 10 days
(B) It redistributes heat globally and influences climate patterns
(C) It is confined to the upper 100 m of the ocean
(D) It has no role in nutrient transport

44. Planktic foraminifera made their first appearance during the
(A) Cambrian
(B) Devonian
(C) Jurassic
(D) Neogene

45. Flash floods are of
(A) Great volume and short duration
(B) Small volume and long duration
(C) Great volume and long duration
(D) Small volume and short duration

46. Consider the processing of a seismic signal (Sine wave) of frequency 100 Hz. The sampling frequency f_s required to avoid loss of information and faithfully reconstruct the signal is
(A) $f_s \geq 100$ Hz
(B) $f_s < 150$ Hz
(C) $f_s \geq 200$ Hz
(D) $f_s < 200$ Hz

47. Mark the correct answer.
(A) If F(n) is the Fourier transform of f(t), then f(t) is the Fourier transform of F(n)
(B) If f(t) is the Fourier transform of F(n) then F(n) is the Fourier transform of f(t)
(C) Both A and B
(D) Neither A nor B

48. Consider an interface between two media-upper medium with velocity V_1 and density ρ_1 and lower medium with velocity V_2 and density ρ_2. Maximum transmission of seismic energy will take place through the interface when
(A) $V_1 > V_2$ and $\rho_1 > \rho_2$
(B) $V_1 < V_2$ and $\rho_1 < \rho_2$
(C) $V_1 = V_2$ and $\rho_1 = \rho_2$
(D) $V_1 > V_2$ and $\rho_1 < \rho_2$

49. The fault plane solution in the figure corresponds to



(A) Dip slip
(B) Thrust fault
(C) Strike slip fault
(D) Normal fault

50. The depth of penetration of an electromagnetic field
(A) increases as both the frequency of the electromagnetic field and the electrical conductivity of the subsurface decrease
(B) increases with decrease in frequency of electromagnetic field
(C) decreases with increase in frequency of electromagnetic field
(D) does not depend on frequency at all

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51. The classic 'RNA World' hypothesis about the origin of life on earth is favoured over a protein first scenario principally because
(A) RNA can store heritable information and also act catalytically as a ribozyme, revolving the chicken-and-egg problem of replication
(B) RNA is chemically more stable than DNA under all conditions
(C) RNA is synthesised only inside a living cell
(D) RNA cannot participate in any catalytic reaction

52. Kepler's third law results from the relationship between
(A) The gravity and magnetic forces
(B) Gravitational attraction and the effect of orbital motion
(C) The elliptical shapes of planetary orbits and the force of gravitation
(D) Solar radiation and planetary mass

53. Widmanstatten bands are common in which type of meteorites ?
(A) Achondrites
(B) Iron meteorites
(C) Stony meteorites
(D) Chondrites

54. In which drainage pattern the confluence of a tributary with the main river is characterised by a discordant junction as if the tributary intends to flow upstream and not downstream ?
(A) Barbed Drainage Pattern
(B) Rectangular Drainage Pattern
(C) Radial Drainage Pattern
(D) Annular Drainage Pattern

55. Which one of the following is *not* the tributary of River Krishna ?
(A) Ghataprabha
(B) Pranhita
(C) Malprabha
(D) Bhima

56. Which depth-profile sequence is correct for seawater constituents ?
(A) Conservative – Constant ; recycled – increases ; scavenged – decreases
(B) Conservative – increases ; recycled – constant ; scavenged – decreases
(C) Conservative – decreases ; recycled – increases ; scavenged – constant
(D) Conservative – constant ; recycled – decreases ; scavenged – increases

57. Rb-Sr dating is generally more suitable for intermediate - felsic rocks because differentiation tends to
(A) Decrease Rb/Sr
(B) Eliminate Sr
(C) Increase Rb/Sr
(D) Keep Rb/Sr constant

58. The lower concordia-discordia intercept can be interpreted as the disturbance age only when Pb loss was
(A) Continuous over a long period
(B) Instantaneous or episodic
(C) Absent
(D) Accompanied by complete U loss

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59. The Re-Os system differs fundamentally from Sm-Nd because, during mantle melting
(A) Both Re and Os are strongly incompatible
(B) Re is compatible and Os incompatible
(C) Os is compatible and Re incompatible
(D) Both remain entirely in the mantle

60. Crystal contamination of a matic magma may promote Ni-Cu sulfide mineralization because it
(A) Decreases silica activity and increases S solubility
(B) Increases Sm/Nd of the magma
(C) Removes all radiogenic Os
(D) Increases silica activity and decreases S solubility

61. The primary mechanism for charge separation in thunder clouds is widely believed to involve
(A) Only gravitational settling of rain drops
(B) Collisions between ice particles (grouped crystals) in the presence of supercooled water and temperature gradients
(C) Only photoionization by solar UV
(D) Only cosmic ray ionization

62. The most frequent type of lightning discharge globally is
(A) Cloud-to-ground
(B) Ground-to-cloud
(C) Intra-cloud
(D) Cloud-to-ionosphere only

63. A line connecting places having equal rainfall is known as
(A) Isobar
(B) Isotherm
(C) Isotachs
(D) Isohyet

64. A cloud with its base at or very near Earth's surface is called
(A) Cumulus cloud
(B) Cirrus cloud
(C) Fog
(D) High cloud

65. The magnesium to calcium ratio (Mg/Ca) of foraminiferal calcite test/shell serves as a proxy for
(A) Seawater pH
(B) Primary productivity
(C) The temperature of calcification
(D) The sedimentation rate

66. Which stratigraphic unit of the paleozoic succession of Lidar Valley, Kashmir Basin is un-fossiliferous ?
(A) Hapatnar group
(B) Muth formation
(C) Zewan formation
(D) Fenestella sholes

67. Which of the following show five-fold radial symmetry ?
(A) Echinoids
(B) Pelecypods
(C) Ammonites
(D) Trilobites

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68. Ammonite suture in the order of complexity
(A) Ceratite < Ammonite < Orthoceratite < Goniatite
(B) Orthoceratite < Goniatite < Ceratite < Ammonite
(C) Goniatite < Ceratite < Orthoceratite < Ammonite
(D) Orthoceratite < Ceratite < Goniatite < Ammonite

69. The opening through which a sponge eject water
(A) Dermal pores
(B) Spongocoel
(C) Osculum
(D) Spicules

70. Walther's law of Facies succession is applicable to
(A) Conformable succession
(B) Overturned sequences
(C) Unconformity
(D) Faulted sequence

71. In a three layer VES model if resistivity $\rho_3 \rightarrow \infty$, then the third layer behaves approximately as
(A) A perfectly conductive layer
(B) A perfectly homogeneous layer
(C) A highly resistive layer
(D) An infinitely thick layer

72. Consider the layers where $\rho_1 = 100\ \Omega m$ (Ohm-m), $\rho_2 = 20\ \Omega m$ (Ohm – m), $\rho_3 = 200\ \Omega m$ (Ohm – m) and $\rho_4 = 50\ \Omega m$ (Ohm – m). The electrical resistivity curve type is
(A) HK
(B) KH
(C) HA
(D) QH

73. A mountain if not compensated at depth gravitationally, it will show
(A) Positive free air anomaly
(B) Negative free air anomaly
(C) Zero free air anomaly
(D) Positive Bouguer anomaly

74. In gravity prospecting the unit of acceleration used to describe the gravity field of the Earth is defined as follows
(A) 1 gal = 1 m/s^2
(B) 1 gal = 10^{-2} m/s^2
(C) 1 gal = 10 cm/s^2
(D) 1 gal = 10^2 cm/s^2

75. Which of the following geophysical well logs provides a measure of formation primary porosity ?
(A) Density log
(B) Neutron log
(C) Sonic log
(D) NMR log

76. The pressure head in groundwater hydraulics represents
(A) The elevation of the aquifer above mean sea level
(B) The height of the water column supported by fluid pressure
(C) The depth to the groundwater level from the surface
(D) The total saturated thickness of the aquifer

77. If the freshwater hydraulic head is 2 m above sea level, then the approximate depth to the freshwater-seawater interface is
(A) 40 m
(B) 2 m
(C) 80 m
(D) 20 m

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78. A porous medium has intrinsic permeability 'K' where fluid viscosity doubles while density remains unchanged, hydraulic conductivity will

(A) Become double

(B) Remain unchanged

(C) Become half

(D) Become zero

79. Match the following.

a.	Hydraulic head	1.	m^{-1}
b.	Intrinsic permeability	2.	m
c.	Transmissivity	3.	m^2
d.	Specific storage	4.	m^2/s

(A) a – 2, b – 3, c – 4, d – 1

(B) a – 1, b – 2, c – 3, d – 4

(C) a – 2, b – 1, c – 4, d – 3

(D) a – 3, b – 1, c – 4, d – 2

80. If a silty clay sample has a porosity of 50% and specific retention of 40%, then its specific yield is

(A) 5%

(B) 4%

(C) 10%

(D) 2%

81. Flash floods are

(A) Global scale floods

(B) Continental scale floods

(C) Regional scale floods

(D) Local scale floods

82. Tectonic Earthquakes are caused due to

(A) Stress and strain along Earth's plates or dislodging of rocks during faulting

(B) Volcanic eruptions

(C) Isostatic imbalance due to sudden geological activity at a regional scale

(D) Weight of water in reservoir

83. Which of the following is the strongest underlying observation in support of plate tectonic hypothesis ?

(A) Decreasing heat flux away from the spreading centres

(B) Striped patterns of alternately positive and negative magnetic anomalies observed symmetrically on opposite sides of the mid-oceanic ridges

(C) Decreasing magnetic field away from the mid-oceanic ridges

(D) Discovery of ocean subduction zones

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84. The reference spheroid is a close approximation to the equipotential surface of gravity whereas the geoid is considered as the physical equipotential surface of gravity. Which of the following best represents the undulations in the geoid ?

(A) Positive geoid undulation over a local mass deficit under the reference spheroid

(B) Negative geoid undulation over a mass excess beneath the reference spheroid

(C) Uneven topography and heterogeneous internal mass distribution of the Earth

(D) Uneven temperature distribution inside the Earth

85. Read the statements below and choose the correct answer from the options given below.

i. Conditional instability is the most common type of atmospheric instability.

ii. Conditional instability occurs when environmental lapse rate is greater than the dry adiabatic lapse rate.

(A) both i and ii are true

(B) i is true and ii is false

(C) both i and ii are false

(D) i is false and ii is true

86. Read Assertion (A) and Reason (R) carefully and select the correct option.

Assertion (A) : A coarse spatial resolution may cause mixed pixels.

Reason (R) : A larger ground resolution cell can include more than one type of ground feature.

(A) Both (A) and (R) are true and (R) correctly explains (A)

(B) Both (A) and (R) are true, but (R) does not explain (A)

(C) (A) is true, but (R) is false

(D) (A) is false, but (R) is true

87. The frequency of the GPS Link – 1 (L – 1) carrier wave is

(A) 1227.60 MHz

(B) 1575.42 MHz

(C) 1176.45 MHz

(D) 10.23 MHz

88. Which one of the following statements is correct regarding the L_1 and L_2 GPS signals ?

(A) L_2 has a higher frequency than L_1

(B) L_2 and L_1 have identical wavelengths

(C) L_1 has a higher frequency and shorter wavelength than L_2

(D) L_1 and L_2 have identical frequencies but different PRN codes

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89. In a Geographical Information System (GIS), a road network stored as a set of interconnected lines with explicitly recorded connectivity and adjacency relationships (which segment connects to which, what lies on either side) is using which data model and property ?
(A) Raster data model with cell based storage
(B) Vector data model with topological coding
(C) Raster data model with attribute tables only
(D) Vector data model with no locational component

90. Which data type stores multispectral data by pixel, with successive band values for each pixel ?
(A) Digital Elevation Model (DEM)
(B) Band Sequential (BSQ)
(C) Band Interleaved by Line (BIL)
(D) Band Interleaved by Pixel (BIP)

91. Match the Physiographic features (List – I) with the Longitudinal divisions of Himalayas.

List – I	List – II
a. Bara-Lacha Pass	i. Eastern Himalayas
b. Dafla Hills	ii. Central Himalayas
c. Nanda Devi Peak	iii. Himachal Himalayas
d. Nathu-La Pass	iv. Kumann Himalayas

Codes :

	a	b	c	d
(A)	ii	iv	i	iii
(B)	iii	iv	ii	i
(C)	iii	iv	i	ii
(D)	iii	i	iv	ii

92. Which of the following pairs are correct ?
i. Eutrophication – Release of hot water from thermal power plants
ii. Biomagnification – Accumulation of pollutants through tissues in increasing concentration along the food chain
iii. Ground water pollution – Seepage of industrial and municipal wastes
iv. Algal Blooms – Enrichment of water bodies resulting from addition of organic and inorganic nutrients

Codes :
(A) Only i, ii and iii
(B) Only ii, iii and iv
(C) Only i, iii and iv
(D) Only i, ii and iv

93. Which combination of statements correctly describes human impacts on biodiversity ?
i. Permanent forest clearing can have high-level impacts.
ii. Urban and industrial development can affect biodiversity.
iii. Rotational shifting cultivation is presented as an example of relatively low-impact land use.
iv. Forest regeneration following land-use abandonment can have generally positive effects.

Codes :
(A) Only i and ii
(B) Only i, ii and iii
(C) Only ii, iii and iv
(D) i, ii, iii and iv

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94. During the December solstice, the Northern Hemisphere generally experiences
(A) Equal day and night everywhere
(B) The sun overhead at 23.5°N
(C) Its shortest day
(D) Its longest day

95. The Findlater jet is a strong low level westerly jet located over the
(A) North Atlantic
(B) Western Indian Ocean, near the equator and Somali coast
(C) Central Pacific
(D) Southern Ocean

96. Which three factors are identified as the main controls on the extent of solid solution that can take place in a crystal structure ?
(A) The relative sizes of the substituting ions/atoms, their ionic charges and the temperature of substitution
(B) Colour, hardness and cleavage of the mineral
(C) Crystal system, symmetry and external crystal habit
(D) Pressure and pH and surrounding environment

97. Many coloured anisotropic minerals show a change in colour as the microscope stage is rotated, when viewed in plane polarised light with the analyser removed. This colour change on rotation is called
(A) Birefringence
(B) Pleochroism
(C) Extinction
(D) Relief

98. Because K-feldspar commonly crystallizes at high temperature with an intermediate Na-K composition, cooling causes it to exsolve into sodium-rich and potassium-rich feldspar. When the resulting lamellae of one alkali feldspar within another are submicroscopic-too fine to be resolved even with the petrological microscope-this specific exsolution texture is termed
(A) Cryptoperthite
(B) Perthite
(C) Antiperthite
(D) Rapakivi

99. In an isobaric (0.1 M_p) T-X phase diagram the lowest temperature at which a liquid can co-exist with both diopside and anorthite is called
(A) cotectic point
(B) eutectic point
(C) triple point
(D) critical point

100. Sapphirine + orthopyroxene + K-feldspar + Quartz + Osumilite is typical assemblage of _____ metamorphism.
(A) Ultra-High temperature
(B) Ultra-Low temperature
(C) Ultra-Low pressure
(D) Ultra-High pressure

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