

Test Booklet No.

प्रश्नपत्रिका क्र.

M**Paper-III****Earth, Atmospheric, Ocean and Planetary Science****Signature and Name of Invigilator**

Seat No.

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(In figures as in Admit Card)

1. (Signature)

(Name)

Seat No.

(In words)

2. (Signature)

(Name)

OMR Sheet No.

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(To be filled by the Candidate)

DEC - 35313**Time Allowed : 2½ Hours]****[Maximum Marks : 150****Number of Pages in this Booklet : 24****Number of Questions in this Booklet : 75****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 75 objective type questions. Each question will carry two marks. All questions of Paper-III will be compulsory, covering entire syllabus (including all electives, without options).
- 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.

(A)	(B)	(C)	(D)
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- 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

- परिक्षार्थींनी आपला आसन क्रमांक या पृष्ठावरील वरच्या कोपऱ्यात लिहावा. तसेच आपणांस दिलेल्या उत्तरपत्रिकेचा क्रमांक त्याखाली लिहावा.
- सदर प्रश्नपत्रिकेत 75 बहुपर्यायी प्रश्न आहेत. प्रत्येक प्रश्नास दोन गुण आहेत. या प्रश्नपत्रिकेतील सर्व प्रश्न सोडविणे अनिवार्य आहे. सदरचे प्रश्न हे या विषयाच्या संपूर्ण अभ्यासक्रमावर आधारित आहेत.
- परीक्षा सुरु झाल्यावर विद्यार्थ्यांला प्रश्नपत्रिका दिली जाईल. सुरुवातीच्या 5 मिनीटांमध्ये आपण सदर प्रश्नपत्रिका उघडून खालील बाबी अवश्य तपासून पहाव्यात.
 - प्रश्नपत्रिका उघडण्यासाठी प्रश्नपत्रिकेवर लावलेले सील उघडावे. सील नसलेली किंवा सील उघडलेली प्रश्नपत्रिका स्विकारू नये.
 - 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 विद्यार्थ्यांनी नोंद घ्यावी.
 - वरीलप्रमाणे सर्व पडताळून पहिल्यानंतरच 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 काळ/निळ्या करावा.
उदा. : जर (C) हे योग्य उत्तर असेल तर.

(A)	(B)	(C)	(D)
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- या प्रश्नपत्रिकेतील प्रश्नांची उत्तरे ओ.एम.आर. उत्तरपत्रिकेतच दर्शवावीत. इतर टिकाणी 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 टिकाणा व्यतिरिक्त इतर कोठेही नाव, आसन क्रमांक, फोन नंबर किंवा ओळख पटेल अशी कोणतीही खूप केलेली आढळून आल्यास अथवा असभ्य भाषेचा वापर किंवा इतर गैरमार्गाचा अवलंब केल्यास विद्यार्थ्यांला परीक्षेस अपात्र ठरविण्यात येईल.
- परीक्षा संपल्यानंतर विद्यार्थ्यांने मूळ ओ.एम.आर. उत्तरपत्रिका पर्यवेक्षकांकडे परत करणे आवश्यक आहे. तथापी, 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.**

DEC-35313/III

Earth, Atmospheric, Ocean and Planetary Science

Paper III

Time Allowed : 2½ Hours]

[Maximum Marks : 150

Note : This paper contains **seventy five (75)** multiple choice questions. Each question carries **Two (2)** marks. Attempt *All* questions.

1. The diagram shows an entire valve of a bivalve shell. Which among the following marks the 'anterior' of the shell ?

- (1) I
- (2) II
- (3) III
- (4) IV

I

II

IV

III

- (A) (1)
- (B) (2)
- (C) (3)
- (D) (4)

2. *Physa prinsepii* is a typical Deccan Trap zone fossil. Which other gastropod is generally associated with it ?

- (1) *Lymnaea subulata*
- (2) *Unio deccanensis*
- (3) *Corbicula peninsularis*
- (4) *Melanoides tuberculata*

- (A) (1)
- (B) (2)
- (C) (3)
- (D) (4)

3. During field work in the Deccan Traps, you come across an intertrappean bed full of fossil wood. What type of fossil record are you seeing ?
- (1) Carbonisation
 - (2) Imprints
 - (3) Petrification
 - (4) Mould and Cast
- (A) (1)
(B) (2)
(C) (3)
(D) (4)
4. Which fossil fern of Wealden age did survive extinction of the genus *Ptilophyllum* ?
- (1) *Marattiopsis macrocarpa*
 - (2) *Cladophlebis indica*
 - (3) *Gleichenia nordenskiöldi*
 - (4) *Sphenopteris hislopi*
- (A) (1)
(B) (2)
(C) (3)
(D) (4)
5. Microfossils, especially foraminifers and ostracods are useful in correlation of strata separated by large distances and belonging to a wide range of environments. Ostracods are considered to be more valuable than forams in such cases because :
- (1) they occur in environments ranging from terrestrial to deep marine
 - (2) they are more sensitive to environmental fluctuations
 - (3) as compared to forams their chances of fossilisation are better
 - (4) their morphology is very distinctive
- (A) (1)
(B) (2)
(C) (3)
(D) (4)
6. Vorticity is a measure of :
- (1) Strength of thermal wind
 - (2) Vertical profile of relative humidity
 - (3) Rotation in wind field
 - (4) Temperature advection
- (A) (1) and (2)
(B) (2)
(C) (3)
(D) (1) and (4)

7. Read the following statements about Indian summer monsoon and choose the *correct* option :

- (1) The day to day variability of Indian summer monsoon rainfall is largely governed by position and intensity of monsoon trough.
- (2) If the onset of Indian summer monsoon over Kerala is later than its normal date by one week, it will reach Rajasthan at a date later than one week with respect to the normal date there.
- (3) Tropical cyclones are major rain giving weather systems during Indian summer monsoon season.
- (4) The normal rainfall during Indian summer monsoon season is evenly distributed across peninsular India.
- (A) (1)-True (2)-False (3)-True (4)-False
- (B) (1)-False (2)-True (3)-False (4)-True
- (C) (1)-True (2)-False (3)-False (4)-False
- (D) (1)-True (2)-True (3)-False (4)-True

8. Match the following :

- (a) Normal date when South-West monsoon covers entire India (1) Easterly waves
- (b) Normal date when South-West monsoon arrives over south Andaman sea (2) Fog
- (c) Most predominant aviation hazard over North India during winter (3) 20th May
- (d) Most important weather giving system over peninsular India during post-monsoon-season (4) 15th July
- (A) (a)–(4), (b)–(3), (c)–(2), (d)–(1)
- (B) (a)–(3), (b)–(2), (c)–(1), (d)–(4)
- (C) (a)–(1), (b)–(2), (c)–(3), (d)–(4)
- (D) (a)–(4), (b)–(3), (c)–(2), (d)–(1)

9. Read the following statements carefully and select the *correct* option :
- (1) There is no large variation in the position of Inter Tropical Convergence Zone (ITCZ) over the oceans region during a year
 - (2) The rate of ozone depletion is the highest over Arctic region
 - (3) The axis of the monsoon trough exhibits southward tilt with height
 - (4) An increase of wind speed down the streamline amounts to convergence in the respective wind field.
- (A) (1)-True (2)-False (3)-True (4)-False
- (B) (1)-True (2)-False (3)-True (4)-True
- (C) (1)-False (2)-True (3)-False (4)-True
- (D) (1)-False (2)-False (3)-False (4)-False
10. Which of the following are the examples of synoptic scale weather systems ?
- (1) Tropical cyclones
 - (2) Thunderstorms
 - (3) Inter-tropical convergence zone
 - (4) Monsoon depressions
- (A) (1) and (3)
- (B) (1), (2) and (4)
- (C) (1) and (4)
- (D) (2), (3) and (4)
11. The Yangtze, Amazon, Mississippi and Rhine rivers all display one of the following pattern :
- (A) They rise within orogenic belts and flow parallel to the orogenic grain
 - (B) They rise within orogenic belts and flow across continents to the passive margins
 - (C) They rise near a rifted margin and flow across continents to the passive margins
 - (D) They rise near a rifted margin and flow through the highlands of rifted margins to the sea

12. Which one of the following statements about solifluction is *incorrect* ?
- (A) Solifluction occurs when soil is saturated with water
 - (B) Mudflows are more rapid than solifluction
 - (C) Solifluction is exclusively a cold-climate process
 - (D) An impermeable layer in a soil can promote solifluction effectively
13. One of the following statements about parabolic dunes is *incorrect* :
- (A) They are crescent shaped, but have a very different orientation from the barachan dunes
 - (B) They are crescent shaped. The horns or cusps of the dunes project downwind
 - (C) Sand dunes on coasts commonly are parabolic and not barachan dunes
 - (D) They are characteristic dunes of partially stabilized sandy terranes
14. One of the following pair of landforms result from an abrupt loss of competence in a stream :
- (A) Deltas and alluvial fans
 - (B) Natural levees and alluvial terraces
 - (C) Alluvial fans and point bars
 - (D) Deltas and ox-bow lakes
15. In general, silicate minerals weather most rapidly, when :
- (A) The silicate minerals crystallize at lower temperatures and have lowest silicon-oxygen ratios
 - (B) The silicate minerals crystallize at highest temperature and have highest silicon-oxygen ratios
 - (C) The silicate minerals crystallize at highest temperature and have the lowest silicon-oxygen ratios
 - (D) The silicate minerals crystallize at lower temperatures and have highest silicon-oxygen ratios

16. Identify the *correct* genetic sequence of Karst landforms :

- (A) doline → polje → uvala
- (B) uvala → doline → polje
- (C) doline → uvala → polje
- (D) uvala → polje → doline

17. Geoid undulations are the displacement between :

- (A) Geoid and Spheroid
- (B) Geoid and Ellipsoid
- (C) Geoid and Sea level
- (D) Geoid and local gravity

18. The focal mechanism of an earthquake can be inferred for the motion on fault plane by using :

- (A) Amplitude on Seismogram
- (B) First motion of Seismograph
- (C) Wavelength on Seismogram
- (D) Magnitude of earthquake

19. In the Big Bang theory of formation of universe, the temperature of universe is deduced to be evolved from :

- (A) 3°K to $10^{13^{\circ}\text{K}}$
- (B) $10^{13^{\circ}\text{K}}$ to 3°K
- (C) 300°K to 3°K
- (D) 3000°K to 1000°K

20. The magnetic susceptibility is negative for :

- (A) Diamagnetic material
- (B) Ferromagnetic material
- (C) Paramagnetic material
- (D) Antiferromagnetic material

21. Which one of the following is *not* an appropriate combination of survey methods ?

- (A) Exploration of fossil fuels : S, G, M
- (B) Exploration of metalliferous mineral deposit : M, EM, E, SP, IP
- (C) Archeological Investigations SP, Rd, G, IP
- (D) Exploration of underground water supplies E, S, Rd

where : G = gravity, M = Magnetic
S = Seismic, E = Electrical resistivity
SP = Self-potential, IP = Induced Polarization, EM = Electromagnetic,
R = Radiometric, Rd = Ground penetraty radar

22. One of the following statements about spatial resolution of the sensors is not *true* :

- (A) Spatial resolution refers to the size of the largest feature that can be detected
- (B) Spatial resolution of passive sensors depends primarily on their instantaneous field of view (IFOV)
- (C) The finer the spatial resolution the less total ground area can be seen
- (D) Geosynchronous satellites have coarse resolution

23. Choose the *correct* order of spectral reflectance of dry soil (DS), wet soil (WS) and green vegetation (GV) in the case of near-infrared (INR) region :
- (A) $WS > DS > GV$
(B) $GV > DS > WS$
(C) $GV > WS > DS$
(D) $GV < WS < DS$
24. Arching capacity of the rocks around a proposed tunnel is an important aspect in the geological study, which of the following kind of rocks can have sufficiently well developed arch patterns :
- (1) badly fissured rocks
(2) massive igneous rocks
(3) steeply dipping formations with strike perpendicular to the axis of the tunnel
(4) badly jointed rocks
- (A) (2) and (3)
(B) (1) and (4)
(C) (2) and (4)
(D) (3) and (4)
25. Points in favour of 'drift theory' of origin of coal deposits are :
- (1) Huge amount of organic matter is accumulating today in swamps
(2) Peat and brown coals are found in delta region
(3) Many tree trunks in coal seams lie inclined or horizontal
(4) Underclays are poor in alkalies, lime and oxides
- (A) (1) and (4)
(B) (2) and (3)
(C) (1) and (3)
(D) (3) and (4)

26. Which one of the following property does persistently change during coalification ?
- (A) Vitrinite reflectance
- (B) Volatile matter
- (C) Ash content
- (D) Calorific value
27. Biostratigraphic unit recognised on the basis of presence of an assemblage of three or more taxa in sediments constitutes :
- (A) range biozone
- (B) assemblage biozone
- (C) abundance biozone
- (D) interval biozone
28. Match the *correct* pairs of hierarchy of cycles of sequence stratigraphy :
- (a) I order (1) Spans of 50 my, driven by break up of continental plates
- (b) II order (2) Spans from 500,000 years to 3 my, driven by long-term tectonic processes and short-term climatic changes, begins with drop in sea level.
- (c) III order (3) Spans 3-50 my, driven by plate movements
- (d) IV order (4) Spans 10,000 – 50,000 years, driven by climatic cyclic events
- (A) (a)–(1), (b)–(3), (c)–(2), (d)–(4)
- (B) (a)–(2), (b)–(3), (c)–(1), (d)–(4)
- (C) (a)–(4), (b)–(3), (c)–(2), (d)–(1)
- (D) (a)–(3), (b)–(2), (c)–(4), (d)–(1)

29. Which of the following processes are dominant in explaining formation of deep sea manganese nodules :

- (1) Hydrogenous
- (2) Hydrothermal
- (3) Halmyrolitic
- (4) Diagenetic

- (A) (1) and (2)
- (B) (1), (2) and (3)
- (C) (3) and (4)
- (D) (2) and (4)

30. The short-lived, powerful, gravity driven mass flow consisting of dilute mixtures of sediment and water of density greater than surrounding water are known as :

- (A) turbidity current
- (B) fluid gravity flow
- (C) avalanches
- (D) landslides

31. The collision and break-up of east and west Gondwana occurred beforeand after..... respectively.

- (A) Columbia, Rhodinia
- (B) Pangea, Rhodinia
- (C) Nena, Arctica
- (D) Laurasia, Pangea

32. Answer the following by the observations from the labelled force balance model.

- (1) The isostatic inequilibrium results in..... .
 - (2) The trench suction force results in..... .
 - (3) The resistance from mantle results in..... .
 - (4) Most significant driving force of subducting plate is..... .
- (A) F_{SP} , F_{SR} , F_{RP} , F_{SD} , respectively
- (B) F_{DF} , F_{SP} , F_{RP} , F_{SU} , respectively
- (C) F_{SU} , F_{SD} , F_{SP} , F_{RP} , respectively
- (D) F_{RP} , F_{SU} , F_{SD} , F_{SP} , respectively

33. Which of the following are allochemical constituents of limestone ?

- (1) Intraclast
 - (2) Pellet
 - (3) Bioclast
 - (4) Lithoclast
- (A) (2), (3) and (4)
- (B) (1), (2) and (3)
- (C) (1), (2) and (4)
- (D) (1), (3) and (4)

34. Which of the following structures are typical of sandy beaches ?

- (1) Swash marks
 - (2) Rill marks
 - (3) Flute marks
 - (4) Browsing traces
- (A) (1), (2) and (4)
- (B) (2), (3) and (4)
- (C) (1), (3) and (4)
- (D) (2) and (4)

35. Deposits of sediments formed from lateral migration of meandering river during flooding are known as :

- (A) point bar deposits
- (B) levee deposits
- (C) flood plain deposits
- (D) channel lag deposits

36. A fan-shaped body of coarse detrital sediments that are poorly sorted and built up by mountain stream at its base represents :

- (A) Submarine fan deposits
- (B) Wadi deposits
- (C) Alluvial fan deposits
- (D) Glacial deposits

37. The mineral lineations can be determined from :

- (1) Slickenfibers
 - (2) Overgrowths
 - (3) Mullions
 - (4) Rods
- (A) (2) and (3)
 - (B) (1) and (3)
 - (C) (1), (2) and (3)
 - (D) (1), (2) and (4)

38. Extinction angle is the angle between :

- (A) two crystallographic axes
- (B) crystallographic axis and vibration direction
- (C) two optic axes
- (D) optic axis and crystallographic axis

39. Biaxial mineral contains three vibration directions α , β , γ . A section that provides a flash figure will contain :

- (A) α and β
- (B) α and γ
- (C) β and γ
- (D) α , β and γ

40. The most suitable radiometric dating method to determine age of ultramafic rocks :

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

41. The difference between plunge and rake is :

- (A) Plunge refers to direction and rake refers to amount of inclination of a lineation
- (B) Plunge and rake are synonyms
- (C) Plunge is measured for planar features whereas rake is measured for a linear feature
- (D) The difference between rake and plunge lies in the plane of their measurement

42. Optically isotropic minerals which have the same optical properties in all directions belong to :

- (A) Orthorhombic system
- (B) Tetragonal system
- (C) Monoclinic system
- (D) Cubic system

43. The following mineral deposits can be of subduction related mineralization :

- (1) Porphyry deposits associated with I-type granites
- (2) Skarn deposits of epigenetic type in carbonate rocks intruded by plutonic rocks
- (3) Magmatic seggregation
- (4) Rift basins associated with volcanism

- (A) (1) and (2)
- (B) (2) and (3)
- (C) (3) and (1)
- (D) (3) and (4)

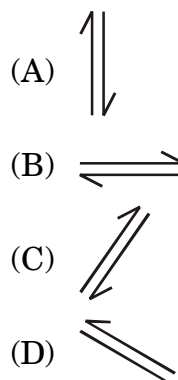
44. Chromite deposits are after associated with :

- (1) Ophiolites complexes
- (2) Stratiform complexes
- (3) Duke Island-type complexes
- (4) Intrusive granites

What rocks are associated with the chromite deposits of Himalaya ?

- (A) (1) and (4)
- (B) (1) and (2)
- (C) (1)
- (D) (2) and (3)

45. Indicate the sense of shear in the figure provided below :



46. If slope angle of the ground surface is more than the dip of a bedded sequence and if both, the ground and beds are inclined in the same direction then :
- (A) Younger beds will be met within the direction of dip
 - (B) Older beds will be met within the direction of dip
 - (C) Only the youngest bed will be met with as one goes down the slope
 - (D) Only the oldest bed will be met with as one goes in the direction of slope
47. The contrast seen in the helium isotope signatures of MORB and OIB, suggests a specific style of mantle convection which is called :
- (A) Whole mantle convection
 - (B) Layered mantle convection
 - (C) Upper mantle convection
 - (D) Lower mantle convection
48. Tin and Tungsten mineralisation is associated with :
- (A) Greisens
 - (B) Gossans
 - (C) Skarns
 - (D) Phyllic alteration haloes
49. Prolific deposition of iron took place :
- (A) Pre-2600 Ma
 - (B) Between 2600 – 1900 Ma
 - (C) Between 1900 – 800 Ma
 - (D) Post 800 Ma
50. Recovery recrystallisation becomes more important in :
- (A) Waning stages of deformation
 - (B) Early stages of deformation
 - (C) Granitic intrusions
 - (D) Gabbroic intrusions
51. The characteristic mineral assemblages of eclogite facies is :
- (A) Orthopyroxene and quartz
 - (B) Orthopyroxene and plagioclase
 - (C) Garnet and Omphacite
 - (D) Garnet and Plagioclase
52. The textural term Xenoblastic in metamorphic petrology is synonymous with the igneous textural term :
- (A) Panidiomorphic
 - (B) Hypidiomorphic
 - (C) Allotriomorphic
 - (D) Glomeroporphyritic

53. If you are working in the Deccan Volcanic Province and your area is characterized by many intertrappean horizons, one of which is rich in plant fossils then you are probably working in :
- (A) Mandla Traps
 - (B) Malwa Traps
 - (C) In Konkan Region
 - (D) On the main Deccan Plateau
54. The destruction caused by tsunamis on the shores is not experienced by vessels travelling in open seas because :
- (A) The waves have large wavelengths and low amplitude
 - (B) The waves have large amplitude and smaller wavelengths
 - (C) The waves have smaller amplitude and smaller wavelength
 - (D) Waves have large amplitude and large wavelength
55. The parent-daughter of radiogenic isotopes do not fractionate during melting and crystallisation because :
- (A) mass difference between parent and daughter is large
 - (B) mass difference between parent and daughter is too small
 - (C) parent and daughter isotopes behaves differently
 - (D) atomic weight of parent and daughter are different
56. Chemically the most primitive meteorites classified as carbonaceous chondrite type CI have an almost one to one chemical correspondence with the composition of the sun barring some elements such as :
- (1) Hydrogen
 - (2) Carbon
 - (3) Rare gases
 - (4) Titanium
- (A) (2) and (4)
 - (B) (1), (2) and (3)
 - (C) (1) and (4)
 - (D) (2) and (4)
57. Which amongst the following are the types of rare gases of the total five, in the Earth's atmosphere ?
- (1) Helium
 - (2) Hydrogen
 - (3) Carbon
 - (4) Neon
- (A) (1) and (4)
 - (B) (1) and (2)
 - (C) (2) and (3)
 - (D) (3) and (4)

58. A secondary texture consisting of irregular “wormy” blebs or rods of quartz in plagioclase horst adjacent to alkali feldspar grain is called as :
- (A) Myrmekite
 - (B) Granophyric
 - (C) Perthitic
 - (D) Graphic
59. Tertiary coal deposits in India are seen in which of the following state/s :
- (1) Jammu and Kashmir
 - (2) Rajasthan
 - (3) Gujarat
 - (4) Orissa
- (A) (2) and (3)
 - (B) (1) and (4)
 - (C) (1), (2) and (3)
 - (D) (3) and (4)
60. A rock made up of olivine and orthopyroxene is :
- (A) Troctolite
 - (B) Meimechite
 - (C) Harzburgite
 - (D) Therzolite
61. If you are travelling through a terrain that exposes a thick, nearly horizontal pile of sediments that have glauconitic sandstone in its basal parts and the area is located due east-southeast of Bundelkhand Granitic complex then you are passing through :
- (A) Basal parts of Vindhyan Supergroup
 - (B) Upper part of Vindhyan Supergroup
 - (C) Mahakoshal Group
 - (D) Bijawar Group
62. Which major element variation diagram would enable to infer crystallisation of olivine ?
- (A) Si Vs. Na
 - (B) Mg Vs. Ni
 - (C) Mg Vs. Ca
 - (D) Mg Vs. Al

63. Identify the *correct* pair :

- (a) Podiform (1) Granite
chromite
- (b) Scheelite (2) Ophiolite peridotite
- (c) Zoisite (3) Mica group mineral
- (d) Spodumene (4) Felspar
- (A) (a)-(1) (b)-(2)
- (B) (a)-(2) (b)-(1)
- (C) (c)-(1) (a)-(2)
- (D) (d)-(3) (b)-(4)

64. On a hill slope covered by overburden, the ratio between shear strength and shear stress would :

- (A) increase
- (B) decrease
- (C) remains constant
- (D) becomes infinity

When the rise in water table is recorded

65. Dharwar craton consists of the following components :

- (1) Trondhjemite gneisses is 3400 Ma
- (2) Gneisses dated is 2900 – 2700 Ma
- (3) Greenstones
- (4) Late intrusive granites

Which of the above constituents occur in the Bhandara-Bastar craton ?

- (A) (2) and (4)
- (B) (1), (2) and (4)
- (C) (1), (2) and (3)
- (D) (1), (2), (3) and (4)

66. Study the section of the modern analogue of an ophiolite :

- (1) X-Pillow lava
- (2) Y-Sheeted Dyke
- (3) Z-Gabbroic complex
- (4) M-Mantle peridotite

Which component is absent in Himalayan ophiolite ?

- (A) (1) and (2)
- (B) (2) only
- (C) (3) only
- (D) (1) and (4)

67. Fractionation of which potential mineral phase/phases is indicated in the figure :

X Z M
 Y

Si/K

- (A) Plagioclase
- (B) Olivine
- (C) Amphibole
- (D) Plagioclase + Amphibole

68. Deposition of thick banded iron formations during 2.7–2.5 Ga caused by :

- (A) High rates of erosion
- (B) Shift from anoxic to oxygenated environments
- (C) Low pH conditions of Archean seas
- (D) High rates of chemical weathering

69. The oldest (3.8 Ga) dated life reported from :

- (A) Isua supracrustals, Greenland
- (B) Sargur group, India
- (C) Fig Tree Formation, South Africa
- (D) Marble Bar, Australia

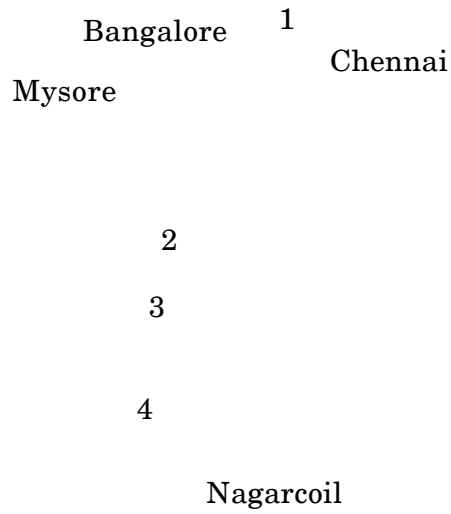
70. A formation of lower permeability that may transmit quantities of water significant in terms of regional groundwater flow, but from which negligible supplies can be obtained are called :

- (A) Aquifers
- (B) Aquitards
- (C) Aquicludes
- (D) Aquitides

71. Fossil assemblage in Barren Measures is characterized by :

- (A) Cyclocladon
- (B) Glossopteris
- (C) Gangamopteris
- (D) Gondwanidium

72. In a sketch map of south Indian Peninsula, identify the features marked as 1, 2, 3 and 4 :



	1	2	3	4
(A)	Achankovil Shear Zone	Opx-isograd	Bhavani-Moyar Shear Zone	Palaghat-Cauvery Shear Zone
(B)	Palaghat-Cauvery Shear Zone	Achankovil Shear zone	Opx-isograd	Bhavani-Moyar Shear Zone
(C)	Opx-isograd	Bhavani-Moyar Shear Zone	Palaghat-Cauvery Shear Zone	Achankovil Shear Zone
(D)	Bhavani-Moyar Shear Zone	Palaghat-Cauvery Shear Zone	Achankovil Shear zone	Opx-isograd

73. Arrange the following types of suture lines in ascending order of evolution :

- (1) Ammonitic
- (2) Goniatic
- (3) Ceratitic
- (A) (1)→(2)→(3)
- (B) (2)→(3)→(1)
- (C) (2)→(1)→(3)
- (D) (3)→(2)→(1)

74. Temperate rainforest differs from equatorial and tropical rainforests with respect to :

- (1) Species diversity
- (2) Tree height
- (3) Leaf canopy density
- (4) Leaf size
- (A) (1)-True (2)-False (3)-False (4)-False
- (B) (1)-True (2)-True (3)-True (4)-True
- (C) (1)-False (2)-True (3)-False (4)-False
- (D) (1)-True (2)-False (3)-True (4)-False

75. During summer season, the weather which is highly hazardous for aviation, in the north-western region of India is :

- (i) Heat wave
- (ii) Heavy rain
- (iii) Thunderstorm
- (iv) Dust storm and sand storm
- (A) (iii)
- (B) (iii) and (iv)
- (C) (ii), (iii) and (iv)
- (D) (ii) and (iii)

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ROUGH WORK