

Test Booklet Code & Serial No.

प्रश्नपत्रिका कोड व क्रमांक

A**Paper-III****EARTH, ATMOSPHERIC, OCEAN & 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)

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OMR Sheet No.

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(To be filled by the Candidate)

APR - 35317**Time Allowed : 2½ Hours]****[Maximum Marks : 150****Number of Pages in this Booklet : 20****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 विद्यार्थ्याला प्रश्नपत्रिका दिली जाईल. सुरुवातीच्या 5 मिनीटांमध्ये आपण सदर प्रश्नपत्रिका उघडून खालील बाबी अवश्य तपासून घ्याव्यात.
 - 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 घ्यावी. 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 वेळी 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 करवा.
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 ठिकाणी लिहीलेली 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 ठिकाणा व्यतिरिक्त इतर कोठेही नाव, आसन क्रमांक, फोन नंबर किंवा ओळख पटेल अशी कोणतीही खुण केलेली आढळून आल्यास अथवा असभ्य भाषेचा वापर किंवा इतर गैरमार्गाचा अवलंब केल्यास विद्यार्थ्याला परीक्षेस अपात्र ठरविण्यात येईल.
- परीक्षा संपल्यानंतर विद्यार्थ्याने 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.**

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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 carrying **Two (2)** marks. Attempt *All* questions.

1. The gossans are commonly formed due to :

- (A) Metasomatic replacement
- (B) Oxidation and secondary sulphide enrichment
- (C) Magmatic differentiation
- (D) Contact metasomatism

2. Porphyry copper deposits are associated with :

- (A) Mid oceanic ridges
- (B) Subduction zones
- (C) Continental rifts
- (D) Back arc basins

3. Which of the following is a *correct* statement ?

- (A) Mahakoshal Group of Central India is a platformal volcano-sedimentary association.
- (B) Mahakoshal Group represents a stable continental marginal basin.
- (C) Mahakoshal Group represents a volcano-sedimentary belt in intra-cratonic mantle activated rift found by faults.
- (D) Mahakoshal Group is a shoe-string type marginal basin.

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| <p>4. The major granitic activity in Indian Peninsula with large granite plutons is of which age ?</p> <p>(A) 1100-1400 m.y.</p> <p>(B) 450-700 m.y.</p> <p>(C) 2400-2550 m.y.</p> <p>(D) 70-90 m.y.</p> <p>5. Difference between Algoma type deposits and superior type deposits is that :</p> <p>(A) Superior type deposits are thick, massive iron ores of early Proterozoic with stable precipitation from chemical phase</p> <p>(B) Algoma type deposits are leusoidal, non-continuous iron ores of late Archaean-early Proterozoic with Mn deposits and carbonate association</p> <p>(C) Both (A) and (B) above are wrong propositions</p> <p>(D) Both (A) and (B) above are correct statements indicating characteristic features</p> | <p>6. Sukhinda Complex of Odisha is famous for :</p> <p>(A) Chromite deposits</p> <p>(B) Pb-Zn deposits</p> <p>(C) Copper deposits</p> <p>(D) Gold deposits</p> <p>7. The bulk composition of Earth is proposed to be nearer to</p> <p>(A) Carbonaceous chondrites</p> <p>(B) Ordinary chondrites</p> <p>(C) Achondrites</p> <p>(D) Enstatite chondrites</p> <p>8. Values for REEs measured are typically normalized to chondritic values because chondritic values are considered to represent :</p> <p>(A) Average solar nebular values</p> <p>(B) Average Mars composition</p> <p>(C) Average sun's composition</p> <p>(D) Average lunar composition</p> |
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| <p>9. The Widmanstätten exsolution pattern in Iron meteorites are characterised by intergrown crystals of :</p> <p>(A) Ti poor and more Ni-rich alloy</p> <p>(B) Ni poor and more Ni-rich alloy</p> <p>(C) Cr poor and Cr-rich alloy</p> <p>(D) Mn poor and Cr-rich alloy</p> <p>10. The mineral assemblage quartz-sapphirine is characteristic of :</p> <p>(A) Amphibolite facies</p> <p>(B) Eclogite facies</p> <p>(C) Blue schist facies</p> <p>(D) Ultra-High Temperature (UHT) Metamorphism</p> <p>11. Eclogite facies rock with composition of garnet and omphacite indicates that the source rock of eclogite was :</p> <p>(A) of impure dolomitic composition</p> <p>(B) of impure granodioritic composition</p> <p>(C) of basaltic composition</p> <p>(D) of andesitic composition</p> | <p>12. The volcanic equivalent of nepheline syenite is :</p> <p>(A) Andesite</p> <p>(B) Basalt</p> <p>(C) Rhyolite</p> <p>(D) Phonolite</p> <p>13. Characteristic minerals of kimberlites are :</p> <p>(A) Olivine-chrome diopside-phlogopite</p> <p>(B) K-feldspar-garnet-orthopyroxene</p> <p>(C) Plagioclase-clinopyroxene-garnet</p> <p>(D) Cordierite-sillimanite-orthopyroxene</p> <p>14. Basalts containing more than 5% normative nepheline are termed as :</p> <p>(A) Nephelinite</p> <p>(B) Ankaramites</p> <p>(C) Basanite</p> <p>(D) Phonolite</p> |
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15. One of the following statements about the trade winds is *incorrect* :

- (A) They lie between the sub-tropical belts of subsidence and the equatorial convergence zone
- (B) They are the most regular wind systems found at the Earth surface
- (C) Their origin is in the subsidence of the sub-tropical high-pressure zones
- (D) The Coriolis effect gives the winds an eastward turn, so they become northwesterly winds in the northern hemisphere and southwesterly in the southern hemisphere

16. Match the following and select the *correct* answer using the codes given below :

Isoline

- (a) Isobar
- (b) Isohyets
- (c) Isotherm
- (d) Isohel

Lines of

- (i) Equal sunshine
- (ii) Equal amounts of rainfall
- (iii) Equal barometric pressure
- (iv) Equal temperature

Codes :

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

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17. Two general locations where precipitation totals tend to be above average for the Earth :
- (A) The equator and on west side of the continents in mid latitudes
- (B) The equator and tropic of cancer
- (C) The tropics of cancer and capricorn
- (D) The equator and on the east side of the continents in mid latitudes
18. A river is not likely to have braided channel, if :
- (A) it is subjected to large fluctuations in discharge
- (B) it has generally large load
- (C) it tends to have very low percentage of solid load
- (D) it drains heavily forested regions
19. This is a dimensionless number that defines the type or degree of turbulence in a flow :
- (A) Reynolds number
- (B) Froude number
- (C) Boundary shear stress
- (D) Manning roughness coefficient
20. Match the following and select the correct answer using the codes given below :
- | | |
|-------------|------------------------------|
| (a) Bajada | (i) Stony Desert |
| (b) Hammada | (ii) Sand desert |
| (c) Reg | (iii) Rocky desert |
| (d) Erg | (iv) Belt of coalescing fans |
- Codes :
- | | | | |
|-----------|-------|-------|------|
| (a) | (b) | (c) | (d) |
| (A) (iv) | (ii) | (iii) | (i) |
| (B) (iii) | (iv) | (ii) | (i) |
| (C) (iv) | (iii) | (i) | (ii) |
| (D) (i) | (ii) | (iii) | (iv) |

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| <p>21. The terms water gaps and wind gaps and beheading are associated with :</p> <p>(A) Antecedant drainage</p> <p>(B) Superposed drainage</p> <p>(C) Stream piracy</p> <p>(D) Structurally controlled drainage</p> <p>22. The ratio of the volume of water that, after saturation, can be drained by gravity to its own volume is called :</p> <p>(A) Specific retention</p> <p>(B) Specific yield</p> <p>(C) Field capacity</p> <p>(D) Storage coefficient</p> <p>23. Methemoglobinemia or blue baby syndrome is caused due to pollution of drinking water by :</p> <p>(A) Nitrate</p> <p>(B) Fluoride</p> <p>(C) Arsenic</p> <p>(D) Sulphate</p> | <p>24. Gravity measurements at a given spot by standard gravimeter gives :</p> <p>(A) Absolute gravity at the spot</p> <p>(B) Absolute gravitational acceleration at the spot</p> <p>(C) Relative measurement of gravity at the spot</p> <p>(D) Diurnal variation in gravity at the spot</p> <p>25. The material transported on the surface of glaciers is called :</p> <p>(A) Englacial</p> <p>(B) Subglacial</p> <p>(C) Supraglacial</p> <p>(D) Paraglacial</p> <p>26. Major glacial stages are of the order of while the interglacials are of</p> <p>(A) 100 Ka, 50 Ka</p> <p>(B) 20 Ka, 100 Ka</p> <p>(C) 80 Ka, 20 Ka</p> <p>(D) 30 Ka, 60 Ka</p> |
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27. The refractive index of the ocean water :
- (A) Increases with salinity
 - (B) Increases with temperature
 - (C) Decreases with salinity
 - (D) Decreases with temperature
28. Which one of the following helps to identify the objects on the earth surface ?
- (A) Atmospheric window
 - (B) Signature
 - (C) Radiometric error
 - (D) Atmospheric diffusion
29. Which one of the following is *not* a remote sensing satellite ?
- (A) LANDSAT
 - (B) IRS
 - (C) RBV
 - (D) IKONOS
30. Which of the following is *correct* statement ?
- (A) The Son-Narmada-Tapti (SONATA) lineament zone is a younger rift of post-cretaceous age
 - (B) Son-Narmada-Tapti lineament is a graben structure
 - (C) The SONATA zone is a amalgamation of earthy Proterozoic rift in Hoshangabad-Sidhi-Gaya sector and much younger cretaceous-sub-recent graben in western sector. It is now a horst in Hoshangabad-Gaya while Graben west of Omkareshwar
 - (D) There is faulting along present day Narmada river course which has resulted in the linear course

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31. A frequent cause of tight spots in the drilled hole occur where abundant presence of clays.
- (A) Kaolinite
(B) Chlorite
(C) Smectite
(D) Illite
32. The three main ways of measuring the electric resistivity of formation penetrated by borehole are
- (A) S. P. log, caliper log, drill time log
(B) Gamma log, spectral log, spectral gamma log
(C) Neutron log, density log, sonic log
(D) Normal log, lateral log, induction log
33. The three basic types of kerogen recognizable based on the differences in chemical characteristics and nature of original organic matter are :
- (A) Category 1, Category 2, Category 3
(B) Set 1, Set 2, Set 3
(C) Type I, Type II, Type III
(D) Organic, Inorganic, Plant based
34. Crude oil density, in degrees API (American Petroleum Institute), is a measure of viscosity. The value of 14 API corresponds to :
- (A) Water
(B) Heavy crude
(C) Light crude
(D) Mixed (Average) crude

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| <p>35. The most striking morphological feature of the ocean floor is the :</p> <p>(A) Mid-Ocean Ridge (MOR)</p> <p>(B) Seamount</p> <p>(C) Continental Slope</p> <p>(D) None of the above</p> <p>36. Which component of the continental margin has the greatest economic and political significance ?</p> <p>(A) Continental slope</p> <p>(B) Continental rise</p> <p>(C) Shelf break</p> <p>(D) Continental shelf</p> <p>37. Highly sodic olivine poor basalt with albite or oligoclase as the sole principal feldspar is called :</p> <p>(A) Trachybasalt</p> <p>(B) Tholeiitic basalt</p> <p>(C) Mugearite</p> <p>(D) Spirrite</p> | <p>38. The magnesium rich variety of olivine is called :</p> <p>(A) Larnite</p> <p>(B) Tephroite</p> <p>(C) Fayalite</p> <p>(D) Forsterite</p> <p>39. Mineral clinozoisite belongs to :</p> <p>(A) Feldspar group</p> <p>(B) Epidote group</p> <p>(C) Amphibole group</p> <p>(D) Pyroxene group</p> <p>40. Only one of the mid-oceanic ridge can actually be seen on land also :</p> <p>(A) Mid-Indian Ocean Ridge</p> <p>(B) 90 East Ridge</p> <p>(C) Mid-Atlantic Ridge</p> <p>(D) Carribean Ridge</p> <p>41. The shear zone that extends from Antarctica, India to Madagascar is :</p> <p>(A) Central Indian Shear Zone</p> <p>(B) Achan Kovil Shear Zone</p> <p>(C) South Indian Shear Zone</p> <p>(D) Palghat-Cauvery Shear Zone</p> |
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42. En-echelon vein pattern in a rock will indicate :

- (A) Pure tension
- (B) Compression
- (C) Shear zone
- (D) Normal slip

43. The neogene period includes :

- (A) Palaeocene and Eocene
- (B) Palaeocene, Eocene and Oligocene
- (C) Miocene, Pliocene, Eocene
- (D) Oligocene, Miocene and Pliocene

44. The clast supported conglomerate belong to the basal Bababudhan Group of South India is an example of of Archaean age.

- (A) Tolchir Boulder Bed
- (B) Cataclastic Breccia
- (C) Intraformational Oligomictic Conglomerate
- (D) Oligomictic Orthoconglomerate

45. Match the following items in Group I with those of Group II and select the correct answer using the codes given below :

Group I

- (p) Catastrophism
- (q) Neptunism
- (r) Uniformitarianism
- (s) Plutonism

Group II

- (1) All rocks precipitated from a universal ocean
- (2) Earth was shaped primarily by rapid and violent events
- (3) Many of earth's primitive rocks were formed by heat from the interior
- (4) Present processes are the key to understanding processes of the past

Codes :

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|-----|-----|-----|-----|-----|
| | (p) | (q) | (r) | (s) |
| (A) | (1) | (3) | (4) | (2) |
| (B) | (2) | (1) | (4) | (3) |
| (C) | (4) | (2) | (3) | (1) |
| (D) | (3) | (1) | (4) | (2) |

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| <p>46. What is the age of plant fossil <i>Glossopteris</i> ?</p> <p>(A) Permo-carboniferous</p> <p>(B) Jurassic</p> <p>(C) Triassic</p> <p>(D) Cretaceous</p> <p>47. Apical disc is present in :</p> <p>(A) Gastropoda</p> <p>(B) Echinoidea</p> <p>(C) Anthozoa</p> <p>(D) Trilobita</p> <p>48. Which of the following is an articulate Brachiopod ?</p> <p>(A) <i>Spirifer</i></p> <p>(B) <i>Rhynchonella</i></p> <p>(C) <i>Terebratula</i></p> <p>(D) All of the above</p> | <p>49. The most typical rock of 'Mollasse Sequence' is :</p> <p>(A) Orthoquartzite</p> <p>(B) Arkose</p> <p>(C) Greywacke</p> <p>(D) Lithic Arenite</p> <p>50. Break in the current flow in a depositional system containing mud and sand may lead the mud within the ripple trough, such bedding structures are termed as</p> <p>(A) Antidunes bedding</p> <p>(B) Planar cross stratification</p> <p>(C) Flaser bedding</p> <p>(D) Current bedding</p> |
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51. In a sedimentary rock if the thickness of a strata is more than 1 cm it is called as

- (A) Lamination
- (B) Lamina
- (C) Bed
- (D) Stratification

52. Antidunes, chutes and pools are formed under flow regions.

- (A) Lower
- (B) Upper
- (C) Subcritical
- (D) Critical

53. Bouger plate correction for gravity measurement means :

- (A) Compensation for the gravity station with reference to elevation above reference ellipsoid and is to be added to reading
- (B) Compensation for free air column at gravity station above the MSL and is subtracted from the reading
- (C) Compensation for the effect of layer of rocks corresponding to the elevation difference between measurement station and reference surface levels
- (D) Compensation for microgravity variation due to lunar phase changes and lunar distance

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54. Which of the following statements is *correct* ?
- (A) Seismic wave propagation is related to specific gravity of the matter
 - (B) Seismic wave propagation is function of rigidity, density and elastic modulus of the medium
 - (C) 'S' waves can travel through liquid
 - (D) 'P' waves are a type of surface wave which appears first on surface
55. Which of the following is a *correct* statement for shear waves ?
- (A) Shear waves are compression-rarefaction type waves
 - (B) Shear waves are similar to acoustic waves
 - (C) Shear waves have particle movement in direction of propagation of wave
 - (D) Shear waves have particle movement perpendicular to the direction of propagation of seismic wave
56. A heat flux (q) in the x direction (qx) is proportional to the magnitude of temperature change across a unit distance in x direction. If K is thermal conductivity characteristic of the material. qx is expressed by :
- (A) $\left(\frac{dT}{dx}\right)^{qK}$
 - (B) $dT \left(\frac{dx}{K}\right)$
 - (C) $-K \left(\frac{dT}{dx}\right)$
 - (D) $\left(\frac{dT}{dx}\right) \cdot \left(\frac{dK}{dx}\right)$
57. A hydrologic unit containing one large aquifer or several connected and inter related aquifers is the definition of :
- (A) Reservoir basin
 - (B) Aquifer cloud
 - (C) Groundwater basin
 - (D) Water contivity

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58. Coal layers that are shiny black and brittle and showing conchoidal fracture are termed as :
- (A) Fusain
 - (B) Vitrain
 - (C) Durain
 - (D) Clarain
59. Atmospheric models built from fundamental conservation laws governing the physical behavior of the atmosphere and use of numerical methods to obtain the (approximated) solution to the system of coupled governing equations are :
- (A) Empirical models
 - (B) Statistical models
 - (C) Numerical models
 - (D) Analytical models
60. According to classical model of atmospheric electricity, the Earth's surface is :
- (A) Positively charged
 - (B) Neutral
 - (C) Negatively charged
 - (D) Zero charged
61. In fair weather condition, near the Earth's surface, the vertical electric field is about :
- (A) 300 V/m
 - (B) 1000 V/m
 - (C) 100 V/m
 - (D) 500 V/m
62. When the atmospheric net radiation is positive :
- (A) Temperature increases
 - (B) Temperature decreases
 - (C) Temperature remains constant
 - (D) Temperature approaches to zero

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63. In the atmospheric modelling system, the prognostic equations :
- (A) Involve time derivative
- (B) do not contain time derivative
- (C) Involve diagnostic variables
- (D) Contain secondary variables
64. Rainfall contribution from western disturbances are significant over :
- (A) Parts of Northern India during southwest monsoon
- (B) West coast of southern Peninsular India during southwest monsoon
- (C) Parts of Northern India during winter
- (D) Whole of west coast during southwest monsoon
65. The angle between isotherms and dry adiabats in a Tephigram is :
- (A) 45 degree
- (B) 90 degree
- (C) 30 degree
- (D) 60 degree
66. The instability resulting from the forced lifting of the parcel is conditional instability and occurs when :
- (A) $\bar{\Gamma}_d < \Gamma < \bar{\Gamma}_s$
- (B) $\bar{\Gamma}_s < \Gamma < \bar{\Gamma}_d$
- (C) $\bar{\Gamma}_s < \bar{\Gamma}_d < \Gamma$
- (D) $\bar{\Gamma}_d < \bar{\Gamma}_s < \Gamma$
- Where $\bar{\Gamma}_d$ is dry adiabatic lapse rate, Γ is environmental lapse rate and $\bar{\Gamma}_s$ is moist adiabatic lapse rate.

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67. Gravity and gravitational forces are related through :
- (A) Gravity force = gravitational force + Coriolis force
 - (B) Gravity force = gravitational force + centrifugal force
 - (C) Gravity force = gravitational force + vertical pressure gradient force
 - (D) Gravity force = gravitational force + viscous force
68. Horizontal wind speed generally increases with altitude above Earth's surface because :
- (A) Coriolis force and frictional force increase with height
 - (B) Gravity force is larger at the surface
 - (C) Frictional force decreases with height
 - (D) Coriolis and centrifugal forces decrease with height
69. Salinity is a major water property directly linked to the :
- (A) Atmospheric general circulation
 - (B) Tropospheric circulation
 - (C) Oceanic general circulation
 - (D) Monsoon circulation
70. Reynolds stress has :
- (A) Three components
 - (B) Nine components
 - (C) Only one component in the x -direction
 - (D) Twelve components
71. Ekman layer is characterized by :
- (A) Constant wind direction at all heights
 - (B) Constant wind speed at all heights
 - (C) Turning of wind with height
 - (D) Increase in air temperature with height

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72. A density log provides a continuous record of a formation's reaction to medium energy focused

- (A) Fast neutrons
- (B) Gamma rays
- (C) Sound waves
- (D) Electric current

73. The Devonian period has been popularly called the

- (A) Age of Reptiles
- (B) Age of Dinosaurs
- (C) Age of Fish
- (D) Age of Amphibians

74. Calc-granulite rocks of sausar super group of Central India are :

- (A) Basic volcanics deformed in granulite facies
- (B) Not true granulites but impure calcareous sediments deformed in upper-amphibolite facies to calc-gneisses
- (C) Impure calcareous sediments deformed in granulite facies
- (D) Deformed grano-diorites

75. A secondary texture consisting of irregular worm like blebs or rods of quartz in plagioclase host adjacent to alkali feldspar grain is called as :

- (A) Myremekite
- (B) Granophyric
- (C) Perthitic
- (D) Graphic

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