SUBJECT CODE	SUBJECT	PAPER
A-08-02	EARTH SCIENCES (EARTH, ATMOSPHERIC, OCEAN AND PLANETARY SCIENCE)	II

HALL TICKET NUMBER	QUESTION BOOKLET NUMBER

OMR SHEET NUMBER

DURATION	MAXIMUM MARKS	NUMBER OF PAGES	NUMBER OF QUESTIONS
1 HOUR 15 MINUTES	100	8	50

This is to certify that, the entries made in the above portion are correctly written and verified.

Candidate's Signature **Name and Signature of Invigilator**

Instructions for the Candidates

1. Write your Hall Ticket Number in the space provided on the top of this page.
2. This paper consists of fifty multiple-choice type of questions.
3. At the commencement of examination, the question booklet will be given to you. In the first 5 minutes, you are requested **to open the booklet and compulsorily examine it as below** :
   (i) To have access to the Question Booklet, tear off the paper seal on the edge of this cover page. Do not accept a booklet without sticker-seal and do not accept an open booklet.
   (ii) **Tally the number of pages and number of questions in the booklet with the information printed on the cover page. Faulty booklets due to pages/questions missing or duplicate or not in serial order or any other discrepancy should be got replaced immediately by a correct booklet from the invigilator within the period of 5 minutes. Afterwards, neither the Question Booklet will be replaced nor any extra time will be given.**
   (iii) After this verification is over, the Test Booklet Number should be entered in the OMR Sheet and the OMR Sheet Number should be entered on this Test Booklet.
4. Each item has four alternative responses marked (A), (B), (C) and (D). You have to darken the circle as indicated below on the correct response against each item.

   Example: (A) (B) ● (D)

   where (C) is the correct response.
5. Your responses to the items are to be indicated in the **OMR Answer Sheet given to you**. If you mark at any place other than in the circle in the Answer Sheet, it will not be evaluated.
6. Read instructions given inside carefully.
7. Rough Work is to be done in the end of this booklet.
8. If you write your name or put any mark on any part of the OMR Answer Sheet, except for the space allotted for the relevant entries, which may disclose your identity, you will render yourself liable to disqualification.
9. **The candidate must handover the OMR Answer Sheet to the invigilators at the end of the examination compulsorily** and must not carry it with you outside the Examination Hall. The candidate is allowed to take away the carbon copy of OMR Sheet and used Question paper booklet at the end of the 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 marks for incorrect answers.**

అభ్యర్థులకు సూచనలు

1. ఈ పుట పై భాగంలో ఇవ్వబడిన స్థలంలో మీ హాల్ టికెట్ నంబరు రాయండి.
2. ఈ ప్రశ్న పత్రము యాభై బహుళైచ్ఛిక ప్రశ్నలను కలిగి ఉంది.
3. పరీక్ష ప్రారంభమున ఈ ప్రశ్నాపత్రము మీకు ఇవ్వబడుతుంది. మొదటి ఐదు నిమిషములలో **ఈ ప్రశ్నాపత్రమును తెరిచి కింద తెలిపిన అంశాలను తప్పనిసరిగా సరిచూసుకోండి.**
   (i) ఈ ప్రశ్న పత్రమును చూడడానికి కవర్‌పేజి అంచున ఉన్న కాగితపు సీలును చించండి. స్టిక్కర్ సీలులేని మరియు ఇదివరకే తెరిచి ఉన్న ప్రశ్నాపత్రమును మీరు అంగీకరించవద్దు.
   (ii) **కవరు పేజి పై ముద్రించిన సమాచారం ప్రకారం ఈ ప్రశ్నపత్రములోని పేజీల సంఖ్యను మరియు ప్రశ్నల సంఖ్యను సరిచూసుకోండి. పేజీల సంఖ్యకు సంబంధించి గానీ లేదా సూచించిన సంఖ్యలో ప్రశ్నలు లేకపోవుట లేదా నిజప్రతి కాకపోవుట లేదా ప్రశ్నలు క్రమపద్ధతిలో లేకపోవుట లేదా ఏవైనా తేడాలుండుట వంటి దోషపూరితమైన ప్రశ్న పత్రాన్ని పెంటనే మొదటి ఐదు నిమిషాల్లో పరీక్షా పర్యవేక్షకునికి తిరిగి ఇచ్చివేసి దానికి బదులుగా సరిగ్గా ఉన్న ప్రశ్నపత్రాన్ని తీసుకోండి. తదనంతరం ప్రశ్నపత్రము మార్చబడదు అదనపు సమయం ఇవ్వబడదు.**
   (iii) పై విధంగా సరిచూసుకొన్న తర్వాత ప్రశ్నాపత్రం సంఖ్యను OMR పత్రము పై అదేవిధంగా OMR పత్రము సంఖ్యను ఈ ప్రశ్నాపత్రము పైనిర్దిష్టస్థలంలో రాయవలెను.
4. ప్రతి ప్రశ్నకు నాలుగు ప్రత్యామ్నాయ ప్రతిస్పందనలు (A), (B), (C) మరియు (D) లుగా ఇవ్వబడ్డాయి. ప్రతిప్రశ్నకు సరైన ప్రతిస్పందనను ఎన్నుకొని కింద తెలిపిన విధంగా OMR పత్రములో ప్రతి ప్రశ్నా సంఖ్యకు ఇవ్వబడిన నాలుగు వృత్తాల్లో సరైన ప్రతిస్పందనను సూచించే వృత్తాన్ని బాల్ పాయింట్ పెన్‌తో కింద తెలిపిన విధంగా పూరించాలి.

   ఉదాహరణ : (A) (B) ● (D)

   (C) సరైన ప్రతిస్పందన అయితే
5. ప్రశ్నలకు ప్రతిస్పందనలను ఈ ప్రశ్నపత్రముతో ఇవ్వబడిన OMR పత్రము పైన ఇవ్వబడిన వృత్తాల్లోనే పూరించి గుర్తించాలి. అలాకాక సమాధాన పత్రంపై వేరొక చోట గుర్తిస్తే మీ ప్రతిస్పందన మూల్యాంకనం చేయబడదు.
6. ప్రశ్న పత్రము లోపల ఇచ్చిన సూచనలను జాగ్రత్తగా చదవండి.
7. చిత్తుపనిని ప్రశ్నపత్రము చివర ఇచ్చిన ఖాళీస్థలములో చేయాలి.
8. OMR పత్రము పై నిర్ణీత స్థలంలో సూచించవలసిన వివరాలు తప్పించి ఇతర స్థలంలో మీ గుర్తింపును తెలిపే విధంగా మీ పేరు రాయడం గానీ లేదా ఇతర చిహ్నాలను పెట్టడం గానీ చేసినట్లయితే మీ అనర్హతకు మీరే బాధ్యులవుతారు.
9. **పరీక్ష పూర్తయిన తర్వాత మీ OMR పత్రాన్ని తప్పనిసరిగా పరీక్ష పర్యవేక్షకుడికి ఇవ్వాలి.** వాటిని పరీక్ష గది బయటకు తీసుకువెళ్లకూడదు. పరీక్ష పూర్తయిన తరువాత అభ్యర్థులు ప్రశ్న పత్రాన్ని, OMR పత్రం యొక్క కార్బన్ కాపీని తీసుకువెళ్లవచ్చు.
10. **నీలి/నల్ల రంగు బాల్ పాయింట్ పెన్ మాత్రమే ఉపయోగించాలి.**
11. **లాగరిథమ్ టేబుల్స్, క్యాలిక్యులేటర్‌లు, ఎలక్ట్రానిక్ పరికరాలు మొదలగునవి పరీక్షగదిలో ఉపయోగించడం నిషేధం.**
12. **తప్పు సమాధానాలకు మార్కుల తగ్గింపు లేదు.**

EARTH SCIENCE
(Earth, Atmospheric, Ocean and Planetary Science)
Paper – II

1. What is the nature of bonding in Halite Crystal ?

(A) Covalent
(B) Van der Waals
(C) Ionic
(D) Metallic

2. Match the following

List – I	List – II
1. Orthoclase	a. Mg_2SiO_4
2. Quartz	b. Al_2SiO_5
3. Kyanite	c. SiO_2
4. Forsterite	d. $KAlSi_3O_8$

	1	2	3	4
(A)	a	b	c	d
(B)	d	c	b	a
(C)	b	c	d	a
(D)	c	d	a	b

3. A biaxial mineral is optically negative, if

(A) X is acute bisectrix
(B) Z is acute bisectrix
(C) Y is acute bisectrix
(D) X is obtuse bisectrix

4. Roto-inversion axis is equal to a symmetry of

(A) Axis of symmetry
(B) Center of symmetry
(C) Plane of symmetry
(D) Screw axis

5. The indicatrix of uniaxial positive mineral is described as

(A) Prolate ellipsoid
(B) Oblate ellipsoid
(C) Sphere
(D) Triaxial ellipsoid

6. Match the following :

List-I (Grain size & colour)	List-II (Rock name)
1. Coarse grained, light colour	a. Basalt
2. Coarse grained, dark colour	b. Rhyolite
3. Fine grained, light colour	c. Granite
4. Fine grained, dark colour	d. Gabbro

	1	2	3	4
(A)	a	b	c	d
(B)	b	c	d	a
(C)	c	d	b	a
(D)	d	a	b	c

7. Myrmekite texture is an inter-growth between

(A) Orthopyroxene and Plagioclase
(B) Plagioclase and Quartz
(C) Orthoclase and Plagioclase
(D) Microcline and Plagioclase

8. What is the texture of Hornfels ?
   (A) Lepidoblastic
   (B) Nematoblastic
   (C) Decussate
   (D) Cataclastic

9. Eclogites are characterized by
   (A) Absence of feldspars
   (B) Presence of feldspars
   (C) Presence of talc
   (D) Presence of chlorite

10. The orbits of the planets around the sun are
   (A) Elliptical (B) Circular
   (C) Rectangular (D) Square

11. Which one of the following planets is similar to the earth ?
   (A) Venus (B) Neptune
   (C) Jupiter (D) Mars

12. **Assertion (A)**: Unconformities develop in a geologic formation when erosion or non-deposition interrupts the continuity of the geologic record.

   Reason (R) : The presence of an unconformity indicates that a portion of the rock record has not been removed.

   In the context of the above two statements which one is correct, as per the following code?
   (A) Both A and R are true, and R is the correct explanation for A
   (B) Both A and R are true, and R is not the correct explanation for A
   (C) A is true, but R is false
   (D) A is false, but R is true

13. Which are the Isotopes that are responsible for the rise of temperature in the earth's interior ?
   (A) Uranium, thorium and potassium isotopes
   (B) Uranium and Rubidium isotopes
   (C) Thorium, potassium and Rubidium isotopes
   (D) Rubidium isotope

14. Helium is used as the fuel for nuclear fusion, which produces
   (A) Lithium (B) Thorium
   (C) Uranium (D) Potassium

15. Kepler's third law states that _____ is same for all the planets.
   (A) T^2 / R^3 (B) T^3 / R^2
   (C) T^2 / R^2 (D) T^3 / R^3

16. Which one of the following statements of the principle of superposition is false ?
   (A) The lowest layers in an undeformed sequence are the oldest
   (B) The topmost layers in an undeformed sequence are the youngest
   (C) A rock layer which lies below another layer must be the younger of the two, if undeformed
   (D) Older rock units typically are found at the base of a sequence

17. Which one of the following is the last stage in the evolution of cyclone ?
   (A) Warm front
   (B) Cold front
   (C) Occluded front
   (D) Doldrum

18. Arrange the following cyclones in the order of their occurrence

I. Lehr
II. Hudhud
III. Nilofer
IV. Nanauk

Choose the correct answer

(A) I, III, II, IV (B) I, IV, II, III
(C) IV, II, I, III (D) II, I, IV, III

19. Match the following

Period	Duration
I. Cambrian	a. 57 million years
II. Devonian	b. 52 million years
III. Jurassic	c. 2.5 million years
IV. Quaternary	d. 54 million years

	I	II	III	IV
(A)	b	a	d	c
(B)	a	b	c	d
(C)	d	c	a	b
(D)	c	d	b	a

20. Which of the following is/are aeolian erosional landforms ?

1. Seif dune
2. Whale Back dune
3. Pedestal Rock
4. Barchan Dune

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

21. The Craton is

(A) A stable land mass
(B) Filled valley
(C) Part of rift valley
(D) Mobile belt

22. In the transportation of river sediments, where the grains will jump from place to place is called as

(A) Suspension (B) Saltation
(C) Rolling (D) Traction

23. Arkose is a variety of

(A) Limestone
(B) Sandstone
(C) Clay
(D) Conglomerate

24. In the physical weathering process, the following changes can takes place

1. Grain size
2. Grain shape
3. Grain angularity
4. Grain composition

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

25. The photoelectric effect is explained by

(A) Wein's displacement law
(B) Stephen Boltzmann's law
(C) Planck's law
(D) Newton's law

26. Spectral resolution of IRS-1D wide field sensor is

(A) 5.8 m (B) 23.5 m
(C) 188 m (D) 100 m

27. In a drainage system

(A) All runoff drains into the same stream
(B) All runoff infiltrates
(C) All water flows away from the largest channel
(D) All runoff evaporates

28. Which one of the following is not a water spreading method for groundwater recharge ?
(A) Flooding
(B) Recharge well
(C) Irrigation
(D) Stream channel

29. The general process by which rock, soil or unconsolidated material moves downhill is called _____
(A) Aeolian action
(B) Mass wasting
(C) Weathering
(D) Flooding

30. Tsunamis originate due to
(A) High tides reaching the coast
(B) Typhoons crossing the sea coast
(C) Submarine earthquakes
(D) Cyclones crossing the sea surface

31. Smog is a type of
(A) Storm
(B) Fog
(C) Precipitation
(D) Fog mixed with smoke

32. Delhi falls on which active seismic zone ?
(A) One (B) Two
(C) Three (D) Four

33. Evaporates form in
(A) Glacial environment
(B) Reducing environment
(C) Arid environment
(D) Soil weathering profiles

34. In the seawater the predominant carbon species is
(A) CO_2 (B) HCO_3^-
(C) H_2CO_3 (D) CO_3^{2-}

35. Which of the two features together control the density of seawater ?
(A) Salinity and depth
(B) Temperature and depth
(C) Salinity and plankton concentration
(D) Temperature and salinity

36. The International Indian Ocean Expedition (IIOE) was undertaken from
(A) 1959 to 1965
(B) 1965 to 1971
(C) 1953 to 1959
(D) 1971 to 1977

37. A type of standing wave that can be considered as a sum of two progressive waves travelling in opposite directions is known as
(A) Microseism
(B) Seiche
(C) Tsunami
(D) Storm surge

38. The ocean waves that break on a beach which has a moderate sloping bottom are known as
(A) Plunging breakers
(B) Surging breakers
(C) Spilling breakers
(D) Rip current breakers

39. The theory of sea-floor spreading is based on
(A) Palaeoseismic anomaly
(B) Palaeotectonic difference
(C) Palaeoelectrical anomaly
(D) Palaeomagnetic anomaly

40. The Mohorovicic discontinuity is between
(A) Core and Mantle
(B) Crust and Core
(C) Crust and Mantle
(D) Lithosphere and Asthenosphere

41. The fault in which hanging wall moves up with reference to foot wall is

(A) Normal fault
(B) Reverse fault
(C) Transform fault
(D) Wrench fault

42. The point on the land or water surface directly above the point of origin at an earthquake in the ground/underground is known as

(A) Focus
(B) Hypocenter
(C) Epicenter
(D) Apocenter

43. New crust is formed at

(A) Convergent plate boundaries
(B) Divergent plate boundaries
(C) Transform faults
(D) Conservative plate boundaries

44. The geotherms are shallower in

(A) Continental areas
(B) Arc regions
(C) Trenches
(D) Mid oceanic ridges

45. Destructive plate boundaries are marked by

(A) Crustal widening
(B) Island arcs
(C) No subduction
(D) Divergence

46. The Earth's crust is thickest at

(A) Shield areas
(B) Cratons
(C) Orogenic belts
(D) Greenstone belts

47. Match the following :

1. Fold	I. Conglomerate
2. Fault	II. Sheeting
3. Joint	III. Graben
4. Unconformity	IV. Plunge

	I	II	III	IV
(A)	4	3	2	1
(B)	4	3	1	2
(C)	4	2	3	1
(D)	1	2	3	4

48. Karst topography develops in _____ terrain.

(A) deserts
(B) limestone
(C) plain
(D) plateau

49. The earth undergoes the following major motions through space

1. The earth rotates on its axis
2. The earth moves with the galaxy as a whole in the expansion of the universe
3. The earth revolves around the Sun

Choose the correct answer

(A) 1, 2 only
(B) 1, 2, 3
(C) 2 only
(D) 3 only

50. An asymmetric thinly laminated and foliated folds showing sharp and angular anticlinal and synclinal parts are called

(A) Chevron folds
(B) Similar folds
(C) Convolute folds
(D) Recumbent folds

Space for Rough Work