

Roll No.

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(Write Roll Number from left side exactly as in the Admit Card)

Signature of Invigilators

1. \_\_\_\_\_
2. \_\_\_\_\_

**2717**

Question Booklet Series

**X**

PAPER–III

Question Booklet No.

(Identical with OMR Answer Sheet Number)

Subject Code : 27

## EARTH ATMOSPHERIC OCEAN & PLANETARY SCIENCES

Time : 2 Hours 30 Minutes

Maximum Marks: 150

### Instructions for the Candidates

1. Write your Roll Number in the space provided on the top of this page as well as on the OMR Sheet provided.
2. At the commencement of the examination, the question booklet will be given to you. In the first 5 minutes, you are requested to open the booklet and verify it:
  - (i) To have access to the Question Booklet, tear off the paper seal on the edge of this cover page.
  - (ii) Faulty booklet, if detected, should be get 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) Verify whether the Question Booklet No. is identical with OMR Answer Sheet No.; if not, the full set to be replaced.
  - (iv) After this verification is over, the Question Booklet Series and Question Booklet Number should be entered on the OMR Sheet.
3. This paper consists of seventy-five (75) multiple-choice type questions. All the questions are compulsory. Each question carries *two* marks.
4. Each Question has four alternative responses marked: (A) (B) (C) (D). You have to darken the circle as indicated below on the correct response against each question.

Example: (A) (B) (●) (D), where (C) is the correct response.
5. Your responses to the questions are to be indicated correctly in the OMR Sheet. If you mark your response at any place other than in the circle in the OMR Sheet, it will not be evaluated.
6. Rough work is to be done at the end of this booklet.
7. If you write your Name, Roll Number, Phone Number or put any mark on any part of the OMR Sheet, except the space allotted for the relevant entries, which may disclose your identity, or use abusive language or employ any other unfair means, such as change of response by scratching or using white fluid, you will render yourself liable to disqualification.
8. Do not tamper or fold the OMR Sheet in any way. If you do so, your OMR Sheet will not be evaluated.
9. You have to return the 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 question booklet and duplicate copy of OMR Sheet after completion of examination.
10. Use only Black Ball point pen.
11. Use of any calculator or mobile phone etc. is strictly prohibited.
12. There are no negative marks for incorrect answers.

[Please Turn Over]



## EARTH ATMOSPHERIC OCEAN &amp; PLANETARY SCIENCES

## PAPER III

1. Which of the following wavelength ranges does not correspond to an atmospheric window?
  - (A) 300 — 2500 nm
  - (B) 3000 — 5000 nm
  - (C) 5000 — 7000 nm
  - (D) 8000 — 14000 nm
2. The high-pressure polymorph of quartz is
  - (A)  $\beta$ -quartz
  - (B) Cristobalite
  - (C) Tridymite
  - (D) Coesite
3. Which one of the following is not a common fault plane feature?
  - (A) Mylonite
  - (B) Silickensides
  - (C) Roche moutonnee
  - (D) Drag
4. Which of the following genus of phylum Brachiopoda is characterised by large and circular pedicle opening?
  - (A) Productus
  - (B) Terebratula
  - (C) Syringothyris
  - (D) Atrypa
5. In Himalayan mountain belt, rocks are deformed. Most common deformational structures observed in this regions are
  - (A) folds and reverse faults
  - (B) normal faults and tensional fractures
  - (C) bending folds and strike slip faults
  - (D) vertical fractures and extensional folds
6. Following mineral forms by ex-solution and sub-solvus cooling:
  - (A) Quartz
  - (B) Perthite
  - (C) Microcline
  - (D) Plagioclare
7. Fossil insects and spiders are often encased in
  - (A) Ambar
  - (B) Asphalt
  - (C) Ice
  - (D) Carbonaceous shale
8. Material leached from upper horizons of Residual Soil is either removed by the groundwater or it is accumulated at the base of
  - (A) A-horizon
  - (B) B-horizon
  - (C) C-horizon
  - (D) R-horizon
9. In considering the strain ellipsoid, shear features are most likely to occur at angles of about
  - (A)  $30^\circ$  to the axis of greatest strain.
  - (B)  $60^\circ$  to the axis of greatest stress.
  - (C)  $30^\circ$  to the axis of least stress.
  - (D)  $30^\circ$  to the axis of least strain.
10. \_\_\_\_\_ is a common product of the chemical weathering of feldspar.
  - (A) Dolomite
  - (B) Kaolinite
  - (C) Kyanite
  - (D) Monticellite

11. Coprolites are  
(A) Pseudofossils  
(B) Fossil foot impressions  
(C) Fossil fecal pellets  
(D) Trace fossils
12. Plastic deformation refers to  
(A) rocks that are subjected to stress within the bounds of Hooke's law.  
(B) stresses in non-solids such as glass, plastic, rubber, etc.  
(C) the deformation of rocks that have exceeded their elastic limit.  
(D) the results mainly of tensile stress.
13. Nepheline is an example of  
(A) Tectosilicate  
(B) Nesosilicate  
(C) Inosilicate  
(D) Sorosilicate
14. Where do you find rocks of ferromagnetic character in the Earth?  
(A) Inner core  
(B) Outer core  
(C) Lower mantle  
(D) Crust
15. In Diopside-Anorthite system (at 1 atm. dry condition) the number of phases that are present at the eutectic point is  
(A) zero  
(B) three  
(C) two  
(D) one
16. The main absorbent of thermal infrared energy in the atmosphere is the \_\_\_\_\_ .  
(A) Oxygen  
(B) Carbon dioxide  
(C) Nitrogen  
(D) Sulfur dioxide
17. Pebbles in a deformed conglomerate have ellipsoidal shape with varying axial ratios. The pebbles in the undeformed conglomerate were  
(A) ellipsoidal as well as spherical  
(B) spherical only  
(C) ellipsoidal only  
(D) circular and flat
18. Burrows are  
(A) Open borings  
(B) Excavations filled with sediments  
(C) Horizontal borings  
(D) Foot impressions
19. A large granitic pluton appears undeformed. Its related dykes and sills are not folded. There is no secondary foliation or granulation of its rocks. The intrusion is most likely  
(A) Pre-tectonic  
(B) Syntectonic  
(C) Post-tectonic  
(D) in a region devoid of tectonism
20. Lopolith refers to  
(A) concordant igneous emplacement which is shallow and centrally sunken.  
(B) discordant igneous emplacement cutting across adjacent strata at 90°.  
(C) concordant igneous intrusion, controlled by fold-geometry.  
(D) discordant igneous intrusion which cuts adjacent strata at an angle of 40°-45°.

21. Which of the following best explains the origin of sink holes?

- (A) The conversion by groundwater of the bicarbonate ion to calcite and water.
- (B) The conversion by groundwater of calcite to bicarbonate with subsequent collapse of overburden.
- (C) Karst topography.
- (D) Deflation pits due to wind in arid regions.

22. \_\_\_\_\_ are suitable across a river valley having alternating strong and soft rocks.

- (A) Earth fill dams
- (B) Rock fill dams
- (C) Arch dams
- (D) Buttress dams

23. Petrification refers to

- (A) conversion of sediments into rocks.
- (B) conversion of badly made glasses into rocks.
- (C) conversion of organic remains into rocks.
- (D) Impressions of leaves marked on solid rocks.

24. Which of the following is found to be preserved in Upper Gondwana rocks?

- (A) Glossopteris
- (B) Gangamopteris
- (C) Noeggerathiopsis
- (D) Ptilophyllum

25. The refractive index of a liquid varies

- (A) inversely with its density.
- (B) directly with its density.
- (C) directly with the square root of its density.
- (D) inversely with the square root of its density.

26. Which of the following geomorphic index is a vector quantity?

- (A) Mountain front sinuosity index
- (B) Stream-gradient index
- (C) Transverse topography asymmetry factor
- (D) Drainage basin symmetry factor

27. Out of the following silicate systems, which one would involve a reaction point?

- (A) Albite-Anorthite system
- (B) Forsterite-silica system
- (C) Diopside-Albite-Anorthite system
- (D) Diopside-Anorthite system

28. Which of the following tectonic settings is likely to yield detrital zircons with the least difference between their crystallization age and depositional age?

- (A) Subduction zone
- (B) Continental rift
- (C) Transform fault
- (D) Passive margin

29. The silicate structure that involves sharing of one oxygen atom by two adjacent tetrahedra is known as

- (A) Tectosilicate
- (B) Phyllosilicate
- (C) Inosilicate
- (D) Sorosilicate

30. The effect of Rayleigh scattering increases inversely with the wavelength ( $\lambda$ ) of the incident electromagnetic radiation as per the expression

- (A) Rayleigh scattering  $\propto \frac{1}{\lambda}$
- (B) Rayleigh scattering  $\propto \frac{1}{\lambda^2}$
- (C) Rayleigh scattering  $\propto \frac{1}{\lambda^3}$
- (D) Rayleigh scattering  $\propto \frac{1}{\lambda^4}$

31. Which of the following is characterised by Pseudo-mid rib?
- Glossopteris
  - Gangamopteris
  - Schizoneura
  - Dadoxylon
32. A fault that brings ultrabasic igneous rocks into direct contact with typical shales should be recorded as
- a negative gravitational anomaly.
  - a positive gravitational anomaly.
  - negative or positive anomaly depending upon whether one uses the torsion balance or the pendulum method.
  - a zero gravitational anomaly because the specific gravity of the two rock types is similar.
33. A quartzite terrain gives \_\_\_\_\_ thermal infrared remote sensing images.
- cold signature in day-time and warm signature in night-time
  - warm signature in day-time and cold signature in night-time
  - cold signatures in both day and night-time
  - warm signatures in both day and night-time
34. Nematoblastic texture refers to
- a mosaic of equidimensional anhedral grains in metamorphic rocks.
  - a mylonitic fabric.
  - a mosaic of broken, irregular grains in metamorphic rocks.
  - abundance of acicular or columnar grains displaying a preferred dimensional orientation in metamorphic rocks.
35. Coarsening upward sequence is a characteristic of
- Deltaic deposit
  - Aeolian deposit
  - Channel deposit
  - Point bar
36. The entire skeleton of a coral is described as
- Polyps
  - Theca
  - Corallum
  - Corallite
37. Near convergent boundary, which type of faults are most common?
- Reverse and strike slip
  - Reverse and normal
  - Only strike slip
  - Strike slip and oblique slip
38. The tectonic control for Gondwana deposit of India can be best described
- as related to subduction zone
  - as regionally extending doubly plunging fold
  - as graben
  - as Island arc
39. The Precambrian-Cambrian boundary in the Lesser Himalaya is marked by the boundary between \_\_\_\_\_ Formations/lithostratigraphic units.
- Nagthat and Blaini
  - Blaini and Infrakrol
  - Infrakrol and Krol
  - Krol and Tal
40. The deepest mixed layer of salinity is found at the
- Equator
  - Subtropical gyres
  - North Indian Ocean
  - Northern North Atlantic

41. Sinistral coiling is seen in  
 (A) Turritella  
 (B) Nautica  
 (C) Murex  
 (D) Physa
42. An aquitard is a rock formation which is  
 (A) Porous and essentially permeable.  
 (B) Porous and not necessarily permeable.  
 (C) Highly porous and impermeable.  
 (D) Non porous and impermeable.
43. The characteristic properties of a continental tropical airmass are  
 (A) warm, moist, unstable  
 (B) hot, dry, unstable  
 (C) cool, moist, unstable  
 (D) cold, dry, stable
44. In Cephalopods the part at the suture line which is convex towards the mouth is known as  
 (A) Saddle  
 (B) Lobe  
 (C) Cepta  
 (D) Siphuncle
45. In sun-synchronous orbit, all points at a given latitude will have  
 (A) the same local mean solar time.  
 (B) the different local mean solar time.  
 (C) the different heights.  
 (D) the same local mean temperature.
46. The sediments of the Siwalik Group were deposited in a \_\_\_\_\_.  
 (A) continental shelf  
 (B) continental slope  
 (C) rift basin  
 (D) foreland basin
47. For the river Ganga, pick up the best answer from the following statements:  
 (A) Solution load is low while suspended and bed loads are very high.  
 (B) Solution load, suspended load and bed loads all are low.  
 (C) Solution load, suspended load and bed loads all are very high.  
 (D) Bed loads and suspended loads are low but solution load is high.
48. Bright band coal is divided into  
 (A) Vitrain and Fusain  
 (B) Vitrain and Durain  
 (C) Vitrain and Clarain  
 (D) Durain and Clarain
49. A clear waterbody shows \_\_\_\_\_ tone in a greyscale near Infrared remote sensing imagery.  
 (A) white  
 (B) light grey  
 (C) dark grey  
 (D) black
50. In some metamorphic rocks, a student has identified them to be feldspar-free assemblages marked by jadeitic clinopyroxene and pyrope garnet. The corresponding metamorphic facies may be designated as  
 (A) Zeolite facies  
 (B) Eclogite facies  
 (C) Granulite facies  
 (D) Blue schist facies

- 51.** The World's largest Mn nodule deposit is located in
- (A) Peru basin
  - (B) Penrhyn basin
  - (C) Clarion Clipperton zone in Pacific
  - (D) Central Indian Ocean
- 52.** In which of the following sedimentary environment very thick cross-beddings are formed?
- (A) Alluvial
  - (B) Eolian
  - (C) Lacustrine
  - (D) Marine
- 53.** Shear strain is measured by changes in
- (A) Angle
  - (B) Viscosity
  - (C) Length
  - (D) Volume
- 54.** In Singhbhum craton, the following marks the volcano-sedimentary association:
- (A) Chaibasa Formation
  - (B) Older Metamorphic Group (OMG)
  - (C) Dhanjori Group
  - (D) Kolhan Group
- 55.** During the process of evaporation, ocean experiences
- (A) sensible heat gain
  - (B) sensible heat loss
  - (C) latent heat gain
  - (D) latent heat loss
- 56.** The successive whorls of gastropod shell lie in mutual contact along the line known as
- (A) Septa
  - (B) Spire
  - (C) Suture
  - (D) Umbilicus
- 57.** Which of the following is the slowest type of mass-movements?
- (A) Rock fall
  - (B) Slide
  - (C) Slump
  - (D) Creep
- 58.** Identify the correct sequence of the electromagnetic waves in their increasing frequency.
- (A) Radiowave, Microwave, Infrared, Visible, Ultraviolet, X-ray
  - (B) Radiowave, Infrared, Microwave, Visible, Ultraviolet, X-ray
  - (C) Microwave, Radiowave, Infrared, Visible, X-ray, Ultraviolet
  - (D) Infrared, Visible, Microwave, Radiowave, X-ray, Ultraviolet
- 59.** During magmatic crystallization, when the magma is charged with enough volatiles, the crystallization of phases from the magma will
- (A) be a very fast one
  - (B) not be possible
  - (C) be fast if the crystallization takes place at island arc setting
  - (D) be prolonged
- 60.** In which of the following rocks could the pyrite be found?
- (A) Chlorite schist
  - (B) Graphite schist
  - (C) Garnet mica schist
  - (D) Quartz biotite schist



61. The Mansar formation belongs to  
(A) Amgaon Group  
(B) Chilpi Group  
(C) Sakoli Group  
(D) Sausar Group
62. What is the correct sequence in decreasing order of magnetic susceptibility?  
(A) Magnetite-Hematite-Sphalerite-Pyrrhotite  
(B) Magnetite-Hematite-Pyrrhotite-Sphalerite  
(C) Magnetite-Pyrrhotite-Hematite-Sphalerite  
(D) Pyrrhotite-Magnetite-Sphalerite-Hematite
63. The genus of class Pelecypoda in which the body whorl covers the entire spire is  
(A) Conus  
(B) Cyprea  
(C) Physa  
(D) Trochus
64. Defect solid solution is exemplified by the following:  
(A) Plagioclase  
(B) Galena  
(C) Pyrite  
(D) Pyrrhotite
65. Which among the following serves as a good archive of palaeoclimate?  
(A) Tidal flat sediments  
(B) Fluvial sediments  
(C) Aeolian sediments  
(D) Lacustrine sediments
66. Sovite is an example of  
(A) Carbonatite  
(B) Granite  
(C) Basalt  
(D) Gabbro
67. Placer deposits are formed as a result of  
(A) Residual concentration process  
(B) Mechanical concentration process  
(C) Magmatic concentration process  
(D) Metamorphic process
68. When wind blows spirally outward clockwise, it is known as  
(A) Cyclone  
(B) Thunder storm  
(C) Anticyclone  
(D) Tornadoes
69. The quartz percentage of orthoquartzite is  
(A) > 95%  
(B) 85 – 94%  
(C) 75 – 84%  
(D) < 75%
70. In simplest words, planolites are \_\_\_\_\_.  
(A) mineral lineations  
(B) closely spaced foliations  
(C) trace fossils  
(D) small-sized ammonites
71. Symmetric ripples are produced by  
(A) wave action  
(B) current action  
(C) suspension  
(D) saltation

72. In which type of formation, the capillary rise will be high?

- (A) Gravel
- (B) Medium sand
- (C) Loam
- (D) Clay

73. The term 'Semri' is associated with

- (A) Singhbhum Group
- (B) Sausar Group
- (C) Vindhyan Super Group
- (D) Cuddapah Super Group

74. In hydrothermal process of formation of ore deposits which type would be formed nearest to the source of hydrothermal solution?

- (A) Mesothermal
- (B) Telethermal
- (C) Hypothermal
- (D) Epithermal

75. Interference colour of minerals depend upon

- (A) birefringence, thickness and orientation of the mineral section
  - (B) birefringence and thickness
  - (C) birefringence only
  - (D) thickness and orientation of the mineral section
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**X-11**

**2717-III**

**ROUGH WORK**

*2717-III*

**X-12**

**ROUGH WORK**