F-2

ENTRANCE EXAMINATIONS – 2026

Ph.D. Earth, Ocean and Atmospheric Sciences

Duration: Two hours Max. Marks: 70

Hall Ticket No.

Instructions:

1. All questions carry equal marks.
2. There is no negative marking.
3. Write your Hall Ticket Number in the OMR Answer Sheet given to you. Also write the Hall Ticket Number in the space provided above.
4. The questions are fully objective and the answers are to be marked on the OMR answer sheet following the instructions provided there upon.
5. At the end of the examination, hand over the OMR answer sheet to the invigilator.
6. No additional sheets will be provided. Rough work can be done in the question paper itself / space provided at the end of the booklet.

PART-A

1. Find the next number in the series: 2, 6, 12, 20, 30, ?
   A. 36
   B. 40
   C. 42
   D. 48

2. If CAT = DBU, then DOG = ?
   A. DPH
   B. EPH
   C. FQI
   D. EOH

3. How many times do the hands of a clock overlap in a day?
   A. 20
   B. 22
   C. 24
   D. 12

4. If droughts have increased in a station in the last three decades, one of the following to the distribution of the rainfall WOULD NOT apply

   A. The right-side tail will be longer
   B. The distribution would be positively skewed.
   C. The mean would be less than median.
   D. Kurtosis would not necessarily change.

5. The mean, median, and mode are the same for a
   A. normal distribution
   B. binomial distribution
   C. Gamma distribution
   D. platykurtic distribution

6. Which of the following variables is most likely to exhibit a strongly leptokurtic distribution?
   A. Earthquake magnitudes in a seismically active region
   B. Standardised (anomaly) daily solar radiation
   C. Daily metro commuter counts on a typical weekday
   D. Standardised annual mean temperature anomalies

7. Which of the following situations requires the use of permutations?
   A. Selecting 3 balls from a bag of 10
   B. Selecting a chairman followed by a secretary from a group of members
   C. Selecting 20 candidates from a pool of applicants
   D. Choosing a committee of 5 members

8. Which of the following variables is most appropriately modeled using a Gumbel distribution?
   A. Daily number of airline passengers
   B. Seasonal mean temperature
   C. Annual maximum river discharge
   D. Annual number of reported disease cases

9. Ravi walks 10 m north, turns right, and walks 5 m, then turns right again and walks 10 m. Which direction is he facing now?
   A. North
   B. East
   C. South
   D. West

10. Complete the series: A, C, F, J, O, ?
   A. S
   B. T
   C. U
   D. V

11. Which statistical test is used to determine if there is a significant difference between the means of three or more groups in quantitative research?
   A. t-test
   B. Analysis of Variance
   C. Chi-square test
   D. Regression analysis

12. In statistics, Non-linear correlation is also called
   A. Non-curvilinear correlation
   B. Curvilinear correlation
   C. Zero correlation
   D. Circular correlation

13. The present age of a woman is 3 years more than three times the age of her daughter. Three years hence, the woman's age will be 10 years more than twice the age of her daughter. Find the present age of the woman.
    A. 30 years
    B. 33 years
    C. 36 years
    D. 39 years

14. In a dataset, the mean is greater than the median. The skewness is
    A. Negative Skewness
    B. No Skewness
    C. Positive Skewness
    D. Cannot be determined

15. Two numbers have a product of 120, and their greatest common divisor (HCF) is 6. Find their least common multiple (LCM)
    A. 20
    B. 30
    C. 50
    D. 60

16. In a school quiz competition, the scores of quiz participants were: 5, 7, 9, 11, and 13. The standard deviation is
    A. 3.16
    B. 2.58
    C. 2.82
    D. 3.45

17. Six years ago, the ratio of the ages of Ram and Ravi was 6:5. Four years hence, the ratio of their ages will be 11:10. Ravi's age at present is
    A. 16 years
    B. 18 years
    C. 20 years
    D. 22 years

18. If two variables change in the same direction (both increase together), the correlation is
    A. Negative correlation
    B. Zero correlation
    C. Positive correlation
    D. inverse correlation

19. The 'mode' is defined as
    A. The middle value after sorting data
    B. The average of all values
    C. The value that occurs most frequently in a data set
    D. The difference between the highest and lowest values

20. Which of the following is 'qualitative data'?
    A. Height of students in cm
    B. Customer feedback comments
    C. Monthly income in rupees
    D. Number of visitors per day

21. Which measure of central tendency is most affected by extreme values (outliers)?
    A. Median
    B. Mode
    C. Mean
    D. Standard deviation

22. A questionnaire used to collect data from a large group of people is an example of
    A. Observation checklist
    B. Experiment
    C. Survey
    D. Case study

23. In a fair coin toss, if the first 5 flips are all "heads," what is the probability that the 6th flip will be "tail"?
    A. 0.5
    B. 1.0
    C. 0.1
    D. 0.9

24. In an ensemble prediction system, each ensemble member differs from other members because of
    A. Different programming languages
    B. Different output formats
    C. Different operating systems
    D. Different initial conditions and/or model physics

25. Find the next number in the series 3, 7, 15, 31, 63, ___
    A. 95
    B. 111
    C. 127
    D. 135

26. In a class of 60 students, 35 study Physics, 30 study Chemistry, and 10 study both. How many students study neither Physics nor Chemistry?
    A. 5
    B. 10
    C. 15
    D. 20

27. If 'EARTH' is coded as FBSUI, then 'GEOLOGY' is coded as
    A. HFPMPHZ
    B. HFNMPHZ
    C. HFPMPGY
    D. HFOLOHZ

28. Five researchers P, Q, R, S, and T are sitting in a row.
    - P is to the immediate left of Q.
    - R is to the right of Q.
    - S is at the extreme left.

    Who is sitting in the middle, with the other two on each side?
    A. P
    B. Q
    C. R
    D. T

29. Find the next number in the series 2, 6, 12, 20, 30, ?
    A. 36
    B. 40
    C. 42
    D. 44

30. In a Venn diagram representing shapes, circle A represents triangles and circle B represents squares. The overlapping region represents shapes that are both triangles and squares. Which region represents shapes that are only squares?
    A. The overlapping region of A and B
    B. The part of circle A outside the intersection
    C. The part of circle B outside the intersection
    D. The area outside both circles

31. In a certain code language, 'VAJR' is coded as '102' and 'DOTG' is coded as '92'. What is the code for 'ZELW' in the given code language?
    A.138
    B.132
    C.124
    D.121

32. Select the option that is related to the third term in the same way as the second term is related to the first term IVORY: ZWSPJ:: CREAM : ?
    A. NFDQB
    B. SNFDB
    C. NSFCN
    D. BQDZL

33. A man is facing West. He turns 45°clockwise, then another 180°in the same direction, and finally 270°anticlockwise. Which direction is he facing now?
    A. North-West
    B. South-East
    C. North-East
    D. South-West

34. In how many ways can the letters of the word **MISSISSIPPI** be arranged?
    A. 11!
    B. 17325
    C. 69300
    D. 34650

35. A hemispherical bowl of internal radius 9 cm is completely filled with a liquid. The liquid is poured into small cylindrical bottles, each having a diameter of 3 cm and a height of 4 cm. How many such bottles are required to empty the bowl?
    A. 36
    B. 48
    C. 54
    D. 72

PART-B

36. After its onset, the Indian summer monsoon is predominantly sustained by
    A. Monsoon disturbances
    B. MJO
    C. La Niña
    D. the meridional gradient of the deep tropospheric temperature

37. One of the following about the moist adiabatic lapse rate is FALSE.
    A. A saturated air parcel cools more slowly than a dry parcel as it rises.
    B. The moisture adiabatic lapse rate is lowest in warm, moisture-rich air.
    C. The moisture adiabatic lapse rate is highest in warm, moisture-rich air.
    D. It is highest at low temperatures and low moisture content.

38. The Indian Ocean Dipole is seasonally phase-locked to
    A. boreal summer through following fall.
    B. boreal spring to the ensuing summer
    C. boreal spring through following summer, fall, and winter seasons
    D. boreal winter and following spring.

39. Solar insolation refers to
    A. Heat emitted by Earth
    B. Incoming solar radiation received by Earth
    C. Radiation from stars
    D. Reflected radiation from clouds

40. Which factor most strongly affects insolation at a location?
    A. Ocean salinity
    B. Latitude
    C. Soil type
    D. Earthquake activity

41. Which process increases Earth's albedo?
    A. Forest growth
    B. Snow cover
    C. Ocean warming
    D. Urbanization

42. Which of the following is an active remote sensing instrument?
    A. Camera
    B. Radiometer
    C. Radar
    D. Spectrometer

43. The region of strongest chlorophyll absorption is in the
    A. Green wavelength
    B. Red and blue wavelengths
    C. Microwave region
    D. Infrared only

44. Which of the following IS NOT relevant for manifestation of thermal wind?
    A. Coriolis force
    B. Centrifugal force
    C. Pressure gradient
    D. Meridional temperature gradient

45. Which of the following is dynamically consistent with gradient wind balance in the real atmosphere?
    A. anomalous cyclonic flow around a high.
    B. cyclonic flow around a low.
    C. anomalous anticyclonic flow around a low
    D. translational motion

46. Which statement best distinguishes the Köppen and Thornthwaite climate classifications?
    A. Köppen is based on potential evapotranspiration, whereas Thornthwaite is based on vegetation.
    B. Köppen is empirical, whereas Thornthwaite does not use temperature.
    C. Köppen uses temperature and precipitation thresholds, whereas Thornthwaite uses a moisture index based on potential evapotranspiration.
    D. Thornthwaite uses only precipitation, whereas Köppen uses only temperature.

47 Identify the one that is associated with the tropics.
    A. Low rainfall-low temperature combination
    B. Dominant baroclinic instability
    C. Frontal cyclones
    D. thermally direct overturning circulation

48. The following are characteristic responses of the climate system to increased greenhouse gas concentrations, EXCEPT
    A. Stratospheric warming
    B. Increasing extreme rainfall events in many regions of the world
    C. Increased frequency of heat waves
    D. Positive water vapour feedback

49. The Coriolis force arises due to
    A. Earth's gravity
    B. Earth's rotation
    C. Solar heating
    D. Frictional force

50. Rossby waves are caused primarily by
    A. Ocean tides
    B. Earth's rotation and latitudinal variation of Coriolis force
    C. Solar flares
    D. Volcanic eruptions

51. Noctilucent clouds are observed mainly in the
    A. Troposphere
    B. Stratosphere
    C. Mesosphere
    D. Thermosphere

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52. The ionosphere is formed mainly due to
    A. Rainfall
    B. Solar ultraviolet and X-ray radiation
    C. Ocean evaporation
    D. Earthquakes

53. During geomagnetic storms, ionospheric disturbances are mainly caused by
    A. Lunar gravity
    B. Solar wind interactions
    C. Rainfall variability
    D. Ocean tides

54. Which of the following statements about the Rossby number in the tropics is most accurate?
    A. It is always much less than 1, indicating dominant geostrophic balance.
    B. It is typically of order unity or larger, reflecting a reduced influence of the Coriolis force.
    C. It is always greater than 10, indicating negligible pressure gradient forces.
    D. It is independent of latitude.

55. One of the following which IS NOT a primary theoretical framework for ENSO is
    A. CISK theory
    B. Bjerknes hypothesis
    C. Delayed oscillation theory.
    D. Recharge-Discharge oscillation theory

56. Which statement best distinguishes geostationary and polar-orbiting meteorological satellites?
    A. Geostationary satellites provide global coverage.
    B. Polar satellites are fixed over the equator.
    C. Geostationary satellites are fixed over one longitude; polar satellites provide near-global coverage.
    D. Both provide identical temporal coverage.

57. The layer in a water body where the vertical density gradient is maximum is called
    A. Pycnocline
    B. Thermocline
    C. Halocline
    D. Oxycline

58. Which of the following about equatorial eastern pacific is FALSE?
    A. region of shallow thermocline
    B. suppressed convection region
    C. SST consistently above 27 °C
    D. Climatological upwelling zone.

59. Which one of the following about western boundary currents is FALSE?
    A. They are a response to the meridional gradient of Coriolis force.
    B. They in general move from tropics to mid-latitude regions.
    C. They are essentially driven by thermohaline forcing.
    D. Ekman pumping plays a role in their manifestation.

60. Dryness experienced during winters in coastal subtropical and mid-latitude regions is primarily due to
    A. Latitude
    B. Relatively shorter day length.
    C. Lack of water resources.
    D. Low saturation vapour pressure

61. In paleoclimate reconstruction, the oxygen isotope composition ($\delta^{18}O$) of planktonic foraminifera primarily reflects which combination of variables?
    A. Atmospheric CO_2 concentration and marine productivity
    B. Sea-surface temperature and isotopic composition of seawater
    C. Ocean salinity and carbonate compensation depth only
    D. Continental weathering rate and Mg/Ca ratio

62. Which paleoclimate archive is most directly used to reconstruct past atmospheric CO_2 concentrations over glacial–interglacial timescales?
    A. Polar ice cores
    B. Tree rings
    C. Fossils
    D. Sediments

63. A negative excursion in carbon isotope values ($\delta^{13}C$) across the Paleocene–Eocene Thermal Maximum (PETM) is generally interpreted as evidence for
    A. Enhanced burial of organic carbon in deep marine basins
    B. Sudden injection of isotopically light carbon into the ocean–atmosphere system
    C. Increased carbonate productivity in shallow tropical seas
    D. Intensified glaciation causing preferential sequestration of $\delta^{12}C$

64. In petroleum geochemistry, biomarker maturity parameters such as sterane isomerization and hopane epimerization are particularly valuable because they
    A. Directly quantify porosity evolution during burial
    B. Remain unaffected by thermal maturation and biodegradation
    C. Record progressive thermal alteration of organic matter with burial history
    D. Measure hydrocarbon migration velocity through carrier beds

65. Which depositional environment is most favorable for the development of highly organic-rich marine petroleum source rocks?
    A. High-energy shallow carbonate shoals with intense oxidation
    B. Deep anoxic restricted basins with high preservation of organic matter
    C. Braided fluvial systems dominated by coarse clastics
    D. Glacial outwash plains with rapid sediment reworking

66. Vitrinite reflectance (R_o) is extensively used in source rock evaluation because it primarily provides information regarding
    A. Original depositional salinity of sediments
    B. Kerogen type and hydrocarbon composition only
    C. Thermal maturity and burial heating history of organic matter
    D. Timing of structural trap formation

F:2

67. Which type of magma series is restricted to subduction zone settings?
    A. Tholeiitic
    B. Alkaline
    C. Calc-alkaline
    D. Sub-alkaline

68. According to the phase rule in metamorphic systems, the relationship between ϕ and C in a mineral system that exhibits solid solution is
    A. $\phi = C$
    B. $\phi < C$
    C. $\phi > C$
    D. None of the above

69. When rocks fail under compression in experimental conditions, it is found that, in general, two sets of planar shear fractures are formed, which intersect in a line parallel to the
    A. Intermediate principal stress axis σ_2
    B. Maximum principal stress axis σ_1
    C. Minimum principal stress axis σ_3
    D. Planes of maximum shear stress

70. The use of factor analysis and principal component analysis (PCA) in regional geochemical exploration is mainly intended to
    A. Eliminate all analytical errors from geochemical data sets.
    B. Distinguish meaningful multielement associations related to mineralization from background variability.
    C. Convert geochemical concentrations directly into ore reserve estimates
    D. Determine absolute ages of hydrothermal alteration zones

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University of Hyderabad

ENTRANCE EXAMINATION – 2026

Ph.D. Admissions - July Session

School/Department/Centre: CEOAS, School of Physics

Course: Ph.D. Subject: Earth Sciences

Q. No.	Answer	Q. No.	Answer	Q. No.	Answer
1	C	26	A	51	C
2	B	27	A	52	B
3	B	28	B	53	B
4	C	29	C	54	B
5	A	30	C	55	A
6	A	31	B	56	C
7	B	32	A	57	A
8	C	33	D	58	C
9	C	34	D	59	C
10	C	35	C	60	D
11	B	36	D	61	B
12	B	37	C	62	A
13	B	38	A	63	B
14	C	39	B	64	C
15	A	40	B	65	B
16	C	41	B	66	C
17	A	42	C	67	C
18	C	43	B	68	B
19	C	44	B	69	A
20	B	45	B	70	B
21	C	46	C		
22	C	47	D		
23	A	48	A		
24	D	49	B		
25	C	50	B		

Note/Remarks :

Date: 09.06.2026

Signature

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