

ENTRANCE EXAMINATIONS – 2020
(Ph.D. Admissions - January 2021 Session)

Ph.D. Earth, Ocean and Atmospheric Sciences

Hall Ticket No.

Time : 2 hours

Max. Marks : 70

INSTRUCTIONS

1. Write your Hall Ticket Number in the OMR Answer Sheet given to you. Also write the Hall Ticket Number in the space provided above on the question paper booklet.
2. All questions carry equal marks.
3. There is no negative marking.
4. Answers are to be marked on the **OMR answer sheet** following the instructions provided there upon.
5. Hand over the OMR answer sheet at the end of the examination 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.
7. Non-programmable calculators are allowed.

PART-A

1. In a _____ observation, researcher stands apart and does not participate
 - A. Structural
 - B. Unstructured
 - C. Non Participant
 - D. Participant
2. The Report submitted when there is a time lag between data collection and presentation of result during a research is called
 - A. Thesis
 - B. Interim Report
 - C. Summary Report
 - D. Article
3. The concrete observable events which represent the abstract concepts or constructs are called
 - A. Data
 - B. Sample
 - C. Variable
 - D. Proposition
4. The first step in formulating a problem is
 - A. Statement of the problem
 - B. Gathering of Data
 - C. Measurement
 - D. Survey

5. A good researcher lays his hands on
- Any area, as long as manpower and funding are available in plenty
 - A specific area and tries to understand it in minute details
 - Several areas and tries to understand them at fundamental level
 - All the above
6. What is a research design?
- A way of conducting research that is not grounded in theory.
 - The choice between using qualitative or quantitative methods.
 - A framework for every stage of the collection and analysis of data.
 - A style in which you present your research findings such as a graph.
7. A girl leaves from her home. She first walks 30 metres in North-West direction and then 30 metres in South-West direction. Next, she walks 30 metres in South-East direction. Finally, she turns towards her house. In which direction is she moving?
- North-East
 - North-West
 - South-East
 - South-West
8. If the dots in a scatter diagram fall on a narrow band, it indicates a ____ degree of correlation.
- Zero
 - High
 - Low
 - None of these
9. The _____ is the standard deviation of a sampling distribution.
- distribution of the sample
 - Standard error
 - Sample standard deviation
 - Experimental error
10. Out of the four numbers, the average of the first three numbers is thrice the fourth number. If the average of the four numbers is 5, the fourth number is
- 4.5
 - 5
 - 2
 - 4
11. Which of the following can be a source of primary data in research?
- Survey and Experiment
 - Experiment
 - Survey
 - Survey and Reference
12. Which of the following is best suited for "Action Research"?
- It is a quantity research
 - It is a survey research
 - It is a population research
 - It is an applied research
13. What can be said about a set of data when its standard deviation is small?
- The data are far apart.
 - All of the data have the same value.
 - The mean of the data can never be zero.
 - The data are close together.

14. In a set of data, if all of the data appear with the same frequency, then,
- A. The standard deviation is always 0.
 - B. The mean is always larger than the standard deviation.
 - C. All of the data have the same value.
 - D. The boxplot does not always look symmetrical.
15. Truth, belief and justification related to knowledge in research is termed:
- A. Metaphysics
 - B. Epistemology
 - C. Logic
 - D. Aesthetics
16. A standard normal distribution has
- A. the mean equal to the variance
 - B. mean equal 1 and variance equal 1
 - C. mean equal 0 and variance equal 1
 - D. mean equal 0 and standard deviation equal 0
17. Reasoning in research is broadly classified into
- A. Deductive reasoning
 - B. Inductive reasoning
 - C. Abductive reasoning
 - D. All of the above
18. Which of the following is true for the hypothetico-deductive method?
- A. It encourages the use of exploratory studies.
 - B. It is the basis for testing of statistical significance.
 - C. It is a computer problem to help researchers to improve the quality of their hypotheses.
 - D. It encourages the development of specific hypotheses based on empirically derived theories
19. If the data follows Normal distribution
- A. Mean is greater than median
 - B. Mode greater than median
 - C. Mean greater than mode
 - D. Mean, Median and Mode are equal
20. The probability of getting two fives in two rolling of a single dice
- A. $\frac{1}{3}$
 - B. $\frac{1}{36}$
 - C. $\frac{1}{2}$
 - D. $\frac{1}{6}$
21. A hypothesis is:
- A. A statement of the aims of an investigation.
 - B. A statement which serves as the basis for further investigation
 - C. The methodical evaluation of research evidence.
 - D. All of these
22. The purpose of research is:
- A. To extend the conceptual understanding of a topic.
 - B. To do the empirical work.
 - C. Primarily to get more data.
 - D. To produce work of publishable quality

23. Negative skewness of the data indicates
- A. Higher values are more
 - B. Lower values are more
 - C. Normal distribution of the data
 - D. Zero variance
24. Every year, Earth Day is celebrated on
- A. 5th of June
 - B. 22nd of April
 - C. 26th of January
 - D. 22nd of March
25. In the given series 36, 34, 30, 28, 24, ... what number comes next?
- A. 20
 - B. 22
 - C. 23
 - D. 26
26. In experimental research, which of the following terms refers to restraining the experimental conditions
- A. Trial
 - B. Control
 - C. Experiment
 - D. Treatment
27. A research paper is a brief report of research work based on
- A. Primary Data only
 - B. Secondary Data only
 - C. Both Primary and Secondary Data
 - D. None of the above
28. What comes next in the given sequence QAR, RAS, SAT, TAU,
- A. UAT
 - B. TAT
 - C. TAS
 - D. UAV
29. The presentation of another's work or data as one's own, even if the other work or data source is cited occasionally, is called:
- A. Fraudulence
 - B. Plagiarism
 - C. Error
 - D. Scientific research
30. Which one of the following is essential for 'Hypothesis'
- A. It should be applicable
 - B. It should be durable
 - C. It should be testable
 - D. It should be measurable
31. Which one of the following is not the correct option for the types of research?
- A. Descriptive vs. Analytical
 - B. Applied vs. Fundamental
 - C. Conceptual vs. Empirical
 - D. Logical vs. Illogical

32. Which is not type of test of significance for small sample?
 A. *t*-test
 B. *z*-test
 C. *F*-test
 D. *Q*-test
33. The criteria for good scale is developed by
 A. Reliability
 B. Practicability
 C. Sensitivity
 D. All of the above
34. Why is data analysis concerned with data reduction?
 A. Because far too much data is collected than is required
 B. Because we need to make sense of the data
 C. Because of the repetitions in answers to questionnaires
 D. Because the sample size has been exceeded
35. Which analysis comes under inferential analysis?
 A. Univariate Analysis
 B. Bivariate Analysis
 C. Multivariate Analysis
 D. Hypothesis Testing

PART-B

36. The mineral formula of jadeite is
 A. Al_2SiO_5
 B. $\text{NaAlSi}_2\text{O}_6$
 C. $\text{NaAlSi}_3\text{O}_8$
 D. $[\text{Na}_2][\text{Mg}_3\text{Al}_2]\text{Si}_8\text{O}_{22}(\text{OH})_2$
37. Statement I: Hydrostatic equation describes the change in pressure with changes in height
 Statement II: hydrostatic equation valid only when vertical acceleration is ignored
 A. Statement I is true, Statement II is also true and Statement II is the correct explanation of Statement I
 B. Statement I is true, Statement II is also true and Statement II is not the correct explanation of Statement I
 C. Statement I is true, Statement II is false
 D. Statement I is false, Statement II is true
38. Omphacite + garnet is a typical assemblage of
 A. Blueschist facies
 B. Greenschist facies
 C. Eclogite facies
 D. Amphibolite facies
39. Actinic radiation has wavelength
 A. $>290 \text{ nm}$
 B. $<290 \text{ nm}$
 C. $<240 \text{ nm}$
 D. None of the above

40. In which of the following sets of chronostratigraphic units, each successive stage is the division of the previous units .i.e. from broads to smallest units
- A. Erathem→Series→Systems→Stage→Zone
 - B. Zone→Erathem→Series→Stage→Systems
 - C. Erathem→Stage→Systems→Series→Zone
 - D. Erathem→Systems→ Series→Stage→Zone
41. One of the following is not an example of microscale atmospheric motion
- A. turbulence
 - B. evaporation of liquid water
 - C. dust storm
 - D. cumulus clouds
42. Mineral discrimination is possible by which geophysical method
- A. Gravity
 - B. Magnetic
 - C. Induced polarization
 - D. Self-potential
43. Koenigsberger ratio is defined as
- A. Induced magnetization/remanent magnetization
 - B. remanent magnetization/Induced magnetization
 - C. Induced magnetization + remanent magnetization
 - D. remanent magnetization - Induced magnetization
44. The average density of surface seawater is about
- A. 1027 kg/m³
 - B. 1.027 kg/m³
 - C. 1.027 kg/cm³
 - D. 1027 g/cm³
45. Which one of the following stable lead isotope is the daughter element of U²³⁵
- A. Pb²⁰⁶
 - B. Pb²⁰⁷
 - C. Pb²⁰⁸
 - D. Pb²⁰⁹
46. Which one of the following conditions is NOT required for tropical cyclone development?
- A. negligible Coriolis force
 - B. warm ocean surface water
 - C. moist unstable air
 - D. weak vertical wind shear
47. Trilobite made their first appearance in
- A. Devonian period
 - B. Cambrian period
 - C. Carboniferous period
 - D. Ordovician period
48. Which one of the following statements is true for a near surface earthquake occurring in a homogeneous, isotropic Earth?
- A. Rayleigh waves are generated
 - B. Love waves are generated
 - C. Shear waves are split
 - D. P waves undergo refraction

49. Pyrite would be expected to form in a
- A. Oxidizing environment
 - B. Reducing environment
 - C. Both oxidizing and reducing environment
 - D. None of these
50. Under cyclonic atmospheric circulation in the Northern hemisphere, Ekman transport would give rise to
- A. Upwelling and divergence
 - B. Downwelling and convergence
 - C. Downwelling and divergence
 - D. Upwelling and convergence
51. Syngenetic deposits are crystallized
- A. Before the host rocks
 - B. Much later than the host rocks
 - C. Contemporaneous with host rocks
 - D. Any of the above
52. Coesite is a high-pressure polymorph of
- A. Diopside
 - B. Hypersthene
 - C. Olivine
 - D. Quartz
53. The diurnal variation of atmospheric boundary layer height is
- A. larger over oceans
 - B. larger over continents
 - C. larger over polar caps
 - D. larger over maritime continent
54. The normal termination of a mature and non-aborted Indian Ocean Dipole IOD is generally attributed to
- A. onset of El Niño
 - B. termination of El Niño
 - C. seasonal monsoonal reversal
 - D. none of the above
55. A thrust is a
- A. Normal fault
 - B. Low angle reverse fault
 - C. Decollement
 - D. Wrench fault
56. On a non-rotating earth, surface winds would blow from
- A. the equator to poles
 - B. the poles to equator
 - C. variable direction
 - D. difficult to say
57. Depth migration is applied to a stacked seismic section. Compared to the stacked section, dipping events in the migrated section
- A. have a steeper slope and move updip.
 - B. remain unchanged.
 - C. have a gentler slope and move downdip.
 - D. have a steeper slope and move downdip

58. Which of the following statements about circulation is FALSE?
- A. It is a scalar integral quantity
 - B. relative circulation in a barotropic fluid is a function of temperature
 - C. It is a macroscopic measure of rotation for a finite area of the fluid
 - D. Absolute circulation in barotropic fluid is conserved.
59. The plutonic equivalent of phonolite
- A. Syenite
 - B. Adamellite
 - C. Monzodiorite
 - D. Nepheline syenite
60. In ophitic texture the laths of
- A. Augite included in plagioclase crystals
 - B. Plagioclase crystals included in augite crystals
 - C. Hornblende included in plagioclase crystals
 - D. Plagioclase included in K-feldspars
61. Fresh water has the maximum density at temperature of
- A. 0°C
 - B. 4°C
 - C. -4°C
 - D. -6°C
62. Diamicrites are deposited by
- A. Fluivial activity
 - B. Eolian activity
 - C. Glacial activity
 - D. Impact activity
63. One of the following gases does not actively contribute to the greenhouse effect
- A. Methane
 - B. Nitrogen Dioxide
 - C. Ozone
 - D. Water Vapor
64. One of the following is not major sink of hydroxyl radical (OH) in the troposphere
- A. Methane
 - B. Carbon Monoxide
 - C. Carbon Dioxide
 - D. Volatile Organic Compounds
65. The temperature that the dry air would need to attain in order to have same density as the moist air at the same pressure
- A. Potential temperature
 - B. Virtual temperature
 - C. Dew point temperature
 - D. Wet-bulb temperature
66. All bodies at temperatures above absolute zero degree emit electromagnetic radiation at different wave length, is known as
- A. Planck's law
 - B. Planktan's law
 - C. Lambert's cosine law
 - D. None of the above

67. The spectral region of the electromagnetic radiation which passes through the atmosphere without much attenuation is known as
- A. Ozone window
 - B. Atmospheric window
 - C. Black hole
 - D. None of the above
68. Which of the following scattering phenomena is responsible for the blue colour of the sky?
- A. Mie Scattering
 - B. Rayleigh Scattering
 - C. Diffraction
 - D. All of the above
69. Monsoon is caused by
- A. Impact of summer temperatures on the seas
 - B. Seasonal reversal of winds
 - C. Movement of clouds
 - D. Rise in sea surface temperature
70. The fraction of solar energy reflected from Earth into space is known as
- A. Insolation
 - B. Albedo
 - C. Irradiance
 - D. Heat loss

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ENTRANCE EXAMINATION – January Session 2021

Ph.D. - Earth, Ocean and Atmospheric Sciences

Key

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

