

Entrance Examinations – 2017
Ph.D. Earth and Space Sciences

Time : 2 hours**Max. Marks : 80**

I N S T R U C T I O N S

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. The question paper consists of 80 objective type questions of one mark each. There is **negative marking of 0.33 for each wrong answer.**
3. The question paper consists of Part 'A' and Part 'B'.
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. The main purpose of research in education is to:
 - A) help in the personal growth of an individual
 - B) help the candidate becomes an eminent educationist
 - C) increase job prospects of an individual
 - D) increase social status of an individual
2. Which of the following is not an essential element of report writing? .
 - A) Research Methodology
 - B) Reference
 - C) Conclusion
 - D) None of these
3. On a topographic map, the blue color indicates the surface feature of
 - A) vegetation
 - B) water
 - C) rock formation
 - D) mountains

4. Why is it important to read original articles when reviewing the literature?
 - A) To obtain an overview of methods and procedures.
 - B) To examine the validity of the conclusions.
 - C) To look for flaws in the method.
 - D) All the above

5. The purpose of research is
 - A) to extend the conceptual understanding of a topic
 - B) primarily to get more data
 - C) to produce work of publishable quality
 - D) that the empirical work should be testing a theory

6. Which one of the following is a statistical index that describes the degree and direction of the relationship between two characteristics or variables
 - A) Probability
 - B) Correlation
 - C) T-test
 - D) Mean

7. When reading a journal article one should
 - A) Accept their ideas - after all they are published authors
 - B) Use the same ideas for your project
 - C) Approach it with a questioning style
 - D) Read it as a way of obtaining more information

8. What is the difference between a bar chart and a histogram?
 - A) A histogram does not show the entire range of scores in a distribution
 - B) Bar charts are circular, whereas histograms are square
 - C) There are no gaps between the bars on a histogram
 - D) Bar charts represents numbers, whereas histograms represent percentages

9. Two papers of statistics theory and lab carries a weightage of 60% and 40 %, respectively. If a student scores 80% in theory and 90% in lab, what is his overall average percentage score of statistics?
 - A) 88%
 - B) 84%
 - C) 90%
 - D) 85%

10. The mean, median, and mode are calculated for the list 8,8,10,15,17. If the number 4 is added to the list which of the following will change?
 - A) mean, median, and mode
 - B) mean
 - C) mean and median
 - D) mean and mode

11. In a certain code language COMPUTER is written as RFUVQNPC. How will MEDICINE be written in that code language?
- A) MFEDJJOE
 - B) EOJDEJFM
 - C) MFEJDJOE
 - D) EOJDJEFM
12. A bag contains Rs. 206 of which 50 P, 25 P and 10 P coins are in the ratio 5: 9: 4. The number of coins of each type respectively is
- A) 360, 160, 200
 - B) 160, 360, 200
 - C) 200, 360, 160
 - D) 200, 160, 300
13. If $\log 2 = 0.3010$ and $\log 3 = 0.4771$, the values of $\log_5 512$ is
- A) 5.875
 - B) 4.875
 - C) 3.875
 - D) 2.875
14. A family has a man, his wife, their four sons and their wives and one daughter. The family of every son also has 3 sons and one daughter. Find out the total number of female members in the family?
- A) 8
 - B) 10
 - C) 9
 - D) 12
15. The correlation coefficient between x and y is 0.60. What is the correlation coefficient between y and x?
- A) -0.60
 - B) 1.60
 - C) 0.60
 - D) 0.06
16. Which of the following types of sensors uses a highly focused beam of light?
- A) SONAR
 - B) Weather radar
 - C) LIDAR
 - D) MST radar
17. A train 220 m long passed a pole in 20 seconds. How long it will take to pass a platform 550 m long?
- A) 50 sec
 - B) 70 sec
 - C) 80 sec
 - D) 60 sec

18. Based on logical reasoning build an analogy to Arc : Circle : Line : ?
- A) Point
 - B) Ellipse
 - C) Sphere
 - D) Rectangle
19. If Z= 2197 and R= 729. How would J be written in that code?
- A) 216
 - B) 125
 - C) 124
 - D) 512
20. The top and bottom of a tower were seen at angles of depression 30° and 60° from the top of a hill of height 100 m. What is the height of the tower?
- A) 42.2 mts
 - B) 58.78 mts
 - C) 33.45 mts
 - D) 66.6 mts
21. A cuboid of dimension 24cm x 9cm x 8 cm is melted and smaller cuboids of side 3 cm each are formed. How many such cuboids can be formed?
- A) 56
 - B) 64
 - C) 48
 - D) 40
22. There are five bags and in the first bag some fruits are kept. Then in each bag the number of fruits is reduced by $\frac{1}{4}$. The last bag contains 4. The number of fruits in the first bag is
- A) 64
 - B) 1024
 - C) 2596
 - D) 256
23. One lady has 2 children, one of her child is boy, what is the probability of having both are boys?
- A) $\frac{1}{3}$
 - B) $\frac{1}{2}$
 - C) $\frac{2}{3}$
 - D) $\frac{2}{5}$
24. What is the next number in the sequence 2, 3, 4, 7, 6, 11, 8, 15, 10, -----
- A) 12
 - B) 13
 - C) 17
 - D) 19

25. The equation $m^2 - 33n + 1 = 0$, where m & n are integers has:
- A) no solution
 - B) exactly two solutions
 - C) exactly one solution
 - D) infinitely many solutions
26. The average of four consecutive even numbers is 49. The largest of these numbers is:
- A) 48
 - B) 50
 - C) 52
 - D) 54
27. "All professors are researchers. Some scientists are professors." Which of the given conclusions is logically valid and is inferred from the above arguments?
- A) all scientist are researcher
 - B) all professors are scientists
 - C) some researcher are scientist
 - D) no conclusion follows
28. If each number in a set of ten numbers is increased by 20, the arithmetic mean of the original ten numbers:
- A) remains the same
 - B) is increased by 20
 - C) is increased by 200
 - D) is creased by 10
29. The remainder of 6^{29} divided by 5 is
- A) 5
 - B) 3
 - C) 1
 - D) 0
30. 'Hour' is related to 'Second' in the same way as 'Tertiary' is related to
- A) Secondary
 - B) Primary
 - C) Ordinary
 - D) None of the above
31. (8, 4, 12, 6, 18, ?, 27)
- A) 10
 - B) 24
 - C) 5
 - D) None of the above

32. For a normal curve with $\mu=65$ and $\sigma=10$, how much area will be found under the curve to the left of the value 65?
- A) 0.25
 - B) 0.5
 - C) 1.5
 - D) 1.0
33. One of the following is not Indian Earth Observation Satellites
- A) INSAT-3DR
 - B) TERRA
 - C) Oceansat-2
 - D) IRS-1
34. In multiple regression, when global test of significance is rejected, we can conclude that
- A) All of the net sample regression coefficient are equal to zero
 - B) All of the sample regression coefficients are not equal to zero
 - C) At least one sample regression coefficient is not equal to zero
 - D) The regression equation intersects the Y-axis at zero
35. Deciding what data is best for your research analysis depends upon which of the following?
- A) The research question
 - B) The nature of the participants
 - C) The researcher's personal preferences
 - D) All the above
36. The independent variable refers to
- A) the variable which is only used in the control condition
 - B) a variable which serves as the aim of an experiment
 - C) the variable which shows us the effect of the manipulation.
 - D) the variable being manipulated or varied in some way by the researcher
37. The primary aim of _____ is to give structure to data in the form of categories which can then be analyzed.
- A) statistics analysis
 - B) coding
 - C) pilot studies
 - D) self completion questionnaires
38. Which of the following is an example of a random sampling method?
- A) systematic sampling
 - B) convenience sampling
 - C) purposive sampling
 - D) cluster random

39. What does it mean when research quotes that their findings are "statistically significant" and the statistical level set was at 0.05?
- A) That a difference found is likely to occur by chance 5 or fewer times out of a 100 which suggests that the difference is due to chance and so does not represent a real difference between the groups or conditions.
 - B) That a difference found is likely to occur by chance 5 or fewer times out of a 100 and suggests that the difference is quite unusual and unlikely to be due to chance but rather a real difference between the groups or conditions.
 - C) That 95% of the time the study will be wrong.
 - D) That a difference found is likely to occur by chance 5 or fewer times out of a 100 and suggests that the difference is quite unusual and unlikely to be due to chance but rather a real difference between the groups or conditions.
40. The observation in a classroom that the higher the room temperature, the lower student performance would be an example of
- A) Negative Correlation
 - B) Zero Correlation
 - C) Positive Correlation
 - D) Independent Correlation

PART - B

41. The most abundant mineral phase in the lower mantle is
- A) Garnet
 - B) Perovskite
 - C) Olivine
 - D) Spinel
42. Spinifex texture is characteristic of
- A) Gabbro
 - B) Tonalite
 - C) Basalt
 - D) Komatiite
43. When cool air flows from high mountain region to region of low elevation, the air will
- A) increase in moisture content
 - B) condense, forming large amounts of dew
 - C) undergo adiabatic warming
 - D) undergo adiabatic cooling
44. The Mariana trench in the western Pacific is about ----- deep.
- | | |
|--------------|-------------|
| A) ~8,448 m | B) ~11,022m |
| C) ~13,022 m | D) ~5,301 m |

45. The density of seawater is controlled by:
- A) temperature and salinity
 - B) temperature and pressure
 - C) salinity and depth
 - D) salinity and chlorophyll
46. Calc-alkaline magma is commonly generated in
- A) Rift setting
 - B) Subduction zone setting
 - C) Collisional environment
 - D) Mid-oceanic ridge
47. In gabbro cumulate the positive Eu-anomaly is mainly due to
- A) Plagioclase accumulation
 - B) Pyroxene accumulation
 - C) Magnetite and ilmenite
 - D) Olivine
48. Loess corresponds to
- A) Eolian deposits
 - B) Braided river flood plain
 - C) Alluvial fan
 - D) Lake deposits
49. If the radius of the earth were to shrink by 1%, its mass remaining the same, the acceleration due to gravity on the earth's surface would
- A) decrease by 2%
 - B) remain unchanged
 - C) increase by 2%
 - D) will increase by 9.8%
50. Positive gravity anomalies are often associated with
- A) deep ocean trenches
 - B) ore bodies beneath Earth's surface
 - C) large cavern systems beneath Earth's surface
 - D) all of these
51. The S-wave shadow zone is evidence that
- A) the outer core is liquid
 - B) the outer core is composed of iron and nickel oxides
 - C) the inner core is solid
 - D) it is very hot near the core

52. Perched water table lies
- A) above water table
 - B) below water table
 - C) at the same level as water table
 - D) at an angle to water table
53. The Proton precession magnetometer measures
- A) Vertical magnetic field
 - B) horizontal magnetic field
 - C) total magnetic field
 - D) inclination of magnetic field
54. According to Hooke's law of elasticity, within elastic limits, if the stress is increased, the ratio of stress to strain
- A) increases
 - B) decreases
 - C) becomes zero
 - D) remains constant
55. The geothermal gradient in the crust averages
- A) 25 degrees Celsius per kilometer
 - B) 1 degree Celsius per kilometer
 - C) 10 degrees Celsius per kilometer
 - D) 100 degrees Celsius per kilometer
56. The equator is warmer than the poles. Why do the surface winds not blow directly from the poles to the equator?
- A) because hot air rises
 - B) because of the Earth's rotation
 - C) because about 71% Earth's surface covered by oceans
 - D) because there are mountains ranges in the way
57. Which of the following are the most productive areas of the ocean?
- A) deep open ocean
 - B) coastal upwelling regions
 - C) estuaries
 - D) coastal downwelling regions
58. The great mass extinction event occurred during
- A) Permian
 - B) Jurassic
 - C) Cambrian
 - D) Eocene

59. Main Central thrust in Himalayan orogen separates.
- A) Siwalik hills and lesser Himalayan sequences
 - B) Subathu Formation and lesser Himalayan sequences
 - C) Lesser Himalayan sequences and high Himalayan crystallines
 - D) Higher Himalayan sequences with Tibet
60. The great global oxidation event occurred during
- A) 2900 Ma
 - B) 3400 Ma
 - C) 2700 Ma
 - D) 2300 Ma
61. Ekman transport moves surface seawaters about ----- to the ----- of the wind direction in the ----- Hemisphere.
- A) 45°, left, Southern
 - B) 90°, right, Northern
 - C) 90°, right, Southern
 - D) 45°, left, Northern
62. The equatorial under current (EUC) is strongest in the:
- A) Pacific Ocean
 - B) Atlantic Ocean
 - C) Indian Ocean
 - D) Southern Ocean
63. In addition to CO₂, increase in one of the following is a potential contributor to global warming in last few decades.
- A) Argon
 - B) Volcanic eruptions
 - C) Methane
 - D) Sulphate aerosols
64. The Bergeron process explains the growth of droplets from cloud to the size needed for rain due to the:
- A) collision and coalescence of droplets in warm clouds
 - B) collision and coalescence of droplets in cold clouds
 - C) growth of ice crystals at the expense of supercooled water droplets, because saturation vapour pressure over water is greater than that over ice surface
 - D) growth of water droplets at the expense of ice crystals, because saturation vapour pressure over water is greater than that over ice surface

65. During the year 1997 that witnessed one of the strongest El Niños of the century, which interannual event among the following is supposed to have reduced its effect on the Indian subcontinent?
- A) Southern annular mode
 - B) Pacific Decadal Oscillation
 - C) Positive Indian Ocean Dipole
 - D) Indian Ocean Basin Warming
66. The first primitive mammals have appeared during.
- A) Triassic
 - B) Paleocene
 - C) Carboniferous
 - D) Permian
67. In India the dinosaurs attained their highest development during the deposition of .
- A) Bagh Beds
 - B) Lameta Beds
 - C) Umaria Marine Beds
 - D) Bap Beds
68. Which of the following rock characterize deep water environments
- A) Marl
 - B) Sand stone
 - C) Loess
 - D) Carbonaceous shale
69. Geostrophic wind does not increase with height in
- A) baroclinic atmosphere
 - B) barotropic atmosphere
 - C) both baroclinic and barotropic atmospheres
 - D) none of the above
70. Considering the atmosphere from the surface to 200 km altitude, the coldest region would be found around
- A) 16 km
 - B) 50 km
 - C) 80 km
 - D) 140 km
71. The scale height of a synoptic disturbances is of the order of:
- A) 10^3 m
 - B) 10^{-2} m
 - C) 10^4 m
 - D) 10 m

72. One of the following is not routinely used to generate an ENSO index. Identify.
- A) Sea surface temperature in the equatorial eastern pacific
 - B) Sea surface temperature in the equatorial central pacific.
 - C) Sea level pressure gradient between Tahiti and Darwin
 - D) Sea surface temperature in the equatorial western pacific
73. Excess alumina in an igneous rock will form the normative mineral
- A) Quartz
 - B) Feldspars
 - C) Aluminosilicates
 - D) Corundum
74. The lithophile elements generally concentrate in
- A) Rock-forming minerals
 - B) Earths' core
 - C) Sulphides
 - D) Atmosphere
75. Cerium is the only REE to form----under oxidizing sedimentary environment.
- A) Two valence
 - B) Three valence
 - C) Four valence
 - D) one valence
76. The equations of motion with the hydrostatic assumption DO NOT permit:
- A) vertically propagating sound waves
 - B) Rossby waves
 - C) inertia-gravity waves
 - D) All of the above
77. The Karewa formation in the Kashmir valley is renowned for its ___ deposits.
- A) Gypsum
 - B) Barytes
 - C) Lignite
 - D) Ochre
78. In Khetri and Singhbhum, copper mainly occurs as
- A) Cuprite
 - B) Chalcopyrite
 - C) Chalcocite
 - D) Covellite
79. The underground water that occurs within the zone of aeration is termed
- A) Plutonic water
 - B) Meteoric water
 - C) Vadose water
 - D) Connate water
80. Disseminated sulphides can be explored effectively by
- A) Self-potential method
 - B) Magnetic method
 - C) Seismic methods
 - D) Induced polarization method

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