

Code No. P-63

Hall Ticket No.

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

Time : 2 hours

(Ph.D. Admission - January 2018 Session)

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. What is the next number in the series 1, 3, 8, 19, -----.
A. 38
B. 42
C. 41
D. 40
2. There are four boys. Tom is shorter than John. Dave is taller than Tom but shorter than John. James is shorter than John but taller than Dave. Who is shortest?
A. John
B. Tom
C. Dave
D. James
3. 657-PUT, 758-TUB. What is PUB-?
A. 658
B. 557
C. 857
D. 678
4. Find the value of $\sqrt[3]{\sqrt{0.000729}}$.

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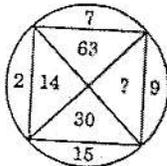
- A. 0.3
 - B. 0.7
 - C. 0.09
 - D. None of the above
5. Tickets numbered 1 to 50 are mixed and one ticket is drawn at random. Find the probability that the ticket drawn has a number which is a multiple of 4 or 7?
- A. $\frac{9}{25}$
 - B. $\frac{9}{50}$
 - C. $\frac{18}{25}$
 - D. None of these
6. Two friends A and B apply for a job in the same company. The chances of A getting selected is $\frac{2}{5}$ and that of B is $\frac{4}{7}$. What is the probability that both of them get selected?
- A. $\frac{8}{35}$
 - B. $\frac{34}{35}$
 - C. $\frac{27}{35}$
 - D. None of these
7. Three pumps, working 4 hours a day, can empty a tank in 2 days. How many hours a day must four pumps work, to empty the tank in one day?
- A. 7 hours
 - B. 8 hours
 - C. 6 hours
 - D. 5 hours
8. What is the mass of the man, if a boat of length 4 m, width 1.5 m floating on a river sinks by 0.015 m when the man gets on the boat?
- A. 100kg
 - B. 90 kg
 - C. 80 kg
 - D. 70kg
9. The average of three consecutive even numbers is 18; find the largest of these numbers.
- A. 15
 - B. 16
 - C. 20
 - D. 26
10. A tree is cut partially and made to fall on ground. The tree however does not fall completely and is still attached to its cut part. The tree top touches the ground at a point 10m from foot of the tree making an angle of 30° . What is the length of the tree?
- A. $10\sqrt{3}$ m
 - B. $10/\sqrt{3}$ m
 - C. $(\sqrt{2} - 1)/10$ m
 - D. $10/\sqrt{2}$ m

11. Information is -----.
- A. Raw Data
 - B. Processed Data
 - C. Input data
 - D. Organized data
12. Hari hired some workers to build his house in 20 days. But on the day of starting of the construction, 12 men did not come. Rest of the people built the entire house in 32 days. How many workers had he initially hired?
- A. 64
 - B. 48
 - C. 32
 - D. 24
13. Raju's room has a floor of 8 m by 4 m. He decides to tile the floor with tiles of 25 cm x 20 cm. How many tiles will he need?
- A. 320 tiles
 - B. 640 tiles
 - C. 160 tiles
 - D. 6.4 tiles
14. If $\log_{xy} = 100$ and $\log_3 x = 10$, then the value of y is -----.
- A. 3^{10}
 - B. 3^{100}
 - C. 3^{1000}
 - D. 3^{10000}
15. Variance of the data 2, 4, 5, 6, 8, 17 is 23.33. Then variance of 4, 8, 10, 12, 16, 34 will be
- A. 23.23
 - B. 25.33
 - C. 46.66
 - D. 48.66
16. A man goes to a place A from station B at a speed of 4 km/hr and returns to the station B at a speed of 6 km/hr. What is his average speed of the entire journey?
- A. 4.8 km/hr
 - B. 5.0 km/hr
 - C. 4.2 km/hr
 - D. 5.6 km/hr
17. Uniting various Qualitative methods with Quantitative methods can be called as -----.
- A. Coalesce
 - B. Triangulation
 - C. Bipartite
 - D. Impassive

18. Short summary of scientific report is called -----.

- A. Article
- B. Research abstract
- C. Publication
- D. Guide

19. What number should come in the place of question mark?



- A. 18
- B. 33
- C. 135
- D. 1454

20. 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

21. Which of the following is not a "Graphic representation"?

- A. Pie Chart
- B. Bar Chart
- C. Table
- D. Histogram

22. An appropriate source to find out descriptive information is -----.

- A. Bibliography
- B. Directory
- C. Encyclopaedia
- D. Dictionary

23. Research is -----.

- A. Searching again and again
- B. Finding solution to any problem
- C. Working in a scientific way to search for truth of any problem
- D. None of the above

24. If $a - b = 3$ and $a^2 + b^2 = 29$, find the value of ab .

- A. 12
- B. 14
- C. 16
- D. 10

25. A blueprint of research work is called -----.

- A. Research problem
- B. Research design
- C. Research tools
- D. Research methods

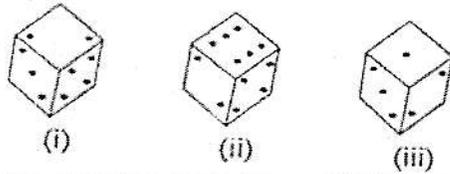
26. In the first 10 overs of a cricket game, the run rate was only 3.2. What should be the run rate in the remaining 40 overs to reach the target of 282 runs?

- A. 6.35
- B. 6.25
- C. 6.45
- D. 6.15

27. The mean deviation of the data 2, 9, 9, 3, 6, 9, 4 from the mean is -----.

- A. 2.23
- B. 2.57
- C. 3.23
- D. 3.57

28. Given below are three different positions of a dice. Find the number of dots on the face opposite the face bearing 3 dots.



- A. 4
- B. 5
- C. 6
- D. cannot be determined

29. The average of 20 numbers is zero. Of them, at the most, how many may be greater than zero?

- A. 1
- B. 0
- C. 19
- D. 10

30. Complete the series. SCD, TEF, UGH, -----, WKL

- A. VKL
- B. VJK
- C. VIJ
- D. VJT

31. It is well known that the world urgently needs adequate distribution of food, so that everyone gets enough. Adequate distribution of medicine is just as urgent. Medical expertise and medical supplies need to be redistributed throughout the world so that people in emerging nations will have proper medical care. This paragraph best supports the statement that
- A. the majority of the people in the world have never been seen by a doctor
 - B. food production in emerging nations has slowed during the past several years.
 - C. most of the world's doctors are selfish about giving time and money to the poor
 - D. many people who live in emerging nations are not receiving proper medical care
32. Find the greatest number that will divide 43, 91 and 183 so as to leave the same remainder in each case.
- A. 4
 - B. 7
 - C. 9
 - D. 12
33. From a group of 7 men and 6 women, five persons are to be selected to form a committee so that at least 3 men are there on the committee. In how many ways can it be done?
- A. 564
 - B. 735
 - C. 756
 - D. 645
34. In how many ways can the letters of the word 'LEADER' be arranged?
- A. 72
 - B. 360
 - C. 240
 - D. 144
35. If one-third of one-fourth of a number is 15, then three-tenth of that number is -----.
- A. 35
 - B. 36
 - C. 54
 - D. 45
36. The product of two numbers is 120 and the sum of their squares is 289. The sum of the number is -----.
- A. 20
 - B. 18
 - C. 23
 - D. 24
37. Today is Sunday. After 61 days, it will be -----.
- A. Friday
 - B. Saturday

- C. Sunday
- D. Monday

38. A man has some hens and cows. If the number of heads be 48 and the number of feet equals 140, then the number of hens will be -----.
- A. 22
 - B. 24
 - C. 26
 - D. 23
39. The angle of elevation of a ladder leaning against a wall is 60° and the foot of the ladder is 4.6 m away from the wall. The length of the ladder is -----.
- A. 2.3 m
 - B. 9.2 m
 - C. 7.8 m
 - D. 9.4 m
40. If $A = x\%$ of y and $B = y\%$ of x , then which of the following is true?
- A. A is smaller than B
 - B. A is greater than B
 - C. Relationship between A and B cannot be determined
 - D. None of these

PART - B

41. One of the following is not a high-nutrient and low-chlorophyll region -----.
- A. equatorial Pacific Ocean
 - B. subarctic Pacific Ocean
 - C. the Southern Ocean
 - D. Bay of Bengal
42. The Stoke's theorem uses which of the following operation?
- A. Divergence
 - B. Gradient
 - C. Curl
 - D. Laplacian
43. The eastern Australian current is the southern counter part of -----.
- A. Kuroshio Current
 - B. Gulf Stream
 - C. North Pacific current
 - D. Canary current
44. Coesite is a high pressure polymorph of -----.
- A. Diopside
 - B. Hypersthene

- C. Olivine
D. Quartz
45. The characteristic mineral of lower mantle is -----.
- A. Rutile
 - B. Anatase
 - C. Perovskite
 - D. Spinel
46. The current density (\vec{J}), conductivity (σ) and electric field strength (\vec{E}) are related by
- A. $\vec{J} = \sigma \vec{E}$
 - B. $\vec{E} = \sigma \vec{J}$
 - C. $\vec{J} = \sigma / \vec{E}$
 - D. $\vec{E} = \sigma^2 \vec{J}$
47. The vapour pressure over a curved interface always exceeds that of the same substance over a flat surface is referred to as -----.
- A. Köhler equation
 - B. Clausius-Clapeyron equation
 - C. Kelvin equation
 - D. Solute effect
48. Rutile crystallizes in -----.
- A. Isometric system
 - B. Tetragonal system
 - C. Orthorhombic system
 - D. Monoclinic system
49. A hydrostatic numerical model filters out -----.
- A. vertically propagating sound waves
 - B. lamb waves
 - C. gravity waves
 - D. rossby waves
50. Pyrope garnet and chrome diopside characteristic minerals of -----.
- A. Kimberlite
 - B. Lamprophyre
 - C. Lamproite
 - D. Carbonitite
51. Which of the following statements is FALSE about tropical cyclones?
- A. The western North Pacific is the most active tropical cyclone region
 - B. They cross equator from southern to northern hemisphere
 - C. A significant number of the Bay of Bengal tropical cyclones are the intensified remnants from the western pacific

- D. The Bay of Bengal has about five times as many tropical cyclones as the Arabian Sea
52. The path traversal in calculating the Green's theorem is -----.
- A. Clockwise
 - B. Anticlockwise
 - C. Inwards
 - D. Outwards
53. The characteristic texture of komatiites is -----.
- A. Porphyritic
 - B. Spherulitic
 - C. Spinifex
 - D. Orbicular
54. Warm dry winds blowing down the east slopes of Rockies are known as -----.
- A. Foehn
 - B. Chinook
 - C. Mistral
 - D. Nor'westers
55. A thrust is a -----.
- A. Normal fault
 - B. Low angle reverse fault
 - C. Decollement
 - D. Wrench fault
56. Which of the following factor primarily controls the density of surface seawater?
- A. temperature
 - B. salinity
 - C. pressure
 - D. rainfall
57. Crenulation cleavage develops during -----.
- A. thrusting
 - B. rifting
 - C. superimposed deformation
 - D. extension
58. Energy detected by the satellite at visible wavelengths is assumed to be ----- solar energy.
- A. absorbed and reflected
 - B. scattered and absorbed
 - C. reflected and scattered.
 - D. reflected

59. Diamictites are deposited by -----.
- A. Fluivial activity
 - B. Eolian activity
 - C. Glacial activity
 - D. Impact activity
60. When the vorticity equation expressed in isobaric coordinates, the following contribution does NOT contribute to vorticity generation
- A. Divergence term
 - B. Tipping term
 - C. Solenoid term
 - D. Friction term
61. Low gravity and high magnetic field anomalies are generally associated with -----.
- A. mobile belts
 - B. deep cratons
 - C. volcanic tuff
 - D. deep trenches
62. The geostrophic flow is a balance between -----.
- A. Viscous and Coriolis force
 - B. Pressure gradient force and Viscous forces
 - C. Pressure gradient force and Coriolis force
 - D. Pressure gradient force, Viscous force and Coriolis force
63. The great mass extinction event occurred during -----.
- A. Permian
 - B. Jurassic
 - C. Cambrian
 - D. Eocene
64. 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
65. Westerly winds are prevalent at -----.
- A. equator at 700 hPa
 - B. at 10 hPa around 40°S during boreal summer
 - C. at 200 hPa around 40°S during boreal summer
 - D. at none of the above places and levels
66. Very small and positive susceptibility is found in -----.
- A. Ferromagnetic
 - B. Diamagnetic

- C. Paramagnetic
 - D. Antiferromagnetic
67. A density of sea water $\rho(S,T,P)=1.0274 \text{ gm/cm}^3$ is conventionally reported as $\sigma(S,T,P)=$
- A. 2.74
 - B. 27.4
 - C. 0.274
 - D. 274.0
68. In a neutrally stable atmosphere, the lapse rate is -----.
- A. equal to dry adiabatic
 - B. between dry and moist adiabatic
 - C. more than dry adiabatic
 - D. None of the above
69. The curl of the electric field intensity is -----.
- A. Conservative
 - B. Rotational
 - C. Divergent
 - D. Static
70. Snowball earth existed ----- period.
- A. 2300 Ma
 - B. 700 Ma
 - C. 360 Ma
 - D. 540 Ma
71. Normand's second proposition states that the "The entropy of the air is equal to the entropy of the same air, saturated at the -----, minus the entropy of the additional liquid water required to saturate it"
- A. Dew point temperature
 - B. Tropopause
 - C. Dry bulb temperature
 - D. Wet bulb temperature
72. The characteristic rock types of continental rift setting -----.
- A. Alkaline basalt
 - B. Boninite
 - C. Adakite
 - D. Granite
73. The buoyancy frequency is a measure of -----.
- A. mass of the atmosphere above a level
 - B. static stability of the atmosphere
 - C. speed of the gravity wave locally
 - D. moisture content of the air

74. Bodies striking in north-south magnetized by induction at low magnetic latitudes shall produce -----.
- A. high magnetic anomalies
 - B. no magnetic anomalies
 - C. high magnetic anomaly followed by a low
 - D. low magnetic anomaly followed by a high
75. Tsunamis are associated with -----.
- A. shallow water gravity waves
 - B. rossby waves
 - C. mixed Rossby-gravity waves
 - D. coastal Kelvin waves
76. If the length of a charge carrier is reduced by half its resistivity -----.
- A. becomes half
 - B. gets doubled
 - C. becomes one-third
 - D. does not change
77. The number of sedimentary basins in India are -----.
- A. 15
 - B. 35
 - C. 26
 - D. 10
78. Gamma Ray detected in density log is -----.
- A. Natural Gamma present in the formation
 - B. Gamma Ray from Epithermal Neutron source
 - C. Gamma Ray scattered from the formation
 - D. Gamma Ray produced due to neutron absorption
79. The reversal of ENSO phase is explained, to a good extent, by -----.
- A. Ekman theory
 - B. Delayed oscillator theory
 - C. Bjerknes theory
 - D. CISK theory
80. Loess corresponds to -----.
- A. Eolian deposits
 - B. Braided river flood plain
 - C. Alluvial fan
 - D. Lake deposits