Code No: D- 96

Hall Ticket No:

University of Hyderabad

ENTRANCE EXAMINATION 2013-2014

Ph. D in Earth & Space Sciences

Date/Day: 23.02.2013, Saturday

Time: 2.00-4.00 PM

Marks: 75

Instructions for the candidates:

1. All questions carry equal marks.
2. Write your Hall Ticket Number on the OMR Answer Sheet and in the space provided on the question paper.
3. The question paper consists of Objective Type questions of one mark each. For each question, there are four answers and the answers are to be indicated with capital letters of alphabets viz., A, B, C and D.
4. The question paper consists of Part 'A' and Part 'B'.
5. Answers are to be marked on the OMR answer sheet following the instructions provided there upon.
6. Hand over the OMR answer sheet at the end of the examination.
7. No additional sheets will be provided. Rough work can be done in the space provided at the end of the booklet.
8. Non-programmable calculators are allowed.

PART-A

1. In a wire, when elongation is 2 cm energy stored is E. if it is stretched by 10 cm, then the energy stored will be

(A) E (B) 2 E (C) 4 E (D) 25 E

2. Two steel wires of the same radius have their lengths in the ratio of 1:2. If they are stretched by the same force, then the strains produced in the two wires will be in the ratio of

(A) 1:2 (B) 2:1 (C) 1:1 (D) 1:4

3. For Hooke's law to hold good, the intermolecular distance must be _____ as compared to the equilibrium distance

(A) Much more (B) Zero (C) Much less (D) Approximately same

4. Energy in a stretched wire is

(A) Half of load ′ strain (B) Half of stress ′ strain
(C) Stress ′ strain (D) Load ′ strain

5. Which of the following have highest elasticity?

(A) Steel (B) Copper (C) Rubber (D) Aluminium

6. A liquid does not wet the surface of a solid if the angle of contact is

(A) Zero (B) An acute one (C) 45° (D) An obtuse one

7. The pressure just below the meniscus of water

(A) Is greater than just above it (B) Is less than just above it
(C) Is same as just above it (D) Is always equal to atmospheric pressure.

8. The center of mass of the Earth's atmosphere is:

A. A little less than halfway between the Earth's surface and the outer boundary of the atmosphere
B. Near the surface of the Earth
C. Near the outer boundary of the atmosphere
D. Near the center of the Earth

9. Which sedimentary rock is most likely to be changed to slate during regional metamorphism?

(A)Breccia (B) Conglomerate (C) Dolostone (D) Shale

10. Compared to dull and rough rock surfaces, shiny and smooth rock surfaces are most likely to cause sunlight to be

(A) Reflected (B) Refracted (C) Scattered (D) Absorbed

11. The equatorial radius of the Earth is approximately

(A) 637 km (B) 6370 km (C) 63700 km (D) 8671 km

12. At which location would an observer find the greatest force due to the Earth's gravity?

(A) North pole (B) Equator (C) London (D) New York

13. Which statement provides the best evidence that the Earth has a nearly spherical shape?

(A) The sun has a spherical shape
(B)The altitude of Polaris(N. Star) changes with the observer's latitude in the Northern Hemisphere
(C) Star trails photographed over a period of time show a circular path
(D) The length of noontime shadows change throughout the year

14. The latitude of a point in the Northern Hemisphere may be determined by measuring the
(A) apparent diameter of Polaris (B) altitude of Polaris
(C) distance to the Sun (D) apparent diameter of the Sun

15. The true shape of the Earth is best described as a

(A) perfect sphere (B) perfect ellipse
(C) slightly oblate sphere (D) highly eccentric ellipse

16. The locus of a point, equidistant from the points (2,-3) and (-3,2) is
(A) x+y=0 (B) x-y=0 (C) 2x-y=0 (D) 2x+y=0

17. Domain of the real valued function $f(x)=e^x$ is

(A) Z (B) N (C) R (D) Does not exist

18. The cube root of $38+17\sqrt{5}$ is

(A) $2+\sqrt{5}$ (B) $2-\sqrt{5}$ (C) $\sqrt{5}-2$ (D) $2+2\sqrt{5}$

19. The equation to the straight line through (2,-3) and perpendicular to x – axis is

(A)X=-3 (B) x=-2 (C) y=-3 (D) x=2

20. The equation of the circle with centre (2,-3) and radius 13 is always satisfied by the point
(A) (0,0) (B) (1,1) (C) (1,2) (D) (2,3)

21. The discontinuity separating Earth's upper and lower crust is termed as

(A) Moho (B)Guttenberg (C) Lehmann (D)Conrad

22. Which of the following is a Mars exploration rover?

(A) Brightness (B)Curiosity (C)Eager (D)Discovery

23. The largest mass extinction on the Earth took place at the following geological boundary

(A) Cretaceous-Tertiarty (B)Permo-Triassic
(C)Ordovician-Silurian (D)Jurrassic-Cretaceous

24. The tropical cyclones often follow the direction of movement from

(A) South to North (B) East to West (C) West to East (D) North to South

25. Which of the crystal systems has four crystallographic axes?

(A) Monoclinic (B) triclinic (C) hexagonal (D) tetragonal

PART-B

26. Potential energy of a molecule on the surface of a liquid is as compare to another molecule inside of the liquid is

(A) More (B) Less (C) Both 'a' and 'b' (D) None of these

27. Rain drops are spherical because of

(A) Gravitational force (B) Surface tension

(C) Air resistance (D) Low viscosity of water

28. Surface tension of liquid is independent of the

(A) Temperature of the liquid (B) Area of the liquid surface

(C) Nature of the liquid (D) Impurities present in the liquid

29. Meniscus of mercury in capillary is

(A) Concave (B) Convex (C) Plane (D) Cylindrical

30. The period of simple pendulum is doubled when

(A) Its length is doubled (B) Its length is halved

(C) The length is made four times (D) Mass of the bob is doubled

31. If the length of a simple pendulum is doubled keeping its amplitude constant its energy will be

(A) Unchanged (B) Doubled (C) Four times (D) Halved

32. The unit of force constant is

(A) Nm (B) N/m (C) N/kg (D) Nkg

33. Moment of inertia depends on

(A) Distribution of particles (B) Mass
(C) Position of axis of rotation (D) All of these

34. The dimensions of angular momentum are

(A) $[M^1 L^2 T^{-1}]$ (B) $[M^1 L^1 T^{-1}]$ (C) $[M^1 L^1 T^{-2}]$ (D) $[M^1 L^2 T^{-2}]$

35. The moment of inertia of a body does not depends upon

(A) Angular velocity of a body (B) Axis of rotation of the body

(C) The mass of the body (D) The distribution of the body

36. Moment of inertia depends upon the

(A) Mass of the body (B) Distribution of mass of the body

(C) Position of axis of rotation (D) All of these

37. If a gymnast, sitting on a rotating stool, with his arms outstretched, suddenly lowers his arms

(A) The angular velocity decreases (B) His moment of inertia decreases

(C) The angular velocity remains constant (D) The angular momentum increases

38. In a sonometer wire, the produced waves are

(A) Longitudinal (B) Transverse, stationary and unpolarised

(C) Transverse, stationary and polarised (D) Transverse, progressive and polarized

39. In a stationary wave, the strain is maximum at the

(A) Nodes (B) Antinodes

(C) Between the node and the antinodes (D) Between any two nodes and antinodes

40. Compared to Earth's crust, Earth's core is believed to be

(A) less dense, cooler, and composed of more iron
(B) less dense, hotter, and composed of less iron
(C) more dense, hotter, and composed of more iron
(D) more dense, cooler, and composed of less iron

41. Which of the following is NOT a type of plate boundary?

(A) convergent boundary (B) divergent boundary (C) translational (D) transform

42. The most voluminous portion of the Earth is known to geologists as

(A)The crust (B) The lithosphere (C) The mantle (D) The core

43. The lithosphere is that portion of the Earth where rocks behave as

(A) Brittle solids (B) Plastic solids (C) Fluids (D) Rock

44. Many divergent plate boundaries coincide with

(A) transform faults (B) explosive volcanic eruptions
(C) the edges of the continents (D) the Mid-Ocean Ridge

45. At transform plate boundaries

(A) Two plates slip horizontally past each other
(B) Two plates move in opposite directions toward each other
(C) Two plates move in opposite directions away from each other
(D) Two plates are subducted beneath each other

46. A typical rate of plate motion is

(A) 3 - 4 centimeters per year (B) 1 - 18 centimeters per year
(C) 1 kilometer per year (D) 1,000 kilometers per year

47. Earthquakes may be caused by

(A) movement of tectonic plates (B) motion along faults in Earth's crust
(C) shifting of bedrock (D) all of these

48. Plate tectonics is

(A) an hypothesis (B) a conjecture (C) a theory (D) the rawest of speculation

49. A subduction zone is most likely to be encountered

(A) at a convergent plate boundary (B) at a divergent plate boundary
(C) at a transform plate boundary (D) at a translational plate boundary

50. Petroleum is **NOT** a mineral because

(A) It does not have a definite chemical composition
(B) It does not have a crystalline structure
(C) It is not a solid
(D) All of these are reasons why petroleum is not a mineral

51. The silicon-oxygen tetrahedron is

(A) The building block of the silicate minerals
(B) composed of 4 oxygen atoms surrounding 1 silicon atom
(C) composed of the two most abundant elements on Earth
(D) all of these

52. Which of the following is **NOT** considered a physical property of minerals?

(A) hardness (B) streak (C) silicate structure (D) luster

53. Select the statement about cleavage which is **NOT** correct

(A) a plane along which crystals break easily
(B) a plane that reflects light
(C) it is well developed in all minerals
(D) there may be more than one cleavage plane in some minerals

54. Atoms with either a positive or negative charge are called

(A) isotopes (B) ions (C) elements (D) radioactive

55. For a given mineral, the physical property which displays the greatest variation is

A) color (B) luster (C) hardness (D) streak

56. Muscovite is

(A) a double chain silicate (B) a framework silicate
(C) a sheet silicate (D) a single chain silicate

57. In a syncline, all rock layers

(A) dip toward the fold axis (B) dip away from the fold axis
(C) have vertical dips (D) have horizontal dips

58. A fault is observed where the hanging wall is displaced upward relative to the footwall

(A) This is a normal fault (B) This is a reverse fault
(C) This is a left-lateral strike-slip fault (D) This is a right-lateral strike-slip fault

59. A fault that displays mostly vertical displacement is

(A) a dip-slip fault (B) a strike-slip fault (C) a transform fault (D) none of these

60. Strike-slip faults can also be

(A) dip-slip faults (B) transform faults (C) anticlines (D) synclines

61. Porosity is

(A) the percentage of a rock's volume that is open space
(B) the capacity of a rock to transmit fluid
(C) the ability of a sediment to retard water
(D) none of the above

62. Seasons on Earth occur because of:

(A) Disproportionate distribution of land mass in northern and southern hemispheres
(B) Tilt of the Earth's axis of rotation
(C) Changes in the specific heat of water and land mass and the wind circulation that is a consequence of the changes in the temperature
(D) Changes in the circulation of Green house gases.

63. An aquifer is

(A) a body of saturated rock or sediment through which water can move easily
(B) a body of rock that retards flow of ground water
(C) a body of rock that is impermeable
(D) a body of rock containing water

64. Which rock type below is likely to possess the highest porosity?

(A) sandstone (B) conglomerate (C) siltsone (D) shale

65. Which rock type below is likely to possess the highest permeability?

(A) shale (B) sandstone (C) siltsone (D) granite

66. The decline in the level of the water table around a pumping well is known as

(A) the porosity parameter (B) the permeability gradient
(C) the cone of depression (D) the sphere of influence

67. The maximum and minimum values of 16cosx+12sinx-9 are

(A) 11 and -29 (B) -29 and 11 (C) -11 and 29 (D) 29 and -11

68. If A = { 1,3,5,8} and B = { 2,3,5 } then (AUB) – $(A \cap B)$ is

(A) { 1,3,5,8} (B) { 2,3,5 } (C) { 1,2,8 } (D) { 2,5,8 }

69. The quadrant containing the point (-7,0) is

(A) I (B) II (C) I and II (D) None

70. Solution of the equation Mod(2x+3) < 2 is

(A) (-2,-3/2)U(-3/2,1) (B) (-5/2,-1/2) (C) (-3/2,-1)U(-1,2) (D) None

71. If the order of the matrix A is 2x3 and the order of the matrix B is 2x4 then the order of $(A^TB)^T$ is

(A) 3 x 2 (B) 3 x 4 (C) 4 x 3 (D) 2 x 3

72. If A+B =225 then (1+tanA)(1+tanB)=

(A) 2 (B) 1 (C) 2tanAtanB (D) None of these

73. Limit $\lim_{x \to \infty} \frac{x}{(4x^2+1)\ -1}$

(A) 4 (B) 1/4 (C) 0 (D) ∞

74. If a polynomial f(x) is divided by (2x-3), the quotient is x^2+2x-1 and remainder is 3 then f(x) is

(A) $2x^3+x^2-8x+6$ (B) x^3-2x^2+8x-6 (C) $2x^3-x^2+8x-6$ (D) None

75. If the length of 3 sides of a triangle are 3, 4 and 5 then area of triangle is

(A) 6 (B) 16 (C) 36 (D) 256
