University of Hyderabad

ENTRANCE EXAMINATION 2012

M.Tech / Advanced P.G. Diploma in Mineral Exploration

Date :   06.06.2012

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 both the question paper booklet and 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. A ball rests upon a flat piece of paper on a table top. The paper is pulled horizontally and quickly towards right. Relative to its initial position with respect to the table, the ball
   (A) remains stationary if there is no friction between the paper and the ball.
   (B) moves to the left and starts rolling backwards if there is a friction between the paper and the ball.
   (C) moves forward, i.e. in the direction in which the paper is pulled.
   (D) both A & B.

2. When the planet comes nearer the sun it moves
   (A) fast   (B) slow   (C) constant at every point   (D) none of the above

3. 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

4. Permeability is
   A) The percentage of a rock's volume that is openings
   B) the capacity of a rock to transmit fluids
   C) the ability of a sediment to retard water
   D) none of the above

5. The d-block transition elements exhibit ability to exist in multiple oxidation states. Arrange the following elements according to the number of possible oxidation states.

(A) Zn < Ti < V < Mn   (B) Ti < Zn < V < Mn

(C) Zn < V < Ti < Mn   (D) Ti < Zn < Mn < V

6. Paramagnetism is given by the relation $\mu = 2(s(s+1))^{1/2}$ magnetons where 's' is the total spin. N this basis, the paramagnetism of Cu^+ in magnetons is

(A) 3.88   (B) 2.83   (C) 1.41   (D) 0

7. Density of H_2O is maximum at

(A) 0°C   (B) -4°C   (C) -273°C   (D) 4°C

8. The period of geostationary artificial satellite is

(A) 24 hours   (B) 6 hours   (C) 12 hours   (D) 48 hours

9. A missile is launched with a velocity less than the escape velocity. The sum of its kinetic and potential energy is

(A) Positive   (B) Negative   (C) Zero   (D) may be positive or negative

10. The slope of the line joining two points (3,6) and (-5,12) is

A) -4/3   B) 4/3   C) -3/4   D) -3

11. The value of Sin30 .Cos60 - Cos30.Sin 60

A) 0   B) 1/2   C) -1   D) -1/2

12. If the matrices A and B are of order 2x3 and 2x2 respectively then the matrix (AB)

A) exists and of order 2x2   B) exists and of order 2x3

C) exists and of order 3x2   D) Does not exist

13. The distance between 2 points A (1,-3) and B (4,-4) is

A) $2\sqrt{5}$ B) $\sqrt{10}$ C) 10   D) $5\sqrt{2}$

14. There is no atmosphere on the moon because

(A) it is closer ot the earth

(B) it revolves round the earth

(C) it gets light from the sun

(D) the escape velocity of gas molecules is less than their root mean square velocity.

15. A satellite is revolving around the sun in a circular orbit with uniform velocity v. If the gravitational force suddenly disappears, the velocity of the satellite will be

(A) zero   (B) v   (C) 2v   (D) infinity

16. The Earth's core is made of

(A) liquid metal   (B) solid metal   (C) slushy metal   (D) none of the above

17. Pumice is a(n)

    (A) Igneous rock   (B) sedimentary rock

    (C) metamorphic rock   (D) both B and C

18. Stalactites are found in caves on the

    (A) roofs   (B) walls   (C) floors   (D) All above

19. Geo-stationary satellite

    (A) revolves about the polar axis

    (B) has a time period less than that of the earth's satellite

    (C) moves faster than a near earth satellite

    (D) is stationary in the space

20. Two planets of radii r_1 and r_2 are made from the same material. The ratio of the acceleration due to gravity g_1/g_2 at the surface of the two planets is

    (A) $\frac{r_1}{r_2}$ (B) $\frac{r_2}{r_1}$ (C) $\left(\frac{r_1}{r_2}\right)^2$ (D) $\left(\frac{r_2}{r_1}\right)^2$

21. If g is the acceleration due to gravity of the earth's surface the gain in the potential energy of an object of mass m raised from the surface of the earth to a height equal to the radius R of the earth is

    (A) $\frac{1}{2}mgR$ (B) 2mgR   (C) mgR   (D) $\frac{1}{4}mgR$

22. The Proton precession magnetometer measures

    (A) Vertical magnetic field   (B) horizontal magnetic field

    (C) total magnetic field   (D) inclination of magnetic field

23. The boundary that separates the crust from the mantle is called

    A) the crust-mantle boundary   B) the lithosphere

    C) the Moho   D) all of these

24. A positive gravity anomaly indicates

    A) an excess of mass   B) a deficiency in mass

    C) a reversal of the gravitational field   D) none of these

25. If the radius of the earth were to shrink by one percent, its mass remaining the same, the acceleration due to gravity on the earth's surface would

    (A) decrease   (B) remains unchanged   (C) increase   (D) none of these

Z-55

PART-B

26. A artificial satellite moving in a circular orbit around the earth has a total (kinetic + potential) energy E_0. Its potential energy is
    (A) $2E_0$ (B) E_0 (C) $1.5\,E_0$ (D) $-E_0$

27. The dimensions of universal gravitational constant are
    (A) $M^2 L^2 T^2$ (B) $M^{-1} L^3 T^{-2}$ (C) $M L^{-1} T^2$ (D) $M L^2 T^2$

28. The masses of two planets are in the ratio 1 : 2. Their radii are in the ratio 1 : 2. The acceleration due to gravity on the planets is in the ratio of
    (A) 1 : 2   (B) 2 : 1   (C) 3 : 5   (D) 5 : 3

29. The modulus of elasticity is dimensionally equivalent to
    (A) Strain   (B) Stress   (C) Surface tension   (D) Poisson's ratio

30. 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

31. Which rock type below is likely to possess the highest porosity?
    A) sandstone   B) conglomerate   C) siltsone   D) shale

32. Folding occurs when rocks behave as
    A) brittle solids   B) fluids   C) ductile solids   D) none of these

33. A structural basin is a special case of
    A) a dome   B) a syncline   C) an anticline   D) a freak of nature

34. Which one of he following does not affect the elasticity of a substance?
    (A) Hammering   (B) Adding impurity in the substance
    (C) Changing the dimensions   (D) Change of temperature

35. Centre of mass of two body system divides the distance between two bodies, is proportional
    (A) to inverse of square of the mass   (B) to inverse of mass
    (C) to the ratio of the square of mass   (D) to the ratio of mass

36. Moment of inertia depends on
    (A) Distribution of particles   (B) Mass   (C) Position of axis of rotation   (D) All of these

37. A body is moving along a circular path with variable speed. It has
    (A) a radial acceleration   (B) a tangential acceleration
    (C) zero acceleration   (D) both tangential and radial accelerations

38. A car moving on a horizontal road may be thrown out of the road is taking a turn
    (A) by the gravitational force
    (B) due to the lack of proper centripetal force
    (C) due to the lack of frictional force between the tire and the road
    (D) due to the reaction of the ground

39. 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

40. 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

41. 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

42. If $y = x^2 - 5x + 7$ then dy/dx at $x = -3$ is
    A) 1   B) -11   C) 13   D) -8

43. The derivative of $Cot(3x+4)$ is
    A) $tan(3x+4)$ B) $3tan(3x+4)$ C) $-cosec^2(3x+4)$ D) $-3cosec^2(3x+4)$

44. Value of $Cos1.Cos2.Cos3 \ldots \ldots Cos179 =$
    A) 1   B) -1   C) 0   D) None of these

45. $\lim\limits_{x \to \infty} \dfrac{(3x-5x^2-11)}{(7x^2+4x-1)}$
    A) -5/7   B) 3/7   C) 0   D) ∞

46. Froth-flotation process is used in the purification of _____ type of ores
    (A) Sulphide ore   (B) Oxide ore   (C) Chloride ore   (D) Carbonate ore

47. On igniting Fe_2O_3 at $1500°C$, the product obtained is
    (A) Molten Fe_2O_3 (B) FeO   (C) Fe_3O_4 (D) metallic Fe

48. Which of the following compounds has maximum pk_a value
    (A) H_2O (B) H_2S (C) H_2Se (D) H_2Te

49. Which one of the following molecules does not have tetrahedral shape
    (A) SO_4^{2-} (B) XeF_4 (C) ClO^{4+} (D) XeO_4

50. Rain drops are spherical because of
    (A) Gravitational force   (B) Surface tension
    (C) Air resistance   (D) Low viscosity of water

51. 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

52. For a water does not wet a glass rod, the angle of contact is
    (A) Obtuse   (B) Acute
    (C) 0°   (D) 90°

53. Which of the following is a type of stress?
    A) shear   B) compression   C) tension   D) all of these are types of stress.

54. What proportion of Earth's water resources occurs as ground water?
    A) less than 1%   B) 10%   C) 25%   D) 33%

55. 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

56. If θ is acute and $\csc\theta = 17/8$ then $\cot\theta$ is
    A) 15/8   B) 8/15   C) 15/17   D) 17/15

57. If $x = a\cos\theta$ and $y = a\sin\theta$ then eliminating θ we get
    A) a circle   B) Ellipse   C) Parabola   D) Hyperbola

58. The value of $\sec^2(7\pi/4)$ is
    A) 4   B) 2   C) 1/2   D) 1/4

59. $\displaystyle\lim_{x \to 6} \frac{(x^3 - 216)}{(x-6)}$
    A) 0   B) 6/5   C) 108   D) -2/5

60. The derivative of sinx at x=180 is
    A) 0   B) 1   C) -1   D) undefined

61. Compared to felsic igneous rocks, mafic igneous rocks contain greater amounts of
    (A) White quartz   (B) aluminium   (C) pink feldspar   (D) iron

62. What are the two most abundant elements by mass found in Earth
    (A) aluminum and iron   (B) sodium and chlorine
    (C) calcium and carbon   (D) oxygen and silicon

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

    (A) breccia   (B) conglomerate   (C) dolostone   (D) shale

64. The apparent resistivity sounding curve representing the resistivity structure $\rho_1 > \rho_2 < \rho_3 > \rho_4$

    (A) HK type   (B) HA type   (C) KH type   (D) KQ type

65. A positive magnetic anomaly indicates

    A) a body of magnetic ore   B) an intrusion of gabbro

    C) mafic rock masse   D) all of the above

66. 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

67. The largest portion of Earth's volume is

    A) the crust   B) the mantle   C) the inner core   D) the outer core

68. The average thickness of the crust is

    A) 10-12 km   B) 30-50 km   C) 100-150 km   D) 1 km

69. Which of the following measures of central tendency tends to be most influenced by extreme values?

    (A) median   (B) mode   (C) mean   (D) none of the above

70. In a set of 15 values, the largest value is increased by 60 points. What effect will this have on the mean of the set of values?

    (A) it will be increased by 60 points   (B) it will remain unchanged

    (C) it will be increased by 4 points   (D) all the above are correct

71. The sample variance of the following sample of five numbers 5, 5,5,5,5 is

    (A) 0   (B) 5   (C) 25   (D) none of the above

72. The variance of a set of negative numbers is

    (A) Negative   (B) Positive   (C) undefined   (D) zero

73. Monomer used in the manufacture of Teflon is

    (A) $CHCl_2\text{-}CHF_2$ (B) $F_2C\text{=}CF_2$ (C) $Cl_2C\text{=}CCl_2$ (D) $F_2HC\text{-}CHF_2$

74. The reaction of aldehydes and ketones with $LiAlH_4$ and $NaBH_4$ is

    (A) Nucleophilic addition   (B) nucleophilic substitution

    (C) Elimination   (D) electrophilic substitution

75. Which of the following has the highest boiling point?

    (A) $CH_3COCH_2CH_3$ (B) CH_3COCH_3 (C) CH_3CHO (D) $CH_3COCH_2CH_2CH_3$