

**ENTRANCE EXAMINATION 2014**  
**M.Tech./Advanced P.G. Diploma in Mineral Exploration**

Date: 06.02.2014

Time: 2.00-4.00 PM

Marks: 75

**Instructions for the candidates:**

- i) All questions carry equal marks.
- ii) Write your Hall Ticket Number in the OMR Answer Sheet given to you. Also write the Hall Ticket Number in the space provided above.
- iii) **There is negative marking. Every wrong answer carries 0.33 mark.**
- iv) Hand over the OMR answer sheet at the end of the examination to the Invigilator.
- v) No additional sheets will be provided. Rough work can be done in the question paper itself / space provided at the end of the booklet.
- vi) Non-programmable calculators are allowed.

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**PART - A**

1. The value of 'g' at a point is  $9.8 \text{ m/sce}^2$ . Suppose the earth suddenly shrink uniformly to half its present size without losing any mass. The value of 'g' at the same point (assuming that the distance of the point from the centre of the earth does not shrink) will become  
(A)  $9.8 \text{ m/sce}^2$  (B)  $4.9 \text{ m/sce}^2$   
(C)  $19.6 \text{ m/sce}^2$  (D)  $2.45 \text{ m/sce}^2$
2. Volcanism is associated with which of the following types of plate boundaries?  
(A) convergent plate boundaries  
(B) divergent plate boundaries  
(C) transform fault plate boundaries  
(D) divergent and convergent plate boundaries
3. In the preparation of frequency distribution for sample, the number of classes depends on  
(A) Number of data points (B) The range of the data  
(C) both A and B (D) none of these
4. What is the name of the large supercontinent that existed 200 million years ago when all of the continents were together?  
(A) San Andreas (B) Andian (C) Indian (D) Pangaea
5. Which of the following statements about convection is true?  
(A) heat is transferred from hot material to cool material without inducing a flow.  
(B) cool material flows upward and displaces hot material  
(C) hot material flows upward and displaces cool material  
(D) random circulation occurs
6. A relative frequency distribution presents frequencies in terms of  
(A) Whole numbers (B) Fractions (C) binary number (D) None of these

7. The number of moles of solute present in 1 kg of a solvent is called its  
 (A) molality (B) molarity (C) normality (D) formality
8. The most electronegative element among the following is  
 (A) sodium (B) bromine (C) fluorine (D) oxygen
9. The law which states that the amount of gas dissolved in a liquid is proportional to its partial pressure is  
 (A) Dalton's law (B) Gay Lussac's law (C) Henry's law (D) Raoult's law
10. The geothermal gradient in the crust averages  
 (A)  $25^{\circ}/\text{km}$  (B)  $1^{\circ}/\text{km}$  (C)  $10^{\circ}/\text{km}$  (D)  $125^{\circ}/\text{km}$
11. 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
12. A positive magnetic anomaly indicates  
 (A) a body of magnetic ore (B) an intrusion of gabbro  
 (C) mafic rock masses (D) all of the above
13. If the correlation coefficient is negative between dependent and independent variables, then the sign of regression coefficient in simple linear regression is  
 (A) Positive (B) negative (C) zero (D) difficult to know
14. The limits for coefficient correlation are  
 (A) 0 to 1 (B)  $-1$  to  $+1$  (C) 1 to 100 (D)  $-1$  to 0
15. The limits for coefficient of determination in linear regression are  
 (A) 0 to 1 (B)  $-1$  to  $+1$  (C) 1 to 100 (D)  $-1$  to 0
16. 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
17. In the construction of a frequency distribution it is always recommended to have classes of  
 (A) Equal width (B) Unequal width (C) smaller width (D) Larger width
18. A body is traveling in a circle at constant speed. It  
 (A) has constant velocity (B) has no acceleration  
 (C) has an inward acceleration (D) has an outward radial acceleration
19. Area of the triangle formed by the vertices (6,5), (-3,2) and (5,-1) is  
 (A) 25.5 (B) 51 (C) 102 (D) 156
20. Equation of line passing through (-2,3) and perpendicular to  $x-3y+17=0$  is  
 (A)  $3x+y+3=0$  (B)  $x-3y+3=0$  (C)  $3x+y+11=0$  (D)  $x-3y+11=0$
21. If  $\operatorname{cosec} x = 17/8$  and  $x$  is acute, then the value of  $\tan x$  is  
 (A)  $15/8$  (B)  $8/15$  (C)  $17/15$  (D)  $8/17$
22. A ladder of length 16 m, when it is placed against vertical wall, its top is 8 m vertically above the base of the wall. The angle made by ladder with the ground is  
 (A)  $60^{\circ}$  (B)  $30^{\circ}$  (C)  $45^{\circ}$  (D)  $75^{\circ}$
23. Which of the following is not an example of isostasy?  
 (A) deep mountain roots (B) deep mountain roots  
 (C) ocean basins are deeper than continents (D) all of these
24. Convection is likely occurring in  
 (A) the mantle (B) the outer core  
 (C) both the mantle and the outer core (D) throughout the Earth

25. A car moving on a horizontal road may be thrown out of the road while 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

**PART- B**

26. A liquid is kept in a glass beaker. Which molecules of the liquid have the highest potential energy?
- (A) Molecules at the bottom of the beaker
  - (B) Molecules near the centre of the liquid
  - (C) Molecules lying at half the depth of liquid and touching the walls of beaker
  - (D) Molecules lying in the surface film
27. The surface of water in contact with glass wall is
- (A) Plane
  - (B) Convex
  - (C) Concave
  - (D) Either convex or concave
28. Energy in a stretched wire is
- (A) Half of load strain
  - (B) Half of stress strain
  - (C) Stress strain
  - (D) Load strain
29. The substance which shows practically no elastic after effect is
- (A) Quartz
  - (B) Copper
  - (C) Silk
  - (D) Rubber
30. The descent of oceanic lithosphere into the mantle is the process of
- (A) subduction
  - (B) accretion
  - (C) divergence
  - (D) contraction
31. Approximate depth of deep-sea trenches
- (A) 1 km
  - (B) 10 km
  - (C) 100 km
  - (D) 250 km
32. What caused dust and condensing material to accrete into planetesimals?
- (A) heating of gases
  - (B) gravitational attraction and collisions
  - (C) nuclear fusion
  - (D) rotation of the proto-sun
33. The name of the layer of the Earth that separates the crust from the core is the
- (A) magma
  - (B) lithosphere magma
  - (C) asthenosphere
  - (D) mantle
34. Oxygen built up in the Earth's atmosphere because
- (A) the oceans separated from the crust
  - (B) rocks weathered and released their oxygen
  - (C) algae and other organisms employed photosynthesis
  - (D) oxygen settled on Earth from planets further from the sun
35. Which of the planets is not geologically active?
- (A) Mars
  - (B) Mercury
  - (C) Venus
  - (D) Earth
36. A astronaut can't hear the explosion on the surface of the moon because
- (A) Frequency of explosion is out of audible range
  - (B) Temperature at that point is very low
  - (C) There is no medium on moon
  - (D) None of above

37. Elastic waves in a solid are  
(A) Only transverse (B) Only longitudinal  
(C) Either transverse or longitudinal (D) Neither transverse nor longitudinal
38. The molecule which has the highest percentage of ionic character among the following is  
(A) HI (B) HF (C) HCl (D) HBr
39. The maximum number of covalent formed by nitrogen is  
(A) 1 (B) 2 (C) 3 (D) 4
40. If A is the set of all factors of 72, B is the set of all multiples of 8, then  $A \cap B$  is  
(A) {6, 8, 24, 72} (B) {2, 3, 24, 72}  
(C) {8, 12, 29, 48, 72} (D) {8, 24, 72}
41. If  $f(x, y) = y^2$ , then  $f(2, f(3,5))$  is  
(A) 125 (B) 625 (C) 81 (D) 375
42. If  $4x+7>9$ , then  
(A)  $x>1$  (B)  $x>5/6$  (C)  $x>1/2$  (D)  $x>3/4$
43. Geometric mean of the series 2, 4, 8, 16 is  
(A) 32 (B) 64 (C) 8 (D)  $\sqrt{32}$
44. The monomer of polythene is  
(A) vinyl chloride (B) ethylene (C) ethyl alcohol (D) None of the above
45. The luster of a metal is due to  
(A) its high density (B) its high polishing  
(C) its chemical inertness (D) presence of free electrons
46. The most abundant rare gas in the atmosphere is  
(A) He (B) Ne (C) Ar (D) Xe
47. The asthenosphere is  
(A) cool and strong (B) cool and weak (C) hot and strong (D) hot and weak
48. Features useful in defining plate boundaries include all except  
(A) shorelines between continents and oceans  
(B) distribution of volcanoes  
(C) distribution of earthquakes  
(D) distribution of mountain ranges
49. How thick is the crust of the Earth?  
(A) about 4 miles (B) about 4 km (C) about 40 km (D) about 400 km
50. Land plants appeared during  
(A) Cenozoic (B) Mesozoic (C) Paleozoic (D) Precambrian
51. Which of the following isotopes is most useful for dating very young wood and charcoal?  
(A) rubidium-87 (B) potassium-40 (C) carbon-14 (D) uranium-238
52. A closed organ pipe and an open organ pipe have their first overtones identical in frequency. Their lengths are in the ratio of  
(A) 1:2 (B) 2:3 (C) 3:4 (D) 4:5
53. 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)  $r_1/r_2$  (B)  $r_2/r_1$  (C)  $(r_1/r_2)^2$  (D)  $(r_2/r_1)^2$
54. The flow of heat from a hot body to a cold body is an example of  
(A) Isothermal process (B) Reversible process  
(C) Adiabatic process (D) Irreversible process
55. The emissive of a perfectly black body is  
(A) 0 (B) 0.5 (C) 1 (D) 0.75

56. For which of the following correlations would the data points be clustered most closely around a 45 degree line?  
(A) 0.05 (B) 0.50 (C) -0.6 (D) 0.9
57. For a standard normal variable the mean and variance are  
(A) 0 and 1 (B) 1 and 0 (C) 0 and 0 (D) 1 and 1
58. The shape of Normal curve is  
(A) Bell shape (B) straight line (C) skewed towards left (D) skewed towards right
59. The limits of a probability measure are  
(A) 0 to 1 (B) -1 to +1 (C) 0 to 100 (D) -1 to 0
60. The probability of getting a Head when you toss a unbiased coin is  
(A) 1 (B) 0.5 (C) -1 (D) -0.5
61. What is the probability of an odd numbers to appear in a single toss of fair dice.  
(A)  $1/6$  (B)  $1/2$  (C) 1 (D)  $-2/6$
62. If  $P(A \text{ or } B) = P(A)$  then  
(A) A and B are mutually exclusive (B) A and B are independent  
(C) A and B are dependent (D) none of these
63. The ability of a given substance to assume two or more crystalline structure is called  
(A) polymorphism (B) isomorphism  
(C) amorphous (D) isomerism
64. How does the Binding Energy per nucleon vary with the increase in the number of nucleons?  
(A) Increases continuously with mass number  
(B) Decrease continuously with mass number  
(C) First decreases and then increases with increase in mass number  
(D) First increases and then decreases with increase in mass number
65. In the ground state, an element has 13 electrons in its M-shell. The element is  
(A) Copper (B) Chromium (C) Nickel (D) Iron
66. What are the conditions under which the relation between volume (V) and number of moles (n) gas plotted? (P = pressure; T= temperature)  
(A) Constant P and T (B) Constant T and V  
(C) Constant P and V (D) Constant n and V
67. Which of the following statements is true?  
(A) As temperature decreases and salinity decreases, density decreases  
(B) As temperature increases and salinity increases, density decreases  
(C) As temperature increases and salinity decreases, density increases  
(D) As temperature decreases and salinity increases, density increases
68. The densest water body in the oceans is  
(A) North Atlantic deep water (B) Antarctic intermediate water  
(C) Antarctic bottom water (D) South Atlantic surface water
69. Acoustic impedance is defined as  
(A) seismic velocity x density (B) seismic velocity + density  
(C) seismic velocity / density (D) seismic velocity – density
70. At mid-ocean ridges, two plates are  
(A) moving towards each other (B) moving away from each other  
(C) sliding along each other (D) stationary
71. Eruptions dominated by basaltic lava flows typically form what type of volcanoes?  
(A) composite (B) stratospheric (C) cinder cone (D) shield

72. Which of the following is NOT a process of physical (mechanical) weathering?  
(A) Frost wedging (B) unloading (C) thermal expansion (D) dissolution
73. Which of the crystal systems has four crystallographic axes?  
(A) monoclinic (B) triclinic (C) hexagonal (D) tetragonal
74. What is the average specific gravity of the continental crust?  
(A) 1.5 (B) 2.5 (C) 3.5 (D) 4.5
75. If only density increases with increasing depth within the earth, the velocity of a P wave should  
(A) stay the same (B) increase (C) decrease (D) zero

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