

University of Hyderabad

ENTRANCE EXAMINATION 2013-2014

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

Date/Day: 26.02.2013, Tuesday

Time: 2.00 – 4.00 pm

Marks: 75

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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~~ 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.
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**PART-A**

1. 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)  $M L^2 T^{-2}$

2. If the acceleration due to gravity of a planet is half the acceleration due to gravity of earth's surface and radius of planet is half the radius of the earth, the mass of planet in terms of mass of earth is

- (A)  $\frac{M_e}{2}$  (B)  $\frac{M_e}{4}$  (C)  $\frac{M_e}{6}$  (D)  $\frac{M_e}{8}$

3. 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

4. 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
5. 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
6. 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
7. A bucket containing water is tied to one end of a rope of length 2.5 m and rotated about the other end in a vertical circle. What should be the minimum velocity of the bucket at the highest point, so that the water in the bucket will not spill? ( $g = 10 \text{ m/s}^2$ )  
 (A) 2.5 m/s (B) 4 m/s (C) 5 m/s (D) 7 m/s
8. The points (4,4), (-4,-4) and  $(-4\sqrt{3}, 4\sqrt{3})$  form a triangle which is  
 (A) Isosceles (B) Equilateral (C) Acute angle (D) Right angled
9. If  $\sin x + \cos x = 0$  and  $x$  does not lie in either 2<sup>nd</sup> or 3<sup>rd</sup> quadrant then  $\sec x =$   
 (A)  $\sqrt{2}$  (B)  $-\sqrt{2}$  (C) 1 (D) -1
10. The value of determinant two of whose rows are equal is  
 (A) 0 (B) 1 (C) 2 (D) Does not exist
11. The quadrant containing the point (0,5) is  
 (A) I (B) II (C) I and II (D) None
12. If  $y = 3x^2 - 15x + 17$  then  $dy/dx$  at  $x = -1$  is  
 (A) -11 (B) -21 (C) 21 (D) None
13. The derivative of  $\sin 3x$  with respect to  $\cos 3x$  is  
 (A)  $\tan 3x$  (B)  $-\cot 3x$  (C)  $-3\tan 3x$  (D)  $-3\cot 3x$
14. If  $A+B = 225$  then  $(1+\tan A)(1+\tan B) =$   
 (A) 2 (B) 1 (C)  $2\tan A \tan B$  (D) None of these
15. Which of the following elements is NOT among the 8 most abundant elements in Earth's crust?  
 (A) potassium (B) calcium (C) carbon (D) iron

16. Atoms become ions when they  
(A) gain or lose electrons (B) gain or lose protons  
(C) gain or lose neutrons (D) gain or lose mass
17. The largest portion of Earth's volume is  
(A) the crust (B) the mantle (C) the inner core (D) the outer core
18. The composition of the upper mantle is known because  
(A) samples of mantle rock have been analyzed by scientists  
(B) meteorites are believed to be similar to the mantle  
(C) some caves on Earth extend into the mantle  
(D) none of these
19. The average thickness of oceanic crust is  
(A) 5-10 km (B) 30-50 km (C) 100-150 km (D) 200-300 km
20. Most ocean water probably came from  
(A) comets impacting Earth's surface (B) volcanic degassing of the planet  
(C) rain falling into the ocean basins (D) melting of polar ice caps
21. The Richter Scale is used to determine  
(A) intensity of earthquakes (B) the magnitude of earthquakes  
(C) the damage from earthquakes (D) the number of casualties in an earthquake
22. The compound that contains both ionic and covalent bonds is  
(A)  $\text{CH}_4$  (B)  $\text{H}_2$  (C)  $\text{KCN}$  (D)  $\text{KCl}$
23. Which of the following burns in Nitrogen gas?  
(A)  $\text{Cu}$  (B)  $\text{Mg}$  (C)  $\text{Zn}$  (D)  $\text{Fe}$
24. Gravity field of the earth varies with  
(A) latitude (B) longitude  
(C) both latitude and longitude (D) none of these
25. The unit of density is  
(A)  $\text{g/cc}$  (B)  $\text{kg}$  (C)  $\text{g/kg}$  (D)  $\text{km}$

**PART-B**

26. A car is moving with a speed of 30 m/s on a circular path of radius 500 m. Its speed is increasing at the rate of  $2 \text{ m/s}^2$ . The acceleration of the car is  
 (A)  $9.8 \text{ m/s}^2$  (B)  $1.8 \text{ m/s}^2$  (C)  $2 \text{ m/s}^2$  (D)  $2.7 \text{ m/s}^2$
27. A cyclist turns around a curve at 15 miles per hour. If he turns at double the speed, the tendency of overturn is  
 (A) doubled (B) quadrupled (C) halved (D) unchanged
28. 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
29. A sphere, a cube and a thin circular plate all made of the same material and having the same mass are initially heated to a temperature of  $300^\circ\text{C}$ . Which one of these cools faster?  
 (A) Circular plate (B) Sphere (C) Cube (D) All will cool at the same rate
30. The emissive of a perfectly black body is  
 (A) 0 (B) 0.5 (C) 1 (D) 0.75
31. The coefficient of transmission of a perfectly black body is  
 (A) Zero (B) One (C) 0.5 (D) 0.75
32. An ideal black body is represented by  
 (A) A metal coated with a black dye (B) A glass surface coated with coal tar  
 (C) A hollow enclosure blackened from inside and having a small hole  
 (D) A lump of charcoal heated to a high temperature
33. According to Prevost's theory of heat exchange, the heat exchange stops at  
 (A)  $0^\circ\text{C}$  (B)  $-5^\circ\text{C}$  (C)  $-273^\circ\text{C}$  (D)  $-273 \text{ K}$
34. Two thermometers A and B exposed to sunlight. The value of A is painted black but that of B is not painted. The correct statement regarding this case is  
 (A) Temperature of B will rise faster

- (B) Temperature of A will remain more than B  
 (C) Both of A and B show equal rise from the beginning  
 (D) Temperature of A will rise faster than B but the final temperature will be same in both
35. Moon has no atmosphere because  
 (A) It is far away from the surface of the earth  
 (B) Its surface temperature is  $10^{\circ}\text{C}$   
 (C) The r.m.s. velocity of all the gas molecules is more than the escape velocity of the moon's surface  
 (D) The escape velocity of the moon's surface is more than the r.m.s velocity of all molecules
36. According to kinetic theory of gasses at absolute zero temperature  
 (A) Water freezes (B) Liquid helium freezes  
 (C) Molecules motion stops (D) Liquid hydrogen freezes
37. For an ideal gas,  $\frac{C_v}{C_p}$  is  
 (A)  $> 1$  (B)  $< 1$  (C)  $= 1$  (D)  $= 2$
38. Boyle's law is applicable in  
 (A) Isochoric process (B) Isothermal process (C) Isobaric process (D) Isotonic process
39. If the pressure of an ideal gas is decreased by 10% isothermally, then its volume will  
 (A) Increase by 10% (B) Increase by 11.1% (C) Decrease by 10% (D) Decrease by 9%
40. Which of the following properties of gas molecule the one that is same for all ideal gases at a particular temperature is  
 (A) Mass (B) Velocity (C) Momentum (D) Kinetic energy
41. Theoretical value of Poisson's ratio lies between  
 (A) -1 to 0.5 (B) -1 to -2 (C) 0.5 to 1 (D) None
42. Which is true of the continental shelf?  
 (A) it is a shallow submarine platform at the edge of continents  
 (B) it slopes very gently seaward

- (C) it has variable width
- (D) all of these
43. Which is characteristic of mid-ocean ridges?
- (A) shallow focus earthquakes (B) high heat flow (C) basalt eruptions (D) all of these
44. Oceanic trenches
- (A) are narrow deep troughs (B) parallel the edges of continents and island arcs
- (C) are typically 8-10 km deep (D) all of these
45. The portion of the continental margin that marks the true edge of the continent is
- (A) continental shelf (B) continental slope (C) continental rise (D) abyssal plain
46. The deepest portions of the ocean basins are
- (A) ocean trenches (B) mid-ocean ridges (C) abyssal plains (D) continental slopes
47. Active volcanoes are associated with
- (A) Active continental margins (B) Ocean islands
- (C) Mid-Ocean Ridges (D) all of these
48. The oldest seafloor on Earth is not more than
- (A) 200 million years old (B) 2 billion years old
- (C) 20 million years old (D) 2 million years old
49. The point within the Earth where seismic waves originate is
- (A) the epicenter (B) the fault scarp (C) the origin (D) the focus
50. The minimum number of seismic stations needed to locate an earthquake is
- (A) 8 (B) 2 (C) 3 (D) 1
51. Most earthquakes at divergent plate boundaries are
- (A) shallow focus (B) intermediate focus (C) deep focus (D) all of these
52. Magnetic field is defined as
- (A) force/unit pole strength (B) product of force and unit pole strength
- (C) both (A) and (B) (D) None of these

53. Which of the following is a characteristic metamorphic mineral?  
 (A) Kyanite (B) Staurolite (C) Cordierite (D) All of the above
54. Negative gravity anomalies are generally associated with  
 (A) sedimentary basins (B) Cratons  
 (C) Metamorphic basement (D) None of these
55. The first seismic waves to arrive at a seismic station are  
 (A) P-waves (B) S-waves (C) Love waves (D) Rayleigh waves
56. Among the secondary effects of large earthquakes are  
 (A) tsunamis (B) fires (C) landslides (D) all of these
57. Folding occurs when rocks behave as  
 (A) brittle solids (B) fluids (C) ductile solids (D) none of these
58. Anticlines  
 (A) form in rocks that are resistant to folding  
 (B) form in rocks as a result of brittle deformation  
 (C) are upwarped folds  
 (D) are downwarped folds
59. In a syncline, the oldest rocks will be found  
 (A) on the limbs of the fold (B) near the axis of the fold  
 (C) at the bottom of the fold (D) none of these
60. Limit  $\lim_{n \rightarrow \infty} \frac{(1+3+5+\dots+(2n-1))}{(2+4+6+\dots+2n)}$   
 (A) 6 (B) 87 (C) 2 (D) 1
61. If  $270 < \theta < 360$  and  $\tan\theta = -24/7$  then  $\sin(\theta/2)$  is  
 (A)  $3/5$  (B)  $4/5$  (C)  $-3/5$  (D)  $-4/5$
62. If the length of 3 sides of a triangle are 30, 24 and 18 then area of triangle is  
 (A) 216 (B) 316 (C) 218 (D) 318
63. The value of  $\tan(45+\theta) + \tan(45-\theta)$  is  
 (A)  $\sec 2\theta$  (B)  $2\sec 2\theta$  (C)  $\operatorname{cosec} 2\theta$  (D)  $2\operatorname{cosec} 2\theta$

64. Limit  $\lim_{x \rightarrow 1} \frac{\sin(x-1)}{(x^2-1)}$
- (A) -1      (B) 1/5      (C) 5      (D) 1
65. The derivative of  $\cos x$  at  $x=270$  is
- (A) 0      (B) 1      (C) -1      (D) undefined
66. The point which is equidistant from (9,3) (7,-1) and (-1,-1) is
- (A) (4,-3)      (B) (-4,3)      (C) (-4,-3)      (D) (4,3)
67. The points (a,0), (0,b) and (3,3) are collinear if
- (A)  $a+b=3$       (B)  $a+b=1/3$       (C)  $1/a + 1/b = 1/3$       (D)  $1/a + 1/b = 3$
68. The angles of the top and foot of a tower as observed from the top of a hill are  $30^\circ$  and  $60^\circ$ . If the height of the hill is 60 m, then the height of the tower is
- (A) 40 m      (B) 50 m      (C) 60 m      (D) 30 m
69. A man invites one or more of his 8 friends to a dinner in .... ways
- (A) 455      (B) 400      (C) 300      (D) None of these
70. The quartile-2 of a data set is 25 and the median is 30. What these indicate?
- (A) The data is very homogeneous      (B) Mistake in calculation  
(C) Data is following Normal distribution      (D) The data got many extreme values
71. What can be said about a set of data when its standard deviation is zero?
- (A) The mean is also zero      (B) All of the data appear with the same frequency  
(C) There is no mode      (D) There is very less difference between data points.
72. If codomain of a function consists of a single element, then constant function is always
- (A) one-one      (B) onto      (C) into      (D) bijective
73. In an isothermal change, an ideal gas obeys
- (A) Boyles law      (B) Charles law      (C) Gay – Lussac's law      (D) None of these
74. The ion that can't be precipitated by both HCl and  $H_2S$  is
- (A)  $Pb^{2+}$       (B)  $Ag^+$       (C)  $Cu^+$       (D)  $Sn^{2+}$
75. Sometimes chlorine gas is passed through water for its purification. What will be the pH value of such a sample of water?
- (A) 7      (B)  $< 7$       (C)  $> 7$       (D) 8
-