Presidency University, Kolkata
Department of Geology
Undergraduate Admission Test 2013

SET: C

Full Marks: 100 (Each wrong answer will be awarded −0.5 marks)

Time: Two Hours

1. The freezing point depression constant for water is − 1.86°C. If 5.0 g Na_2SO_4 is deissolved in 45.0 g water, the freeziing point is changed by -- 3.28°C. The Van't Hoff factor for Na_2SO_4 is
a. 0.381 b. 2.05 c. 2.63 d. 3.11

2. If a car accelerates uniformly, from rest, to a speed of 144 Km/h in 20 sec, it covers a distance of:
a. 20 m b. 400 m c. 1440 m d. 2980 m

3. Weight of a body is maximum at:
a. moon b. poles of the earth
c. equator of the earth d. centre of the earth

4. The coefficient of volume expansion of water is zero at:
a. 0°C b. 100°C c. −40°C d. 4°C

5. The equation of state of 4 gms of Hydrogen (assuming perfect gas) gas is:
a. PV=RT b. PV=2RT c. PV=RT/2 d. PV=4RT

6. 5 Kg of water at 10°C is added to 10 Kg of water at 40°C. Neglecting heat capacity of vessel and other losses, the equilibrium temperature will be close to:
a. 30°C b. 25°C c. 35°C d. 33°C

7. The acceleration of a particle performing SHM is 12 cm/s^2 at a distance of 3 cm from the mean position. Its time period is:
a. 3.14 s b. 2.0 s c. 0.5 s d. 1.0 s

8. If the absolute refractive index of glass be 3/2 and that of water is 4/3, what is the refractive index of glass with respect to water ?
a. 9/8 b. 2 c. 1/2 d. 8/9

9. The decay constant of radioactive radium is 4.28×10^{-4} years. Its half-life will be:
a. 2000 years b. 1240 years
c. 63 years d. 1620 years

10. When two light waves interfere, which of the following is conserved?
a. intensity b. energy c. amplitude d. momentum

11. Bohr's assumption on H-atom is
a. $\lambda = h/p$ b. $m\omega r^2 = nh/2\pi$
c. $E = mc^2$ d. $\Delta x.\Delta p = h/4\pi$

12. Which one of the following can be qualitatively detected from an aqueous solution by aqueous $AgNO_3$ solution?
a. Sulfate b. Sulfite c. Sulfide d. borate

13. The valence shell electronic configuration of As^{3-} is
a. $4s^24p^3$ b. $4s^24p^4$ c. $4s^24p^5$ d. $4s^24p^6$

14. The presence of two unpaired electrons in oxygen atom can be explained by
a. Pauli's Exclusion Principle b. Aufbau Principle
c. Hund's Rule d. Uncertainty Principle

15. The half-life of a radioactive isotope is 4.8 min. How much amount of 1.0 mg of that element will be left after 48 minutes?
a. 0.5 mg b. 0.45 mg c. 0.1 mg d. 0.01 mg

16. $^{232}Th_{90}$ disintegrates giving the end product $^{208}Pb_{82}$. The total number of particles emitted are:
a. 6α, 4β b. 6α, 6β c. 4α, 6β d. 4α, 4β

17. Which of the following pair of cations can be separated by boiling with NaOH solution?
a. Fe^{3+}, Al^{3+} b. Sn^{2+}, Pb^{2+}
c. Al^{3+}, Zn^{2+} d. Zn^{2+}, Pb^{2+}

18. Normality of a given ortho-phosphoric solution is 9N. The molarity of that solution is
a. 1M b. 4M c. 2M d. 3M

19. Equivalent weight of permanganate in the conversion of $MnO_4^- \rightarrow MnO_2$ will be
a. M/4 b. M/2 c. M/3 d. M/5
(M = molecular weight of permanganate)

20. The electronegativites of H and Cl are 2.1 and 3.0, respectively. The percentage of ionic character of H-Cl bond is
a. 16.50 b. 17.24 c. 18.30 d. 15.7

21. If 0.023 g sodium metal is reacted with 100 ml of distilled water, the pH of the resultant solution is
a. 10 b. 11 c. 12 d. 13

22. The reduction potential values of $Zn^{2+}/Zn_{(s)}$ and $Ag^+/Ag_{(s)}$ are -0.76 and + 0. 80 volts. The e. m. f. of Zn-Ag cell is
a. +1.56 b. −1.56 c. +2.12 d. − 2.12

23. Super heavy elements are laid in the range of atomic number
a. 57-71 b. 89-103 c. 104-126 d. 72-88

24. Which one of the following can be used as an oxidizing agent and acid salt?
a. $NaHSO_4$ b. $NaHSO_3$
c. $KHCO_3$ d. $KH(IO_3)_2$

25. The circle $(x-4)^2+(y-3)^2=9$ touches
a. x axis b. y axis
c. both the axes c. no coordinate axis

26. If A={2,4,6,8} then which of the following is true?
a. $\{2,4\} \in A$ b. $\{2,4\} \subseteq A$
c. $\{2,4\} \subset A$ d. $\{2,4\} \in A^C$

27. If ω is one of the imaginary cube root of unity then the value of ω^{242} is given by:
a. 0 b. 1 c. ω d. ω^2

28. If $f(x-1) = 7x-5$, then the value of $f(x)$ is:
a. $7x+2$ b. $7x-12$ c. $8x-4$ d. $7(x+1)$

29. $\lim_{x\to 1}\left[\cos\left(\frac{\pi}{2}\sqrt{x^2-2x+2}\right)\right] = ?$
a. 0 b. 1 c. −1 d. ½

30. If $y = sin^2\frac{x}{2}$, then $\frac{dy}{dx}$=?
a. $sinx$ b. ½$sinx$ c. $cosx$ d. ½$cosx$

31. If the radius of the earth shrinks by 1.5 % (mass remaining same), then the value of the acceleration due to gravity changes by:
a. 1% b. 2% c. 3% d. 4%

32. A source of frequency f gives 5 beats/sec when sounded with a source of frequency 200 Hz. The second harmonic 2f gives 10 beats/sec when sounded with a source of frequency 420 Hz. Then f is equal to
a. 195 b. 190 c. 220 d. 205

33. Which of the following does not support the wave nature of light?
a. Interference b. Diffraction
c. Polarisation d. Photoelectric effect

34. 60W power is being supplied through a wire under a potential difference of 240 V. The electric current flowing through the wire is:
a. 4A b. 24 A c. 0.025A d. 0.25A

35. The de Broglie wavelength associated with a particle of mass m and velocity v is:
a. mh/v b. h/(mv) c. m/(hv) d. hmv

36. If $x = 2^{1/2}\times 2^{-1/2}\times 64^{1/6} = {}^{1}/_{y}$ then the value of y is
a. $\frac{1}{2}$ b. 1 c. 2 d. 4a

37. Find the product of $0.5\sqrt[3]{2}$ and $0.25\sqrt[3]{32}$
a. 2 b. $\frac{1}{2}$ c. 4 d. 1

38. If $x = 3-\sqrt{7}i$ then what is the value of $|x|$
a. −4 b. 4 c. 2 d. 3

39. Which of the following is the solution of inequation $|x+1|<4$?
a. $x<-5$ b. $x>3$
c. $x<-5$ *or* $x>3$ d. $-5<x<3$

40. If the r th term of a G.P. is $(-1)^{r-1}2^{r+2}$, then the value of the 5th term is:
a. 128 b. − 128 c. 256 d. − 256

41. The outline of a section of a cone cut parallel to its axis is:
a. hyperbolic b. parabolic
c. circular arc d. Semielliptic

42. α and β are the roots of the equation $x(x-3)=4$, then the value of $\alpha^2-\beta^2$ is:
a.15 b. −15 c. 17 d. − 17

43. What is the value of $log_{5\sqrt{7}}84035$?
a. 10 b. 11 c. 9 d. 7

44. In how many ways can the results of 3 successive football matches be decided?
a. 32 b. 29 c. 27 d. 24

45. If sinA+sinB=2 then the value of sin(A+B) is
a. ½ b. 0 c. 1 d. −1

46. Which of the following is equal to $\sqrt{3}sin10°$?
a. $sin40°+sin20°$ b. $cos50°-cos70°$
~~c. $cos50°+cos70°$~~ d. $cos70°+cos50°$
C. $\sin 60°-\sin 20°$

47. If $tanx=\frac{b}{a}$, then the value of $(a^2+b^2)sin2x$ is
a. ab b. $2ab$ c. $\frac{2a}{b}$ d. None

48. The value of x in $sin^{-1}x-cos^{-1}x=\frac{\pi}{6}$ is
a. 1 b. $\frac{1}{2}$ c. $\frac{1}{\sqrt{2}}$ d. $\frac{\sqrt{3}}{2}$

49. The magnetic flux linked with a coil is given by the equation: $\phi = 5t^2+3t+6$. The induced e.m.f. in the coil on the fourth second will be:
a. 10V b. 43V c. 40V d. 20V

50. C is the midpoint of a straight line AB. The coordinates of A and C are (7,−8) and (2,−2) respectively. What are the coordinates of B?
a. (3,4) b. (3,−4) c. (−3,4) d. (−3,−4)