BJNP
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Knowledge is Discipline
Learning with the Speed of Mumbai and the Tradition of Kota

Max Marks: 200 **Date: 07.08.2022**

ABHIMANYU BATCH
CHEMISTRY: PART TEST
Topic: Solution + Nitrogen Family

1. A mixture has four components P,Q,R and S. If 0.2 mol of each component is present in the mixture, the total sum of mole faction of all the components is
   (a) 0.2 (b) 0.8 (c) 1.0 (d) 0.4

2. The amount of anhydrous Na_2CO_3 present in 250 mL of 0.25 M solution is
   (a) 6.625 g (b) 66.25 g (c) 6.0 g (d) 6.225 g

3. Molarity is expressed as
   (a) Moles / 1000g (b) Moles/liter (c) Liter/ mole (d) Gram/liter

4. Which of the following solutions has the highest normality?
   (a) 8 g of KOH/liter (b) 6 g of NaOH/100mL
   (c) 1 g phosphoric acid/liter (d) 0.5 M H_2SO_4

5. Molarity of 0.2 N H_2SO_4 is
   (a) 0.1 (b) 0.4 (c) 0.6 (d) 0.2

6. Pressure cooker reduces cooking time for food because
   (a) Boiling point of water involved in cooking is increased
   (b) Heat is more evenly distributed in the cooking space
   (c) The higher pressure inside the cooker crushes the food material
   (d) Cooking involves chemical changes helped by a rise in temperature.

7. If liquids A and B form an ideal solution then
   (a) the entropy of mixing is zero
   (b) the Gibbs free energy and the entropy of mixing are zero each
   (c) the Gibbs free energy and the entropy of mixing are zero each
   (d) the enthalpy of mixing is zero

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8. Total vapor pressure of mixture of 1 mol A (P_A^0= 150 torr) and 2 mol B ((P_B^0= 240 torr) is 200 torr. In this case,
(a) there is positive deviation from Raoult's law
(b) there is negative deviation from Raoult's law
(c) there is no deviation from Raoult's law
(d) molecular masses of A and B are also required for calculating the deviation.

9. The vapor pressure of a solvent is 20 torr, whereas that of its dilute solution is 17 torr. The mole fraction of the solvent is
(a) 0.6 (b) 0.4 (c) 0.85 (d) 0.7

10. Mole elevation constant K_b for water is 0.52 K/m. 0.1 molal solution of NaCl will boil at
(a) 100.52^o C (b) 100.052^o C (c) 101.04^o C (d) 100.104^o C

11. Addition of 0.643 g of a compound to 50 mL of benzene (density = 0.879 g mL^{-1}) lowers the freezing point from 5.51^oC to 5.03^o C

(K_f of benzene = 5.12 K mol^{-1} kg). Molar mass of the compound is

(a) 162 g mol^{-1} (b) 156 g mol^{-1} (c) 145 g mol^{-1} (d) 156 g mol^{-1}

12. π_1, π_2,π_3 and π_4 are the osmotic pressures of 5% $(\frac{W}{V})$ solution of ures, fructose, sucrose, and KCl respectively at certain temperatures. The correct order of their magnitude is
(a) $\pi_1 > \pi_4 > \pi_2 > \pi_3$ (b) $\pi_1 < \pi_4 < \pi_2 < \pi_3$ (c) $\pi_4 > \pi_1 > \pi_2 > \pi_3$ (d) $\pi_4 > \pi_1 > \pi_3 > \pi_2$

13. For 0.1 M solution, the colligative property will follow the order
(a) $NaCl > Na_2SO_4 > Na_3PO_4$ (b) $NaCl > Na_2SO_4 = Na_3PO_4$
(c) $NaCl < Na_2SO_4 < Na_3PO_4$ (d) $NaCl < Na_2SO_4 = Na_3PO_4$

14. Which of the following is kept in water?
(a) White phosphorus (b) Sodium (c) Potassium (d) Calcium

15. Which one of the following elements occurs free in nature ?
(a) Nitrogen (b) Phosphorus (c) Arsenic (d) Antimony

16. Which of the following represents laughing gas ?
(a) NO (b) N_2O (c) NO_2 (d) N_2O_3

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17. A mixture of ammonia and air at about 800° C in the presence of Pt gauze forms

(a) N_2O (b) NO (c) NH_2OH (d) N_2O_3

18. Calcium cyanamide on treatment with steam under pressure gives ammonia and

(a) Calcium carbonate (b) Calcium hydroxide
(c) Calcium oxide (d) Calcium bicarbonate

19. Which of the following exhibits highest solubility in water ?

(a) NH_3 (b) PH_3 (c) AsH_3 (d) SbH_3

20. When ammonia is passed over heated copper oxide, the metallic copper is obtained. The reaction shows that ammonia is

(a) A dehydrating agent (b) An oxidizing agent
(c) A reducing agent (d) A nitrating agent

21. PCl_3 reacts with water to form

(a) PH_3 (b) H_3PO_3, HCl (c) $POCl_3$ (d) H_3PO_4

22. H_3PO_3 is

(a) A tribasic acid (b) A dibasic acid (c) Neutral (d) A monobasic acid

23. Solid PCl_5 exists as

(a) PCl_5 (b) PCl_4^+ (c) PCl_6^- (d) PCl_4^+ and PCl_6^-

24. The number of P – O - P bridges in the structure of phosphorus pentoxide and phosphoros trioxide are respectively

(a) 6,6 (b) 5,5 (c) 5,6 (d) 6,5

25. One mole of calcium phosphide on reaction with excess water gives

(a) One mole of phosphine (b) Two moles of phosphoric acid
(c) Two moles of phosphine (d) One mole of phosphorous pentoxide

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MATHEMATICS: PART TEST

Topics: Increasing, Decreasing, Maxima and Minima

26. If $f(x) = 2x^3 + 3x^2 - 12x + 5$, then the interval in which (l_1) increases and (l_2) decreases ia

(a) $l_1 = (-\infty, -2) \cup (1, \infty)$, $l_2 = (-2, 1)$
(b) $l_1 = (-\infty, 1)$, $l_2 = (-1, 2) \cup (2, \infty)$
(c) $l_1 = (-\infty, -1) \cup (2, \infty)$, $l_2 = (-1, 2)$
(d) $l_1 = (-\infty, 2) \cup (-1, \infty)$, $l_2 = (5, 2)$

27. The values of x for which the function $\dfrac{\log x}{x}$ decreases is

(a) $x > 1$
(b) $x < 1$
(c) $x > e$
(d) $x > 3$

28. The function $f(x) = x^3 - 3x^2 - 24x + 5$ is an increasing function in the interval

(a) $(-\infty, -2) \cup (4, \infty)$
(b) $(-2, \infty)$
(c) $(-2, 4)$
(d) $(-\infty, 4)$

29. For which interval the given function $f(x) = -2x^3 - 9x^2 - 12x + 1$ is decreasing?

(a) $(-2, \infty)$
(b) $(-2, 1)$
(c) $(-\infty, -1)$
(d) $(-\infty, -2)$ or $(-1, \infty)$

30. The set of all points for which $f(x) = x^2e^{-x}$ strictly increases is

(a) $(0, 2)$
(b) $(2, \infty)$
(c) $(-\infty, \infty)$
(d) $(-2, 0)$

31. The values of k for which the function $f(x) = kx^3 - 9x^2 + 9x + 3$ may be increasing on R are

(a) $k > 3$
(b) $k < 3$
(c) $k \leq 3$
(d) None of these

32. The function $\dfrac{x-2}{x+1}$, $(x \neq 1)$ is increasing on the interval

(a) $(-\infty, 0]$
(b) $[0, \infty)$
(c) R
(d) None of these

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33. Om which interval is the given function, $f(x) = 2x^3 - 15x^2 + 36x + 1$ monotonically decreasing?

(a) $[2, 3]$ (b) $(2, 3)$ (c) $(-\infty, 2)$ (d) $(3, \infty)$

34. The function $f(x) = \sin^4 x + \cos^4 x$ increases, if

(a) $0 < x < \frac{\pi}{8}$ (b) $\frac{\pi}{4} < x < \frac{3\pi}{8}$ (c) $\frac{3\pi}{8} < x < \frac{5\pi}{8}$ `(d) $\frac{5\pi}{8} < x < \frac{3\pi}{4}$

35. The function f defined by $f(x) = (x + 2)e^{-x}$ is

(a) Decreasing for all x
(b) Decreasing in $(-\infty, 1)$ and increasing in $(-1, \infty)$
(c) Increasing for all x
(d) Decreasing in $(-1, \infty)$ and increasing in $(-\infty, -1)$

36. The function $f(x) = \frac{l\,n(\pi + x)}{l\,n(e + x)}$ is

(a) Increasing on $[0, \infty)$
(b) Decreasing on $[0, \infty)$
(c) Decreasing on $\left[0, \frac{\pi}{e}\right)$ and increasing on $\left[\frac{\pi}{e}, \infty\right)$
(d) Increasing on $\left[0, \frac{\pi}{e}\right)$ and decreasing on $\left[\frac{\pi}{e}, \infty\right)$

37. The function $f(x) = \frac{\log x}{x}$ is increasing in the interval

(a) $(1, 2e)$ (b) $(0, e)$ (c) $(2, 2e)$ (d) $(1/e, 2e)$

38. $f(x) = \frac{a \sin x + b \cos x}{c \sin x + d \cos x}$ decreases for all x, if

(a) $ad - bc < 0$ (b) $ad - bc > 0$ (c) $ab - cd > 0$ (d) $ab - cd < 0$

39. x^{2x} has a stationary point at

(a) $x = e$ (b) $x = \frac{1}{e}$ (c) $x = 1$ (d) $x = \sqrt{e}$

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40. The minimum value of $(x - \alpha)(x - \beta)$ is

(a) 0 (b) $\alpha\beta$ (c) $\frac{1}{4}(\alpha - \beta)^2$ (d) $-\frac{1}{4}(\alpha - \beta)^2$

41. If $y = a \log x + bx^2 + x$ has its extreme value at $x = 1$ and $x = 2$, then $(a, b) =$

(a) $\left(1, \frac{1}{2}\right)$ (b) $\left(\frac{1}{2}, 2\right)$ (c) $\left(2, \frac{-1}{2}\right)$ (d) $\left(\frac{-2}{3}, \frac{-1}{6}\right)$

42. The maximum and minimum values for the function $f(x) = 3x^4 - 4x^3$ on $[-1, 2]$ are

(a) 7, 0 (b) 0, –7 (c) 16, –1 (d) –7, 16

43. If $x + y = 16$ and $x^2 + y^2$ is minimum, then the values of x and y are

(a) 3, 13 (b) 4, 12 (c) 6, 10 (d) 8, 8

44. If $f(x) = 2x^3 - 21x^2 + 36x - 30$, then which one of the following is correct?

(a) f(x) has minimum at x = 1 (b) f(x) has maximum at x = 6

(c) f(x) has maximum at x = 1 (d) f(x) has no maxima or minima

45. The maximum value of $\exp(2 + \sqrt{3}\cos x + \sin x)$ is

(a) exp (2) (b) $\exp(2 - \sqrt{3})$ (c) exp (4) (d) 1

46. The sum of two natural numbers is 10. Their product is maximum if the numbers are

(a) x = 5, y = 5 (b) $x = \sqrt{5}$, y = 5 (c) x = 5, y = –5 (d) x = –5, y = 5

47. Maximum area of a rectangle whose perimeter is given as 24 metres is equal to

(a) 36 m^2 (b) 49 m^2 (c) 64 m^2 (d) 81 m^2

48. If from a wire of length 36 metre a rectangle of greatest area is made, then its two adjacent sides in metre are

(a) 6, 12 (b) 9, 9 (c) 10, 8 (d) 13, 5

49. The denominator of a fraction is greater than 16 of the square of numerator, then least value of fraction is

(a) $-\frac{1}{4}$ (b) $-\frac{1}{8}$ (c) $\frac{1}{12}$ (d) $\frac{1}{16}$

50. The length of the perimeter of a sector of a circle is 20 cm, the maximum area of the sector is

(a) 30 cm^2 (b) 20 cm^2 (c) 40 cm^2 (d) 25 cm^2

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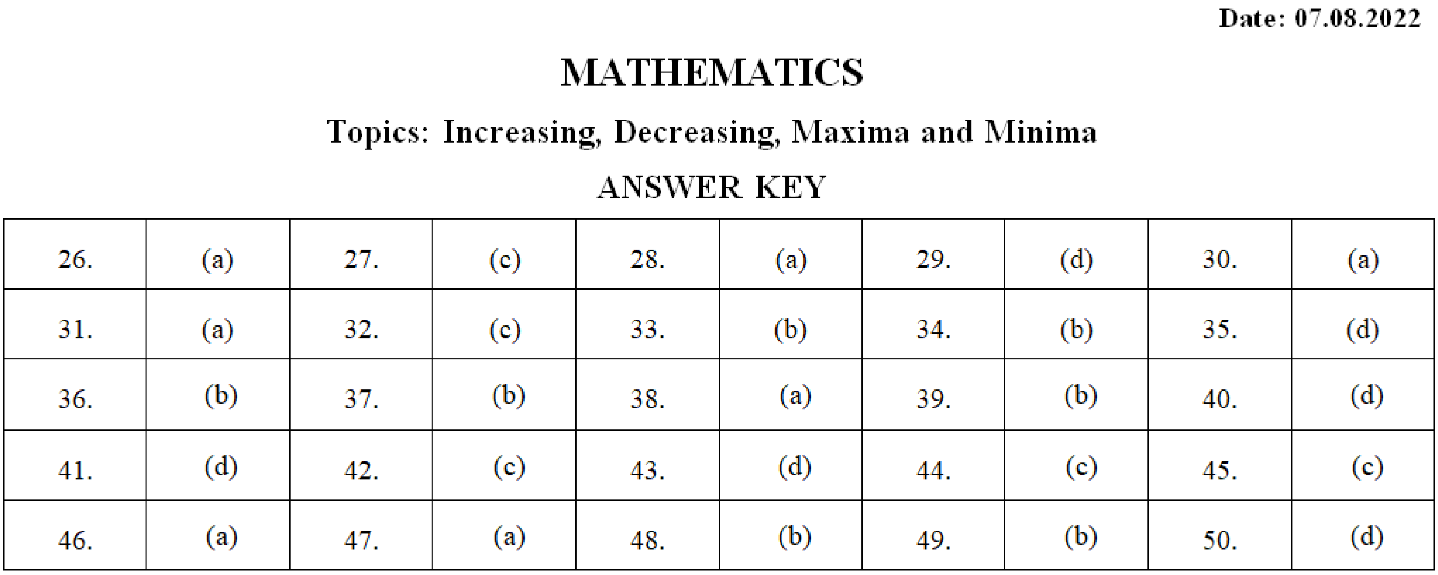
CHEMISTRY: PART TEST ANSWER KEY
Topic: Solution + Nitrogen Family

1.	(c)	2.	(a)	3.	(b)	4.	(b)	5.	(a)
6.	(a)	7.	(d)	8.	(b)	9.	(c)	10.	(d)
11.	(d)	12.	(c)	13.	(c)	14.	(a)	15.	(a)
16.	(b)	17.	(b)	18.	(a)	19.	(a)	20.	(c)
21.	(b)	22.	(b)	23.	(d)	24.	(a)	25.	(c)



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MATHEMATICS
Topics: Increasing, Decreasing, Maxima and Minima
ANSWER KEY

26.	(a)	27.	(c)	28.	(a)	29.	(d)	30.	(a)
31.	(a)	32.	(c)	33.	(b)	34.	(b)	35.	(d)
36.	(b)	37.	(b)	38.	(a)	39.	(b)	40.	(d)
41.	(d)	42.	(c)	43.	(d)	44.	(c)	45.	(c)
46.	(a)	47.	(a)	48.	(b)	49.	(b)	50.	(d)