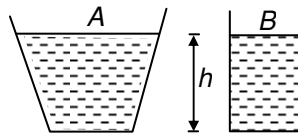


PHYSICS**CHOOSE THE CORRECT OPTION:**

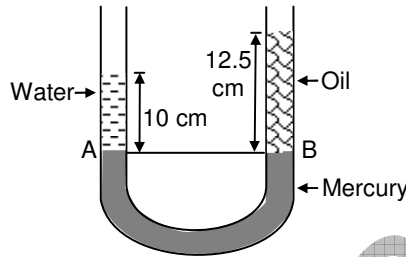
- Two blocks *A* and *B* are made of different kinds of wood. Block *A* floats in water with $\frac{1}{4}$ th of its above the surface of water. Block *B* floats in water with $\frac{2}{3}$ rds of its volume below the surface of water. The ratio of the densities of *A* and *B* is
(A) 3 : 2 (B) 5 : 3 (C) 9 : 8 (D) 4 : 3
- An object is placed 10 cm in front of a convex mirror of focal length 20 cm. The distance of the image from the mirror is
(A) 10 / 3 cm (B) 20 / 3 cm (C) 10 cm (D) 40 / 3 cm
- A real image formed by a concave mirror is 4.5 times the size of the object. If the mirror is 20 cm from the object, its focal length is
(A) $\frac{90}{11}$ cm (B) $\frac{120}{11}$ cm (C) $\frac{150}{11}$ cm (D) $\frac{180}{11}$ cm
- A concave mirror of focal length '*f*' produces a real image '*n*' times the size of the object. The distance of the object from the mirror is
(A) $(n-1)f$ (B) $(n+1)f$ (C) $\frac{n+1}{n}f$ (D) $\frac{n-1}{n}f$
- A concave mirror has radius of curvature 30 cm. Where should an object be placed in front of the mirror so that a virtual image three times the size of the object is formed?
(A) 7.5 cm (B) 10 cm (C) 17.5 cm (D) 20 cm
- For concave mirror, the magnification of real image was found to be twice as great when the object was 15 cm from the mirror. The focal length of the mirror is
(A) 5.0 cm (B) 7.5 cm (C) 10 cm (D) 12.5 cm
- 100 g of ice at 0°C is mixed with 100 g of water 80°C. The final temperature of the mixture will be
(A) 0°C (B) 20°C (C) 40°C (D) 60°C
- The minimum amount of ice at 0°C required to be added to 200g of water at 80°C, so as to lower its temperature to 0°C is
(A) 50 g (B) 25 g (C) 100 g (D) 200 g
- What volume of iron will have the same thermal capacity as 1200 c.c of water (SP. Heat of iron = 0.1 cal/g°C, density of iron = 7.5 gm/c³)
(A) 100 c.c (B) 500 c.c (C) 1600 c.c (D) 2000 c.c
- Two liquids *A* and *B* are at temperatures of 75°C and 15°C respectively. Their masses are in the ratio 2 : 3 and their specific heat are in the ratio 3 : 4. The resultant temperature of the mixture if the liquids *A* and *B* mixed is
(A) 35°C (B) 75°C (C) 80°C (D) None of these
- The amount of heat required to convert 10 gm of ice at 0°C into water at 20°C is
(A) 80 cal (B) 100 cal (C) 1000 cal (D) None of these
- 1 gm of water at 0°C is mixed with 1 gm water at 40°C. The resultant temperature of the mixture is
(A) 0°C (B) 20°C (C) 30°C (D) 40°C

13. Some water at 100°C is mixed with twice the quantity of water at 70°C . The equilibrium temperature is
 (A) 75°C (B) 80°C (C) 85° (D) 90°C
14. The density of iron in CGS system is 7.6 g cm^{-3} . Its density in SI system is :
 (A) 7600 kg m^{-3} (B) 76 kg m^{-3} (C) 760 kg m^{-3} (D) None of these
15. An ant covers 2 cm, 1.5 cm, 2.5 cm, 3 cm and 1 cm in one second each. The average speed of the ant is :
 (A) 2 ms^{-1} (B) 2.5 ms^{-1} (C) 1.5 ms^{-1} (D) None of these
16. A body completes one around a circular path of radius 7 m. The distance covered by the body and his displacement is :
 (A) 88 m distance and 88 m displacement (B) 44 m distance and 44 m displacement
 (C) 44 m distance and zero displacement (D) None of these
17. A hockey ball of mass 200 g traveling at 10 ms^{-1} is struck by a hockey stick, so as to return it along its original path with a velocity of 5 ms^{-1} . Calculate the change in momentum that occurred in the motion of the ball, by the force applied the hockey stick.
 (A) -3 kg ms^{-1} (B) -5 kg ms^{-1} (C) -7 kg ms^{-1} (D) -8 kg ms^{-1}
18. Force of 25N, brings a change in momentum of 50 Ns. The force acts on a body for :
 (A) 5 s (B) 2 s (C) 10 s (D) 25 s
19. The measure of inertia of a body is its :
 (A) density (B) mass (C) volume (D) acceleration
20. A gun of mass 2 kg recoils with a velocity of 0.1 ms^{-1} while firing a bullet of mass 'm' with a velocity of 100 ms^{-1} . The mass of bullet fired is :
 (A) 20 g (B) 2 g (C) 10 g (D) 5 g
21. A point moving with uniform acceleration describes distance s_1 and s_2 metres in successive intervals of t_1 and t_2 secs. The acceleration is then given by
 (A) $\frac{s_1 t_1 + s_2 t_2}{t_1 t_2 (t_1 + t_2)}$ (B) $\frac{2(s_1 t_1 - s_2 t_2)}{t_1 t_2 (t_1 + t_2)}$ (C) $\frac{s_2 t_1 - s_1 t_2}{t_1 t_2 (t_1 + t_2)}$ (D) $\frac{2(s_2 t_1 - s_1 t_2)}{t_1 t_2 (t_1 + t_2)}$
22. A car, starting from rest, has a constant acceleration a_1 for a time interval t_1 during which it covers a distance s_1 . In the next time interval t_2 , the car has a constant retardation a_2 and comes to rest after covering a distance s_2 in time t_2 . which of the following relations is correct ?
 (A) $\frac{a_1}{a_2} = \frac{s_1}{s_2} = \frac{t_1}{t_2}$ (B) $\frac{a_1}{a_2} = \frac{s_2}{s_1} = \frac{t_1}{t_2}$ (C) $\frac{a_1}{a_2} = \frac{s_2}{s_1} = \frac{t_2}{t_1}$ (D) None of these
23. The two ends of a train moving with constant acceleration pass a certain point with velocities 'u' and 'v'. The velocity with which the middle point of the train passes the same point is
 (A) $\frac{u+v}{2}$ (B) $\frac{u^2+v^2}{2}$ (C) $\sqrt{\frac{u^2+v^2}{2}}$ (D) $\sqrt{u+v}$
24. A car starts from rest and accelerates at 5 ms^{-2} for sometime. Then, the car moves with uniform velocity for 15 second. Again, it decelerates at 5 ms^{-2} and comes to rest. If the total time for the journey is 25 seconds, then the average speed for the journey is
 (A) 10 ms^{-1} (B) 20 ms^{-1} (C) 30 ms^{-1} (D) 40 ms^{-1}

25. Two vessels *A* and *B* of different shapes have the same base area and are filled with water up to the same height '*h*' (see figure). The force exerted by water on the base is F_A for vessel *A* and F_B for vessel *B*. The respective weights of the vessels are W_A and W_B . Then



- (A) $F_A > F_B$; $W_A > W_B$
 (B) $F_A = F_B$; $W_A > W_B$
 (C) $F_A = F_B$; $W_A < W_B$
 (D) $F_A > F_B$; $W_A = W_B$
26. A U-tube contains water and oil separated by mercury. The mercury columns in the two arms are at the same level with 10 cm of water in one arm and 12.5 cm of oil in the other, as shown in figure. What is the relative density of oil?



- (A) 0.8 (B) 1.0 (C) 1.25 (D) None of these
27. A block of wood floats in a liquid with four-fifths of its volume submerged. If the relative density of wood is 0.8, what is the density of the liquid in units of $kg\ m^{-3}$?
- (A) 750 (B) 1000 (C) 1250 (D) 1500
28. An ice cube floats on water in beaker with $\frac{9}{10}$ th of its volume submerged under water. What fraction of its volume will be submerged if the beaker of water is taken to the moon where the gravity is $\frac{1}{6}$ th that on the earth?
- (A) $\frac{9}{10}$ (B) $\frac{27}{50}$ (C) $\frac{2}{3}$ (D) zero
29. Choose the correct statement(s) from the following :
- (A) A body will sink in a liquid if its weight is equal to or greater than the weight of the liquid displaced by it.
 (B) A body will float in a liquid if its weight is equal to or less than the weight of the liquid displaced by it.
 (C) When a body floats in a liquid, the portion of the body above the surface of the liquid is independent of the density of the body relative to that of the liquid.
 (D) In still air, a hydrogen-filled balloon rises up to a certain height and then stops rising.
30. A cubical block of steel of each side equal to '*l*' is floating on mercury in a vessel. The densities of steel and mercury are ρ_s and ρ_m . The height of the block above the mercury level is given by
- (A) $l \left(1 + \frac{\rho_s}{\rho_m} \right)$ (B) $l \left(1 - \frac{\rho_s}{\rho_m} \right)$ (C) $l \left(1 + \frac{\rho_m}{\rho_s} \right)$ (D) $l \left(1 - \frac{\rho_m}{\rho_s} \right)$



CHEMISTRY

CHOOSE THE CORRECT OPTION:

31. Which of the following elements with the given E.C will possess the lowest I.P. value
(A) $1s^2 2s^2 2p^6 3s^1$ (B) $1s^2 2s^2 2p^2$ (C) $1s^2 2s^2 2p^5$ (D) $1s^2 2s^2 2p^6 3s^2 3p^2$
32. Which of the following is correct order of increasing first ionization energy?
(A) $C < N < O < F$ (B) $F < C < N < O$ (C) $C < O < N < F$ (D) $F < O < N < C$
33. Electronic configuration of an element A is $1s^2 2s^2 2p^3$ and electronic configuration of another element B is $1s^2 2s^2 2p^4$. The possible compound that can be formed between A and B is
(A) A_5B_2 (B) A_3B_2 (C) A_2B_5 (D) AB_3
34. Octet rule is not violated in
(A) XeF_2 (B) $BeCl_2$ (C) O_2 (D) SCl_4
35. Electronegativities of four elements A, B, C and D respectively 2.1, 3.0, 3.5, 4.0. Which one of the following bonds is more polar.
(A) A – B (B) A – C (C) A – D (D) B – C
36. At constant temp if the volume of the same amount of gas is decreased by 10%, the pressure exerted by the gas is
(A) increases by 10% (B) decrease by 10%
(C) increase by < 10% (D) increases by > 10%
37. The rates of diffusion of two gases X and Y are in the ratio 1 : 5 and that of Y and Z in the ratio of 1 : 16. The ratio of rates of diffusion of Z and X is
(A) 5 : 6 (B) 1 : 30 (C) 6 : 5 (D) 30 : 1
38. The mass of an atom of an element is 4×10^{-23} gm. It's atomic weight is
(A) 0.4 (B) 4 (C) 16 (D) 24
39. Which of the following contains the maximum number of atoms?
(A) 10 g of $CaCO_3$ (B) 4 g of hydrogen (C) 9 g of NH_4NO_3 (D) 1.8 g of $C_6H_{12}O_6$
40. Which of the following a redox reaction?
(A) $NaCl + KNO_3 \rightarrow NaNO_3 + KCl$ (B) $CaC_2O_4 + 2HCl \rightarrow CaCl_2 + H_2C_2O_4$
(C) $Mg(OH)_2 + 2NH_4Cl \rightarrow MgCl_2 + 2NH_4OH$ (D) $Zn + 2AgCN \rightarrow 2Ag + Zn(CN)_2$
41. $X Cu + Y HNO_3 \rightarrow Cu(NO_3)_2 + Z NO + H_2O$, then X, Y and Z in the balanced chemical equation are respectively
(A) 3, 2, 2 (B) 3, 2, 8 (C) 3, 8, 2 (D) 2, 8, 3
42. The oxidation number of 'N' in HN_3 is
(A) + 1 / 3 (B) 0 (C) -1 / 3 (D) 1
43. In which of the following compounds oxygen exhibits an oxidation state of +2 ?
(A) H_2O (B) H_2O_2 (C) OF_2 (D) H_2SO_4
44. Two grams of H_2 diffuses in 10 minutes. The weight of O_2 that can diffuse from the same container in the same time under similar condition is
(A) 4 gm (B) 0.5 gm (C) 6 gm (D) 8 gm
45. The electronic configurations for four elements A, B, C, D are $1s^2$, $1s^2 2s^2 2p^2$, $1s^2 2s^2 2p^5$ and $1s^2 2s^2 2p^6$ respectively. The tendency to form ionic bond is largest in
(A) A (B) B (C) C (D) D
46. Water has relatively high specific heat. This property makes it suitable for use as
(A) coolant (B) solvent (C) catalyst (D) all the three A, B and C

47. If a pure substance boils at 100°C and freezes at 0°C at atmospheric pressure, then the substance
 (A) cannot be identified based only on this data
 (B) need not be water
 (C) could be water
 (D) is surely water
48. Alkalis are _____ that dissolve in water.
 (A) acids (B) bases (C) oxides (D) gases
49. The total number protons, electrons and neutrons in a hundred water molecules are _____, _____ and _____ respectively.
 (A) 900, 900, 900 (B) 1000, 1000, 800
 (C) 900, 800, 900 (D) 800, 900, 900
50. Valency of inert gases is :
 (A) zero (B) one (C) two (D) three
51. Protons are obtained when discharge tube is filled with the following gas / vapours.
 (A) Na (B) H_2 (C) Hg (D) He
52. X^{3-} is isoelectronic with Argon. It has electrons and neutrons in equal number. The mass number of 'X' is
 (A) 30 (B) 31 (C) 32 (D) 33
53. The wavelength of a photon is $3.319 \times 10^{-20}\text{m}$. Its energy is
 (A) $6 \times 10^{-6}\text{J}$ (B) $2 \times 10^{-7}\text{J}$ (C) $1 \times 10^{-7}\text{J}$ (D) $5 \times 10^{-7}\text{J}$
54. Which one of the following constitutes a group of the isoelectronic species?
 (A) C_2^{2-} , O_2^- , CO, NO (B) NO^+ , C_2^{2-} , CN^- , N_2
 (C) CN^- , N_2 , O_2^{2-} , C_2^{2-} (D) N_2 , O_2^- , NO^+ , CO
55. Given that the abundances of isotopes ^{54}Fe , ^{56}Fe and ^{57}Fe are 5%, 90% and 5% respectively, the atomic mass of Fe is
 (A) 55.85 (B) 55.95 (C) 55.75 (D) 56.05
56. Which of the following is correctly matched
 (A) Eka Boron - Aluminium (B) Eka Silicon - Gallium
 (C) Eka Aluminium - Germanium (D) Eka Boron - Scandium
57. The elements with atomic number 34 belongs to
 (A) IVA group, 4th period (B) IVA group, 5th period
 (C) IVA group, 6th period (D) VIA group, 4th period
58. Which of the following represents the electronic configuration of d-block elements.
 (A) $(n-1) s^2 nd^{1-10}$ (B) $(n-1) d^{1-10} ns^2$
 (C) $ns^2(n-1) d^{0 \text{ or } 1}$ (D) $(n-1) d^{1-10} ns^2 np^6$
59. Match the following :
- | List – I
(Z) | List – II
(Position) |
|------------------------------------|------------------------------------|
| (i) 19 | (p) p – block |
| (ii) 23 | (q) f – block |
| (iii) 36 | (r) d – block |
| (iv) 64 | (s) s - block |
| (A) i – s; ii – r; iii – p, iv - q | (B) i – r; ii – s; iii – q, iv - p |
| (C) i – s; ii – q; iii – r, iv - p | (D) i – s; ii – r; iii – q, iv - p |

60. Different species of iodine can be placed in the increasing order of their size as
 (A) $I^+ < I < I^-$ (B) $I < I^- < I^+$ (C) $I^- < I^+ < I$ (D) $I^+ < I^- < I$

□□□

MATHEMATICS

CHOOSE THE CORRECT OPTION:

61. A cube is enclosed in a sphere of diameter 2 cm. The volume of cube is :
 (A) π (B) 1 (C) $\sqrt{2}$ (D) $2\sqrt{2}$
62. If each side of a cube is increased by half its side, then its surface area increases by :
 (A) 125% (B) 150% (C) 100% (D) None of these
63. When $2^4 \times 3^4 \times 5^4 \times 7$ is expressed as a single number, then the sum of its digits will be :
 (A) 21 (B) 19 (C) 23 (D) 18
64. Simplify : $300^2 - 299^2 + 298^2 - 297^2 + 296^2 - 295^2 \dots 4^2 - 3^2 + 2^2 - 1^2$
 (A) 55150 (B) 45150 (C) 35150 (D) 65150
65. What will be the unit's digit in $3^{99} + 5^{99} + 9^{99}$?
 (A) 1 (B) 3 (C) 5 (D) 9
66. Given that $3^x \cdot 3^y \cdot 3^z = 19683$, the average of x , y and z will be :
 (A) 2 (B) 3 (C) 4 (D) 4.5
67. Given that $c = b^x = a^y$ and $d = a^y = b^z$, the value of $\frac{xy}{qz}$ is :
 (A) d (B) b (C) a (D) 1
68. Given that $n(A - B) = x + 41$, $n(B - A) = 4x - 1$, $n(A \cap B) = 2x + 3$ and $n(A) = n(B)$, then x is :
 (A) 12 (B) 14 (C) 16 (D) 18
69. $A' - B'$ is same as :
 (A) $(A - B)'$ (B) $A - B'$ (C) $A - B$ (D) $B - A$
70. R is a relation on $N \times N$ (set of natural numbers) such that $(a, b) R (c, d)$ iff $a + d = b + c$, where $a, b, c, d \in N$. R is _____ relation.
 (A) Anti-symmetric (B) Identity (C) Equivalence (D) Not equivalence
71. $A = \{1, 2\}$, $B = \{a, b\}$ and $R = \{(1, a), (1, b), (2, a), (2, b)\}$. If $R^{-1} = \{(a, 1), (b, 1), (a, 2), (b, 2)\}$ the $R^{-1} =$ _____
 (A) $A \times B$ (B) $B \times A$ (C) $A^{-1} \times B$ (D) $A \times B^{-1}$
72. $(R^{-1})^{-1} = R$ is :
 (A) True (B) False (C) Doubtful (D) None of these
73. A relation R on a set A is such that $R = R^{-1}$, then R is :
 (A) Symmetric (B) Reflexive (C) Transitive (D) None of these
74. If the root of $2(x + p) - 3 = 5$ is 2 more than the root of $4 - x = 2x - 5$, then p is equal to; taking x as the variable.
 (A) 0 (B) 1 (C) -1 (D) $\frac{1}{2}$
75. The sides of an equilateral triangle are $(3x + 2y)$ cm, $(5x + 6y)$ cm and $(x + y + 3)$ cm. Then the perimeter of the triangle is
 (A) 15 cm (B) 12 cm (C) 18 cm (D) 10.5 cm
76. The length of a square is increased by 25% and its breadth is decreased by 25%. The ratio of the area of the square to that of the resulting rectangle is :
 (A) 15 : 16 (B) 16 : 15 (C) 5 : 4 (D) 4 : 5

77. The length and breadth of a hall are 8 m 75 cm and 6 m 25 cm respectively. The largest possible size of the tiles which can be used to pave the floor is :
 (A) 25 cm × 20 cm (B) 75 cm × 25 cm (C) 50 cm × 25 cm (D) 25 cm × 25 cm
78. The perimeter of a rhombus is 52 cm. The shorter diagonal is 10 cm. The length of the other diagonal will be _____ cm.
 (A) 20 (B) 26 (C) 24 (D) 18
79. The legs of a right angled triangle are in the ratio 1 : 2 and its area is 64 cm². The hypotenuse of the triangle is _____ cm.
 (A) 8 (B) $8\sqrt{2}$ (C) $8\sqrt{3}$ (D) $8\sqrt{5}$
80. The ratio of radii of two cylinders is 1 : $\sqrt{3}$ and heights are in the ratio 2 : 3. The ratio of their volumes is :
 (A) 1 : 9 (B) 2 : 9 (C) 3 : 9 (D) 4 : 9
81. The smallest natural number which should multiply 388962 to make it a perfect square is :
 (A) 2 (B) 3 (C) 7 (D) 11
82. If $\sqrt{3364} = 58$, then $\sqrt{1.3456} =$
 (A) 1.42 (B) 1.46 (C) 1.24 (D) 1.16
83. The price of 3 books are in the ratio 3 : 5 : 7. The difference between the costliest and cheapest is Rs. 52. Then the cost of the modest book is Rs. _____
 (A) Rs. 65 (B) Rs. 70 (C) Rs. 75 (D) Rs. 80
84. If $\frac{a}{b} = \frac{b}{c}$, then we can say that
 (A) $\frac{a}{c} = \frac{a^2 - b^2}{b^2 - c^2}$ (B) $\frac{a}{c} = \frac{a^2 + b^2}{b^2 + c^2}$ (C) $\frac{a}{c} = \frac{a^2 + c^2}{a^2 + b^2}$ (D) $\frac{a^2}{c^2} = \frac{a+b}{b+c}$
85. If $\frac{a}{b} = \frac{c}{d}$, then we can say that $\frac{a^2 - c^2}{ab - cd} = \frac{ab - cd}{b^2 - d^2}$
 (A) True (B) False (C) Doubtful (D) None of these
86. $\sqrt[4]{\sqrt{a^8}} \cdot \sqrt[6]{\sqrt[3]{a^9}}$ is equal to :
 (A) a^2 (B) a (C) $a^{\frac{1}{4}}$ (D) $a^{\frac{1}{3}}$
87. Given that $2^{x+y} = 32$ and $3^{x-y} = 27$, find x, y.
 (A) 2, 3 (B) 3, 2 (C) 4, 1 (D) 3, 1
88. Evaluate : $\frac{3001^2}{6} - \frac{2999^2}{6}$
 (A) $333\frac{2}{3}$ (B) $333\frac{5}{6}$ (C) $333\frac{1}{6}$ (D) $333\frac{1}{3}$
89. Given that $x^{x^x} - (x^2)^x = 0$; then x equals :
 (A) 1 (B) 2 (C) $\frac{1}{2}$ (D) $-\frac{1}{2}$
90. If $x = \frac{1}{2}$ then the value of $(x^x)^x$ is :
 (A) $\sqrt[4]{2}$ (B) $\sqrt[3]{2}$ (C) $\frac{1}{\sqrt[4]{2}}$ (D) $\frac{1}{\sqrt[3]{2}}$



Answer Key

1. C	2. B	3. D	4. C	5. B	6. C	7. A	8. D	9. C	10. A
11. C	12. B	13. B	14. A	15. D	16. C	17. A	18. B	19. B	20. B
21. D	22. C	23. C	24. B	25. B	26. A	27. B	28. A	29. D	30. B
31. A	32. C	33. C	34. C	35. C	36. D	37. D	38. D	39. B	40. D
41. C	42. C	43. C	44. D	45. C	46. A	47. D	48. B	49. B	50. A
51. B	52. D	53. A	54. B	55. B	56. D	57. D	58. B	59. A	60. A
61. D	62. A	63. D	64. B	65. A	66. B	67. D	68. B	69. D	70. C
71. B	72. A	73. A	74. C	75. B	76. B	77. D	78. C	79. D	80. B
81. A	82. D	83. A	84. B	85. A	86. B	87. C	88. D	89. B	90. C

□□□

Sample Paper