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PHYSICS

51. Two quantities A and B are related by the relation A/B = m where m is linear mass density and A is force. The dimensions of B will be

(1) same as that of latent heat (2) same as that of pressure

(3) same as that of work (4) same as that of momentum

52. The dimensional formula of capacitance in terms of M, L, T and I is

(1) $[ML^2T^2I^2]$ (2) $[ML^{-2}T^4I^2]$ (3) $[M^{-1}L^3T^3I]$ (4) $[M^{-1}L^{-2}T^4I^2]$

53. If l, m and n are the direction cosines of a vector, then

(1) $l+m+n=1$ (2) $l^2+m^2+n^2=1$ (3) $\frac{1}{l}+\frac{1}{m}+\frac{1}{n}=1$ (4) $lmn=1$

54. The angle between i+j and j+k is

(1) 0° (2) 90° (3) 45° (4) 60°

55. A particle is moving eastwards with a velocity of 5 ms^{-1}. In 10 seconds the velocity changes to 5 ms^{-1} northwards. The average acceleration in this time is

(1) $\frac{1}{\sqrt{2}}$ ms^{-2} towards north-west (2) zero

(3) $\frac{1}{2}$ ms^{-2} towards north (4) $\frac{1}{\sqrt{2}}$ ms^{-2} towards north-east

56. The linear momentum of a particle varies with time t as $p=a+bt+ct^2$ which of the following is correct?

(1) Force varies with time in a quadratic manner.

(2) Force is time-dependent.

(3) The velocity of the particle is proportional to time.

(4) The displacement of the particle is proportional to t.

57. A shell of mass m moving with a velocity v suddenly explodes into two pieces. One part of mass m/4 remains stationary. The velocity of the other part is

(1) v (2) $2v$ (3) $3v/4$ (4) $4v/3$

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58. The velocity of a freely falling body after 2s is

(1) $9.8\ ms^{-1}$ (2) $10.2\ ms^{-1}$ (3) $18.6\ ms^{-1}$ (4) $19.6\ ms^{-1}$

59. A large number of bullets are fired in all directions with the same speed u. The maximum area on the ground on which these bullets will spread is

(1) $\frac{\pi u^2}{g^2}$ (2) $\frac{\pi u^4}{g^2}$ (3) $\frac{\pi u^2}{g^4}$ (4) $\frac{\pi u}{g^4}$

60. The minimum stopping distance for a car of mass m, moving with a speed v along a level road, if the coefficient of friction between the tyres and the road is μ, will be

(1) $\frac{v^2}{2\mu g}$ (2) $\frac{v^2}{\mu g}$ (3) $\frac{v^2}{4\mu g}$ (4) $\frac{v}{2\mu g}$

61. When a bicycle is in motion, the force of friction excreted by the ground on the two wheels is such that it acts

(1) In the backward direction on the front wheel and in the forward direction on the rear wheel

(2) In the forward direction on the front wheel and in the backward direction on the rear wheel

(3) In the backward direction on both the front and the rear wheels

(4) In the forward direction on both the front and the rear wheels

62. In a perfectly inelastic collision, the two bodies

(1) strike and explode (2) explode without striking

(3) implode and explode (4) combine and move together

63. Under the action of a constant force, a particle is experiencing a constant acceleration, then the power is

(1) zero (2) positive

(3) negative (4) increasing uniformly with time

64. Consider the following two statements:

A : Linear momentum of a system of particles is zero.

B : Kinetic energy of a system of particles is zero.

Then

(1) A implies B & B implies A (2) A does not imply B & B does not imply A

(3) A implies B but B does not imply A (4) A does not imply B but B implies A

65. An engine develops 10 kW of power. How much time will it take to lift a mass of 200 kg to a height of 40 m? (Given $g = 10\ ms^{-2}$)

(1) 4s (2) 5s (3) 8s (4) 10s

66. If a spring has time period T, and is cut into n equal parts, then the time period will be

(1) $T\sqrt{n}$ (2) $\frac{T}{\sqrt{n}}$ (3) nT (4) T

67. When temperature increases, the frequency of a tuning fork

(1) increases

(2) decreases

(3) remains same

(4) increases or decreases depending on the materials

68. If a simple harmonic motion is represented by $\frac{d^2x}{dy^2} + \alpha x = 0$, its time period is

(1) $2\pi\sqrt{\alpha}$ (2) $2\pi\alpha$ (3) $\frac{2\pi}{\sqrt{\alpha}}$ (4) $\frac{2\pi}{\alpha}$

69. A cinema hall has volume of 7500 m^3. It is required to have reverberation time of 1.5 seconds. The total absorption in the hall should be

(1) 850 w-m^2 (2) 82.50 w-m^2 (3) 8.250 w-m^2 (4) 0.825 w-m^2

70. To absorb the sound in a hall which of the following are used
(1) Glasses, stores (2) Carpets, curtains
(3) Polished surfaces (4) Platforms

71. If N represents avagadro's number, then the number of molecules in 6 gm of hydrogen at NTP is
(1) 2N (2) 3N (3) N (4) N/6

72. The mean translational kinetic energy of a perfect gas molecule at the temperature T K is
(1) $\frac{1}{2}kT$ (2) kT (3) $\frac{3}{2}kT$ (4) $2kT$

73. The amount of heat given to a body which raises its temperature by 1°C
(1) water equivalent (2) thermal heat capacity
(3) specific heat (4) temperature gradient

74. During an adiabatic process, the pressure of a gas is found to be proportional to the cube of its absolute temperature. The ratio *Cp/Cv* for gas is
(1) $\frac{3}{2}$ (2) $\frac{4}{3}$ (3) 2 (4) $\frac{5}{3}$

75. Cladding in the optical fiber is mainly used to
(1) to protect the fiber from mechanical stresses
(2) to protect the fiber from corrosion
(3) to protect the fiber from mechanical strength
(4) to protect the fiber from electromagnetic guidance

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CHEMISTRY

76. The valency electronic configuration of Phosphorous atom (At.No. 15) is
    (1) $3s^2 3p^3$ (2) $3s^1 3p^3 3d^1$ (3) $3s^2 3p^2 3d^1$ (4) $3s^1 3p^2 3d^2$

77. An element 'A' of At.No.12 combines with an element 'B' of At.No.17. The compound formed is
    (1) covalent AB (2) ionic AB_2 (3) covalent AB_2 (4) ionic AB

78. The number of neutrons present in the atom of $_{56}Ba^{137}$ is
    (1) 56 (2) 137 (3) 193 (4) 81

79. Hydrogen bonding in water molecule is responsible for
    (1) decrease in its freezing point (2) increase in its degree of ionization
    (3) increase in its boiling point (4) decrease in its boiling point

80. In the HCl molecule, the bonding between hydrogen and chlorine is
    (1) purely covalent (2) purely ionic (3) polar covalent (4) complex coordinate

81. Potassium metal and potassium ions
    (1) both react with water (2) have the same number of protons
    (3) both react with chlorine gas (4) have the same electronic configuration

82. 5.85 gms of sodium chloride were dissolved in water and the solution made upto 100 ml in a standard flask. 10 ml of this solution were pipetted out into another flask and made up with distilled water into 100 ml of solution. The concentration of the sodium chloride solution now is
    (1) 0.1 M (2) 1.0 M (3) 0.5 M (4) 0.25 M

83. Concentration of a 1.0 M solution of phosphoric acid in water is
    (1) 0.33 N (2) 1.0 N (3) 2.0 N (4) 3.0 N

84. Which of the following is a Lewis acid?
    (1) Ammonia (2) Berylium chloride
    (3) Boron trifluoride (4) Magnesium oxide

85. Which of the following constitutes the components of a buffer solution?
(1) Potassium chloride and potassium hydroxide
(2) Sodium acetate and acetic acid
(3) Magnesium sulphate and sulphuric acid
(4) Calcium chloride and calcium acetate

86. Which of the following is an electrolyte?
(1) Acetic acid (2) Glucose (3) Urea (4) Pyridine

87. Calculate the Standard emf of the cell, $Cd/Cd^{+2}//Cu^{+2}/Cu$ given that E^0 Cd/Cd^{+2} = 0.44V and E^0 Cu/Cu^{+2} = (–) 0.34 V.
(1) (–) 1.0 V (2) 1.0 V (3) (–) 0.78 V (4) 0.78 V

88. A solution of nickel chloride was electrolysed using Platinum electrodes. After electrolysis,
(1) nickel will be deposited on the anode (2) Cl_2 gas will be liberated at the cathode
(3) H_2 gas will be liberated at the anode (4) nickel will be deposited on the cathode

89. Which of the following metals will undergo oxidation fastest?
(1) Cu (2) Li (3) Zinc (4) Iron

90. Which of the following cannot be used for the sterilization of drinking water?
(1) Ozone (2) Calcium Oxychloride
(3) Potassium Chloride (4) Chlorine water

91. A water sample showed it to contain 1.20 mg/litre of magnesium sulphate. Then, its hardness in terms of calcium carbonate equivalent is
(1) 1.0 ppm (2) 1.20 ppm (3) 0.60 ppm (4) 2.40 ppm

92. Soda used in the L-S process for softening of water is, Chemically.
(1) sodium bicarbonate (2) sodium carbonate decahydrate
(3) sodium carbonate (4) sodium hydroxide (40%)

93. The process of cementation with zinc powder is known as
(1) sherardizing (2) zincing (3) metal cladding (4) electroplating

94. Carrosion of a metal is fastest in
   (1) rain-water (2) acidulated water (3) distilled water (4) de-ionised water

95. Which of the following is a thermoset polymer?
   (1) Polystyrene (2) PVC
   (3) Polythene (4) Urea-formaldehyde resin

96. Chemically, neoprene is
   (1) polyvinyl benzene (2) polyacetylene
   (3) polychloroprene (4) poly-1,3-butadiene

97. Vulcanization involves heating of raw rubber with
   (1) selenium element (2) elemental sulphur
   (3) a mixture of Se and elemental sulphur (4) a mixture of selenium and sulphur dioxide

98. Petrol largely contains
   (1) a mixture of unsaturated hydrocarbons C_5 - C_8
   (2) a mixture of benzene, toluene and xylene
   (3) a mixture of saturated hydrocarbons C_{12} - C_{14}
   (4) a mixture of saturated hydrocarbons C_6 - C_8

99. Which of the following gases is largely responsible for acid-rain?
   (1) SO_2 & NO_2 (2) CO_2 & water vapour
   (3) CO_2 & N_2 (4) N_2 & CO_2

100. BOD stands for
   (1) Biogenetic Oxygen Demand (2) Biometric Oxygen Demand
   (3) Biological Oxygen Demand (4) Biospecific Oxygen Demand

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MINING ENGINEERING

101. The core (dia in mm) size obtained with NX size

(1) 21 (2) 28

(3) 40 (4) 54

102. Bore hole deviation is _____ degrees for 30 m.

(1) 1 (2) 2

(3) 3 (4) 4

103. The following safety device is provided in sinking shaft in case of overwind

(1) spider (2) kibble

(3) detaching hook (4) rider

104. The method of sinking adopted in unstable or friable strata with heavy inrush of water encountered is

(1) German tubing (2) forced drop

(3) cementation method (4) freezing method

105. The Velocity of detonation of premix cartridge is

(1) 5000 m/s (2) 7000 m/s

(3) 3500 m/s (4) 3200 m/s

106. The constituents in slurry explosive (TNT : AN: Water)

(1) 20:15:65 (2) 20:65:15

(3) 15:20:65 (4) 65:15:20

107. Relieving hole should be drilled at least ___ m away from the misfired hole in the under ground.

(1) 1 (2) 0.5

(3) 0.3 (4) 0.2

108. The pattern of cut mostly preferred for laminated strata is
(1) Ring drilling (2) fan cut (3) pyramid cut (4) burn cut

109. To get lumpy coal or to minimize the coal dust the blasting technique adopted is
(1) cushion blasting (2) muffled blasting
(3) coyote blasting (4) pop shooting

110. In roof stitching the face should not be advanced more than ____ m from the last tensioned rope
(1) 4 m (2) 3 m (3) 2.4 m (4) 2 m

111. In sand stowing incorrect profile will leads to
(1) cavitations (2) wear on pipes
(3) setup pulsation (4) jamming

112. Ring rose detector works on the principle of
(1) Formation of gas cap (2) Wheatstone bridge
(3) Diffusion-combustion-contraction (4) Optical properties

113. The elements in the delay element of short delay detonator
(1) Antimony and potassium permanganate
(2) Red lead and silicon
(3) silicon and Antimony
(4) PETN and ASA

114. Cone sheets are
(1) Sills (2) Dykes
(3) folds (4) faults