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) $4v/3$

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

Set Code : T2
Booklet Code : A

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

Set Code : T2
Booklet Code : A

MECHANICAL ENGINEERING

101. A mortise gauge is a
(1) planning tool (2) striking tool
(3) marking tool (4) boring tool

102. A saw which cuts wood during the return stroke of the saw is known as
(1) push saw (2) pull saw (3) rip saw (4) hand saw

103. In a shaper, tool head consist of
(1) clapper box (2) work holding device
(3) collet (4) four sided tool post

104. The swing diameter over the bed is _____ the height of the centre measured from the bed of the lathe.
(1) equal to (2) one and half times
(3) twice (4) thrice

105. The rake angle required to machine brass by HSS tool is
(1) 0° (2) 10° (3) 20° (4) –10°

106. The binding material used in cemented carbide tool is
(1) tungsten (2) chromium (3) silicon (4) cobalt

07. The relation between tool life(T) and cutting speed (V) is VT^n = constant. In this relation, the value of n depends upon
(1) work material (2) working conditions
(3) tool material (4) type of chip produced

108. The usual value of the point angle of a drill is

(1) 60° (2) 80° (3) 112° (4) 118°

109. Drilling is an example of

(1) Orthogonal cutting (2) Oblique cutting
(3) Simple cutting (4) Uniform cutting

110. The top and sides of the table of a shaper usually have

(1) I-type slots (2) L-type slots (3) T-type slots (4) H-type slots

111. In lapping operation, the amount of thickness of metal removed is

(1) 0.005 to 0.01 mm (2) 0.01 to 0.1 mm
(3) 0.05 to 0.1 mm (4) 0.5 to 1 mm

112. The process of removing metal by a cutter which is rotated in the same direction of travel of work piece is called

(1) up milling (2) down milling (3) face milling (4) end milling

113. CNC drilling machine is considered to be

(1) P.T.P controlled machine (2) Continuous path controlled machine
(3) Servo controlled machine (4) Adaptive controlled machine

114. Seam welding is best adopted for metal thickness ranging from

(1) 0.025 to 3 mm (2) 3 to 5 mm (3) 5 to 8 mm (4) 8 to 10 mm

115. In welding, flux is used to

(1) improve melting point of metal (2) obtain high temperature
(3) mix the metal at joint (4) protect molten metal from atmosphere